DEPARTMENT OF COMPUTER SCIENCE
S.V.U. COLLEGE OF COMMERCE MANAGEMENT AND COMPUTER SCIENCE
SRI VENKATESWARA UNIVERSITY: TIRUPATI

RESTRUCTURED CURRICULUM FOR M.Sc (CS)
TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMIC
YEAR 2021 - 2022
Amended as per NEP-2020

SRI VENKATESWARA UNIVERSITY: : TIRUPATI
DEPARTMENT OF COMPUTER SCIENCES
M.Sc(CS) Programme (CBCS) Regulations-2016
Amended as per NEP-2020
(with effect from the batch admitted in the academic year 2021-22)
CHOICE BASED CREDIT SYSTEM (CBCS)

1. Preamble:

M.Sc (CS) Programme is of two academic years with each academic year being divided into two consecutive (one odd + one even) semesters.

Choice-Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures / tutorials / laboratory work / field work / project work /viva / seminars / assignments / presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

i.	choose electives from a wide range of courses offered by the Departments of the College/University.
ii.	opt for additional courses of interest
iii.	adopt an inter-disciplinary approach in learning
iv.	make the best use of expertise of the available faculty
v.	Skill Oriented Course and Multidisciplinary Course/Project are introduced as per Action Plan of National Education Policy-NEP-2020

2. **MINIMUM QUALIFICATION:**

   Minimum qualification for seeking admission into M.Sc(CS) Programme is any U.G.Degree with computer science as one of the major subject, with at least 40% marks for general and pass marks for SC/ST in aggregate.

3. **Branch of Study:: M.Sc(CS)** Programme

4. **Programme Duration:**
   4.1 Minimum duration of the full-time M.Sc(CS) Programme is two consecutive academic years i.e. four semesters and maximum period is four academic years.

   4.2 **Semester:**
   Generally, each semester shall consist of 90 actual instruction days including sessional test days. However, instructional days may be reduced up to 72, when necessary, with increased instructional hours per course per week.

5. **Credits:**
   Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of instruction hours per week. The norms for assigning credits to a course for a duration of one semester shall be as follows:
   i   One credit for every one hour of lecture/tutorial per week
   ii One credit for every two hours of practical work/seminar per week
   iii 4 credits in a semester for project work.

6. **Classification of Courses:**

The courses of each specialization of study are classified into Core Courses, Elective Courses and Foundation courses. It is mandatory for a student to complete successfully all the **Core and Elective courses** pertaining to his/her of specialization of study.

Category	Course Code	Title of the Paper/Course	Core / Elective or Minor Or Soft Skill Courses	Teaching hours/week			University Exam Duration [Hrs]	Marks			Credits
				L	T	P		IE / IA	EE / EA	Total Marks	
DSCC1	MSCS - 101C	Computer Organization	Core	3	1	0	3	20	80	100	4
DSCC2	MSCS - 102C	Programming in Java & Data Structures	Core	3	1	0	3	20	80	100	4
DSCC3	MSCS - 103C	Operating Systems	Core	3	1	0	3	20	80	100	4
DSEC1	MSCS - 104GE	1.Mathematical Foundations for Computer Science 2.Computer Oriented Operational Research	Generic Elective	3	1	0	3	20	80	100	4
AECC1	MSCS - 105CF	Environmental Studies	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC1	MSCS - 106EF	1.PC Hardware Basics 2.Statistical Methods	Elective Foundation	2	0	0	1.5	-	50	50	2
	MSCS - 107P1		Practical I On Core	0	0	4	3	20	80	100	4
	MSCS - 108P2		Practical II On Core & Generic Elective	0	0	4	3	20	80	100	4
								120	580	700	28

<div align="center">SEMISTER-I</div>

Category	Course Code	Title of the Paper/Course	Core / Elective or Minor or Soft Skill Courses	Teaching hours/week			University Exam Duration [Hrs]	Marks			Credits
				L	T	P		IE / IA	EE / EA	Total Marks	
DSCC4	MSCS - 201C	Advanced Data Base Management System	Core	3	1	0	3	20	80	100	4
DSCC5	MSCS - 202C	Computer Networks	Core	3	1	0	3	20	80	100	4
DSCC6	MSCS - 203C	Computer Graphics	Core	3	1	0	3	20	80	100	4
DSEC2	MSCS - 204GE	1.E- Commerce 2.Accounting and Financial Management	Generic Elective	3	1	0	3	20	80	100	4
AECC2	MSCS - 205CF	Human Rights and Value Education	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC2	MSCS - 206EF	1.Principles of Management 2.Internet of Things	Elective Foundation	2	0	0	1.5	-	50	50	2
	MSCS - 207P1		Practical I on Core	0	0	4	3	20	80	100	4
	MSCS - 208P2		Practical II on Generic Elective	0	0	4	3	20	80	100	4
								120	580	700	28

SEMESTER-II

4

Category	Course Code	Title of the Paper/Course	Core / Elective or Minor or Soft Skill Courses	Teaching hours/week			University Exam Duration [Hrs]	Marks			Credits
								IE / IA	EE / EA	Total Marks	
SEMESTER-III											
				L	T	P					
DSCC7	MSCS - 301C	Data Warehousing and Data Mining	Core	3	1	0	3	20	80	100	4
DSCC8	MSCS - 302C	Web Technologies	Core	3	1	0	3	20	80	100	4
DSCC9	MSCS - 303C	Software Engineering	Core	3	1	0	3	20	80	100	4
DSEC3	MSCS - 304-GE-A	1.Systems Programming 2.Computer Algorithms 3.UID Using .Net Technologies 4.IT in Forensic Science 5.Software Testing	Generic Elective-A	3	1	0	3	20	80	100	4
DSEC4	MSCS - 305 GE-B	1.Cloud Computing 2.Big Data Analytics 3.Artificial Neural Networks 4.Cyber Security 5.Mobile App Development	Generic Elective –B	3	1	0	3	20	80	100	4
AECC3	MSCS - 306CF	Soft Skills & Personality Development	Compulsory Foundation	2	0	0	1.5	-	50	50	2
SEC3	MSCS - 307EF	1. Multimedia	Elective Foundation	2	0	0	1.5	-	50	50	2
		2.Data Science Essentials									
	MSCS - 308P1		Practical I on Core	0	0	4	3	20	80	100	4
	MSCS - 309P2		Minor Project work	0	0	8	3	20	80	100	4
			Outreach Activity/Seminar	0	0	0	--	0	0	0	0
								140	660	800	30

					SEMESTER-IV						
Category	Course Code	Title of the Paper/Course	Core / Elective or Minor Or Soft Skill Courses	Teaching hours/week			University Exam Duration [Hrs]	Marks			Credits
				L	T	P		IE / IA	EE / EA	Total Marks	
DSEC5	MSCS - 401MP	Major Project Work	Core	0	0	24	3	100	200	300	12
	All Semesters			Total						2500	100

The following are the open elective courses offered by the Department of Computer Science to other departments
1. Programming in C
2. Office Automation
3. Open-Source Tools

6.1 **Core Course:-**
There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

6.2 **Elective Course:-**
Elective course is a course which can be chosen from a pool of papers. It may be:
* Supportive to the discipline of study
* Provide a expanded scope
* Enable an exposure to some other discipline/domain
*Nurture students's proficiency/skill

6.2.1. An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students. These electives shall be "Discipline centric". Three or Four papers may be offered, of which Two may be choosen.

6.2.2 Skill Oriented Course and Multidisciplinary Course/Project are introduced as per Action Plan of National Education Policy-NEP-2020.

6.2.3 An elective may be "Open Elective" and shall be offered for other Discipline only. Atleast one paper must be chosen for study as mandatory. More than one paper may be studies through self study.

6.3 **Foundation Courses:**
The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation, "Compulsory Foundation" courses are the courses based upon the content that leads to knowledge enchancement. They are mandatory for all discipline. Elective Foundation courses are value-based and are aimed at man-making education.

6.4 Audit Course (100 Marks Inernal – Zero Credits)
The main aim of Audit Course is to aware the Contemporary Societal issues. This course is under self study.

6.5 **MOOCS and e-Learning:**
Discipline centric elective course through MOOCS (Massive Open Online Course) platform. Students of I, II and/or III semesters can register for the course offered by authorized Institutions/Agencies through online with the approval of the DDC concerned. The certificate issued by the Institutions/Agencies after successful completion of the course will be considered for the award of the Grade to that course in open electives only. Further, 30-40% of the syllabus of any one course in I, II and III semesters may be taught through e-Learning.

7 **Course Registration:**
Every student has to register for the set of Courses offered by the Department in that Semester including those of Open Elective course of the other Departments and MOOCS courses with the total number of their Credits being limited by considering the permissible weekly contact hours (typically: 36/Week).

8 **Credits Required for Award of Degree:**
A student shall become eligible for the award of M.Sc(CS), if he/she earns a **minimum of 96** credits by passing all the core and electives along with practicals, seminars, comprehensive viva-voce prescribed for the programme.

8.1   It is mandatory for a student to complete successfully all the core courses pertaining to his/her specialization of study.

8.2   A student may choose Generic Electives from the list of elective courses offered from his/her specialization of study.

8.3   Further, a student may select from a list of Elective courses from other Departments as Open Electives to "suit the required" number of credits, such that the total credits is atleast 96.

8.4   There should be a register maintained by the Head of the Department indicating for each student, the course (s) registered by the student within the department, so that "Generic Electives" opted by the student are indicated.

8.5   In the case of Open Elective, the Head of the Department should prepare a statement /register indicating the courses choosen/ opted by the students of the department in other departments.

8.6   The Head of the Department should send the list of registered papers (opted by the student) to the Principal with a copy to the controller of examinations immediately with in a week commencement of each semester.

8.7   A copy of the courses registered by the students in each semester approved by the Principal shall be sent to the Academic Branch as well as Examination Branch.

8.8   The list of students registered for Mooc's shall be furnished giving details of the programme with a copy to the Principal and Controller of Examinations.

8.9   A model of Registers to be maintained by the Head of the Department is given in the Annexure. It is mandatory on the part of the Head of the Department to maintain Register for each Course separately.

9. **Scheme of Instruction :**
The Board of Studies (BOS) of each specialization shall formulate the scheme of instruction and detailed syllabi. For every course learning objectives and learning outcomes should be defined. While formulating the scheme of instruction, the BOS shall facilitate to offer the minimum number of credits for the entire Programme. The syllabi of theory courses shall be organized into four/five units of equal weight. The question paper for the semester end University Examination in theory course shall consist of four / five units, two questions from each unit of syllabus carrying a total of 60 marks. There shall be short answer questions for a total of 20 marks.
Part A contains of 20 marks with two short question from each unit out of which the student has to answer five questions with each question carrying 4 marks with a total of 20 marks.
Examination in theory shall consists of five units in each paper, two questions from each unit of syllabus out of which a student shall answer one question carrying 12 marks for each question with a total of 60 marks.

10. EVALUATION:
10.1 Evaluation shall be done on a continuous basis i.e. through Continuous Internal Evaluation (CIE) in the Semester and Semester End Examination (SEE). For each theory course, there shall be two internal tests of two hours duration carrying 20 marks each and one Semester end Examination of 3 hours duration carrying 80 marks. Internal marks for a maximum of 20 shall be awarded based on the average performance of the two internal tests.

10.2 The first internal test shall be held immediately after the completion of 50% of the instruction days covering 50%

of the syllabus. The second internal test shall be held immediately after the completion of 90 instruction days covering the remaining the 50% of the syllabus.

10.3 It is mandatory for a student to attend both the internal tests in each theory course. The weighted average of the marks secured in two tests is awarded as sessional marks. However, 0.8 shall be assigned as weight for the best performance of the two tests whereas for the other test it shall be 0.2. If a student is absent for any of the internal test for whatsoever reason, the marks for that test shall be zero.

10.4 The students shall be permitted to verify the valuation of answer scripts of sessional tests and signature same the verification.

10.5 The valuation and verification of answer scripts of Sessional Tests shall be completed within a week after the conduct of the internal Tests. The answer scripts shall be maintained in the department until the semester end results are announced.

10.6 The valuation of End-Semester Examination answer scripts shall be arranged by the Controller of Examinations as per the University procedures in vogue.

10.7 : Evaluation of Practicals:

For each practical course, the sessional marks for a maximum of 100 shall be awarded by the teacher based on continuous assessment of practical work. The Semester end University practical Examinations carrying 100 marks shall be conducted by i) Internal examiners and ii) external examiner permitted by the Board of Studies of the Department a panel submitted to the Controller of examiners.

11 : PROJECT WORK:

11.1 The work shall be carried out in the concerned department of the student or in any recognized Educational Institutions of Higher learning/Universities/Industry/Organization as approved by the DDC. The student shall submit the outcome of the project work in the form of a report.

11.2 The Project work shall be evaluated at the end of the IV semester with 300 marks in which 100 marks are Internal and 200 marks are External evaluation of the project work.

12. **Grading and Grade Points:**

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is the ratio of total credit points secured by a student in the courses registered in a semester and a total course credits taken during that semester. It shall be given up to two decimal places.

$$\textbf{SGPA} \ (S_i) = \Sigma(C_i \times G_i) / \Sigma C_i$$

where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith course.

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in the courses in all semesters and the sum of the total credits of all courses in all the semesters. It is given up to two decimal places.

$$\textbf{CGPA} = \Sigma(C_i \times S_i) / \Sigma \ C_i$$

Where S_i is the SGPA of the ith semester and C_i is the total number of credits in that semester.
The SGPA and CGPA shall be rounded off to two decimal points and reported in the transcripts.

Letter Grades and Grade Points:
A 10-point grading system with the following letter grades is to be followed.

Grades and Grade Points

Marks	Grade Point	Letter Grade
75-100	7.5-10	O (Outstanding)
65-74	6.5-7.4	A+ (First)
60-64	6.0-6.4	A (First
55-59	5.5-5.9	B+ (Second)
50-54	5.0-5.4	B (Second)
40-49	4.0-4.9	C(Third)
00-39	0.0-3.9	F (Fail)

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

12.1 In each Semester, every student who satisfies the attendance requirements should register for examination, failing which he/she shall not be promoted to the next semester. Any such student who has not registered for examination in a semester shall repeat that semester in the next academic year after obtaining the proceedings of the Principal.

12.2 To pass a course in M.Sc(CS) Programme, a student has to secure the minimum grade of (P) in the PG Semester end Examination. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination as supplementary candidate.

12.3 A student is eligible to improve the marks in a paper in which he has already passed, within 4 years from the year of admission as and when it is conducted for the subsequent batches. This provision shall not be provided once the candidate is awarded Degree.

12.4 A student who has failed in a course can reappear for the Semester end Examination as and when it is held in the normal course. The Sessional Marks obtained by the student will be carried over for declaring the result.

12.5 Whenever the syllabus is revised for a course, the semester Examination shall be held in old syllabus three times. Thereafter, the students who failed in that course shall take the semester end Examination in the revised syllabus.

13. Award of Degree :

A student who has earned a minimum of 96 credits by passing in all the core courses and the minimum number of electives prescribed shall be declared to have passed the course work and shall be eligible for the award of degree.

13.1 A student who has earned extra credit shall be issued an separate certificate to that effect, mentioning the subject and grade.

14. Ranking and Award of Prizes / Medals:

14.1 Ranks shall be awarded in each branch of study on the basis of Cumulative Grade Point Average (CGPA) for top ten percent of the students or top three students whichever is higher.

14.2 The students who have become eligible for the award of PG degree by passing regularly without break, shall only be considered for the award of ranks.

14.3 Award of prizes, scholarships and other honours shall be according to the rank secured by the student as said above and in conformity with the desire of the Donor.

15. Attendance Requirements:

15.1 A student is required to complete the Programme of Study satisfying the attendance requirements in all the semesters within twice the prescribed period of study four academic years from the year of admission, failing which he/she forfeits his/her seat.

15.2 A student shall repeat the semester if he/she fails to satisfy the attendance requirements given below:

i A student shall attend at least 60 percent of the maximum hours of instruction taken by the teacher for each course.

ii A student shall attend at least 75 percent of the maximum hours of instruction taken for all the courses put together in that semester.

15.3 The Principal shall condone the shortage of attendance of a student provided, the student satisfies the clause 15.2 and obtain atleast 60% of overall attendance in a semester on **medical grounds only.**

15.4 A student who fails to satisfy the attendance requirements specified in clause 15.2 shall **repeat that semester** in the subsequent academic years with the written permission of the Principal.

15.5 A student shall not be permitted to study any semester more than two times during the Programme of his/her study.

15.6 A student who satisfies the attendance requirements specified in clause 15.2 in any semester may be permitted to repeat that semester after canceling the previous attendance and sessional marks of that semester with the written permission of the Principal. However, this facility shall be extended to any student not exceeding twice during the entire Programme of study provided the stipulation in clause 15.1 is met.

16. **Conditions of Promotion:**

A student shall be eligible for promotion to the next semester provided, if he/she satisfies the attendance requirements in the immediately preceding semester as specified in clause 15. The Principal of the concerned college will furnish the promotion list to the HOD at the beginning of II,III & IV Semester.

17. Transitory Regulations:

17.1 A student who has been repeated in the previous regulations for not satisfying the attendance requirements shall be permitted to join in these regulations provided the clauses 15.1 and 15.4 hold good.

17.2 Semester end University Examinations under the regulations that immediately precede these regulations, shall be conducted two times after   the conduct of last regular examination under those regulations.

17.3 The students who satisfy the attendance requirements under the regulations that immediately precede these regulations, but do not pass the courses shall appear for the Semester end University Examinations in equivalent courses under these regulations as specified by the BOS concerned.

SYLLABUS

Department of Computer Science
Master of Computer Science (M.Sc. (CS))

VISION

To be the source of bringing out globally competent pioneering computing professionals, researchers, innovators and entrepreneurs and thereby succeed and contribute value to the knowledge-based economy and society.

MISSION

- To offer high-grade, value-based Post-graduate and Doctoral programmes in the field ofComputer Applications.
- To provide conducive environment so as to achieve excellence in teaching-learning, andresearch and development activities.
- To bridge the gap between industry and academia by framing curricula and syllabi based onindustrial and societal needs.
- To offer tasks for experiential technology-intensive knowledge through collaborative and interdisciplinary activities.
- To provide appropriate forums to develop innovative talents, practice ethical values andinculcate as enduring learners.
- To facilitate students to nurture skills to practice their professions competently to meet theever-changing needs of society
- Achieve academic excellence in Computer Applications through innovative teaching andlearning processes.
- To prepare the students to be professionally competent to face the challenges in theindustry.
- Promote inter-disciplinary research among the faculty and the students to create state of artresearch facilities.
- To promote quality and ethics among the students.
- Motivate the students to acquire entrepreneurial skills to become global leaders

Program Educational Objectives (PEOs)

The graduate will

PEO1

- Domain Expertise: apply and continuously acquire knowledge, both theoretical and applied, related to core areas of computer science;

PEO2
- Computing Skills and Ethics: Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment;

PEO3
- Lifelong Learning and Research: work productively as computer professionals demonstrating effective use of oral and written communication, working competently as a member of a team unit, adhering to ethical standards in the profession.

Program Outcomes (POs)

PO1
- Domain Expertise: communicate computer science concepts, designs, and solutions effectively and professionally;

PO2
- Computing Skills and Ethics: apply knowledge of computing to produce effective designs and solutions for specific problems;

PO3
- Lifelong Learning and Research: identify, analyse, and synthesize scholarly literature relating to the field of computer science

PO4
- Modern Tool Usage: use software development tools, software systems, and modern computing platforms.

PO5
- Social Contribution: an understanding of professional, ethical, legal, security and social issues and responsibilities

PO6
- Ethics: capable of evaluating personal and professional choices in terms of codes of ethics and ethical theories and understanding the impact of their decisions on themselves, their professions, and on society

PO7
- Life Long Learning: apply design and development principles in the construction of software systems of varying complexity.

Program Specific Outcomes (PSOs)

PSO1
- Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

PSO2
- Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open source platforms.

PSO3
- Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems

MSCS 101C: COMPUTER ORGANIZATION

Department	Computer Science	**Course Type**	DSCC
Course Title	Computer Organization	**Course Code**	MSCS 101C
L–T–P	3-1-0	**Credits**	4
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	80	**CIE Marks**	20

Course Objectives:

CO1: Conceptualize the basics of organizational and architectural issues of a digital computer andclassify and compute the performance of machines, Machine Instructions.

CO2: Understand concepts of register transfer logic and arithmetic operations.CO3: Explain different types of addressing modes and memory organization. CO4: Learn the different types of serial communication techniques.

CO5: Summarize the Instruction execution stages.

Course Learning Outcomes:

CLO1: Understand the theory and architecture of central processing unit.

CLO2: Analyze some of the design issues in terms of speed, technology, cost, performance.CLO3. Design a simple CPU with applying the theory concepts.

CLO4. Use appropriate tools to design verify and test the CPU architecture.

CLO5. Learn the concepts of parallel processing, pipelining and interprocessor communication.CLO6. Understand the architecture and functionality of central processing unit.

CLO7. Exemplify in a better way the I/O and memory organization.

UNIT I:

Logic Circuits: Logic functions – synthesis of logic functions – Minimizations of logic - Synthesiswith NAND and NOR gates Implementation of Logic gates - Flip-flops – Registers and shift registers – counters – decoders – Multiplexers – PLDs – sequential circuits. Basic Structure of Computers: Functional Units - Basic operational concepts – Bus structures – performance – Multi processors andMulti computers: Functional Units – Basic operational concepts – Bus structures – performance – Multiprocessors and Multi computers – Historical Perspective.

UNIT II:

Machine Instructions and programs: Numbers, Arithmetic operations and characters – Memory locations and address, operations – instructions and instruction, sequencing – addressing modes.

UNIT III:

Input / Output organization: accessing I/O Devices – Interrupts – direct memory access – buses 240- interface circuits – Standard I/O Interfaces.

UNIT IV:

Memory System, Concepts – semiconductor RAM memories - Read only memories – cache memories – performance considerations – virtual memories management requirements – secondary storage Arithmetic: Addition and subtraction of sign members – design of fast adders – multiplication of positive members – signed operand multiplication – fast multiplication – integer division – floating point numbers and operations.

UNIT V:

Basic Processing Unit: Concepts – execution of a complete instruction – Multiple – Bus organization – hardware control – micro programmed control. Pipelining: Concepts – Data hazards – instructionhazards – influence on Instruction sets - data path and control constructions – supers cal operation- ultra SPARC II – Performance considerations.

Text Books:

1. Hamacher C, Vranesic Z, and Zaky S. Computer Organization, 5th edition, Mc Graw – Hill,2002

Reference Books:

1. Stallings W, Computer Organization and Architecture, 6th edition. Parson Education, 2003.
2. Mano M.M. Computer System Architecture, 3rd edition. PHI, 1993.
3. Yarbrough JM, Digital Logic – Applications and Design, Thomas Lernig, 1997.
4. Heuring VP, and Jordan HF, Computer Systems Design and Architecture, Pearson Education,1997.

MSCS 102C: PROGRAMMING IN JAVA AND DATA STRUCTURES

Department	Computer Science	Course Type	DSCC
Course Title	Programming In Java and Data Structures	Course Code	MSCS 102C
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:

CO1: Use an integrated development environment to write, compile, run and test simple object-oriented Java programs

CO2: Identify classes, objects, members of a class and relationships among themCO3: Use arrays and class array

CO4: Create and access packages

CO5: Describe features of classes and interfaces in Java

CO6: Demonstrate the concepts of polymorphism and inheritance

Course Learning Outcomes:

CLO1: ability to choose appropriate data structures such as stack, queues, linked list, trees andgraphs to represent items in real world

CLO2: ability to analyze the time and space complexities of algorithms, and implement varioussearching and sorting techniques

CLO3: Implement linear and non-linear data structures

CLO4: Ability to design programs using a variety of data structures such as stacks, queues, hashtables, binary trees, search trees, heaps, graphs, and B-trees to solve specific problems

CLO5: Evaluate algorithms and data structures in terms of time and space complexity of basicoperations.

UNIT – I:

Object Oriented Programming Fundamentals & Java: Java Features, Object Oriented Programming Concepts – Abstraction, Encapsulation, Inheritance, and Polymorphism. Java Fundamentals: Data Types, variables, arrays, Inheritance to classes: class fundamentals, Objects, References, Constructors, Overloading of methods, Access control, Nested and Inner classes. Inheritance: Inheritance basics, Using super, multilevel hierarchy, method overriding, dynamic method dispatch,abstract classes, final with inheritance.

UNIT-II:

Packages, Exceptions and Threads: Packages and Interfaces: Packages, Access protection, Importing packages, interfaces, Exception Handling: fundamentals, exception types, uncaught exceptions,using try, nested try statements, throw, throws, Java built-in exceptions, user defined exceptions. Multithreading: Thread model, main thread, creating a thread, multiple threads, thread priorities, synchronization, Inter thread communication, String handling.

UNIT-III:

GUI Programming Features: Applets: Applet basics, Applet architecture, an applet skeleton, Applet display method, Repainting, Using Status window, HTML APPLET tag, passing parameters to applet, Audio Clip interface. Event Handling; two event handling mechanisms, Event model, Event classes, sources of events, Event Listener interfaces, Adapter classes.

UNIT IV:

Introduction: Concept of Data Structures - Overview of Data Structures Implementation of DataStructures. Arrays: Definition - Terminology - One dimensional array – Multidimensional. Arrays - Pointer arrays. Linked Lists : Single linked lists Circular linked list - Double linked lists -CircularDouble linked lists - Applications of linked lists. Stacks: Definition - Representation of stack - Operations of stack Applications of stack. Queues: Definition - Representation of Queues - Various queue structures - Application of queues.

UNIT - V:

Trees: Definition and concepts - Representation of Binary tree - Operations on Binary tree - Typesof binary trees - Trees and forests - B Trees - B+ Tree Indexing
Graphs: Terminology - Representation of graphs - Operations and graphs Applicationof graph structures

Text Book

1. Herbert Schildt: "The Complete Reference Java 2"(Fifth Edition),TMH.
2. CLASSIC DATA STRUCTURES; by D.Samanta -PHI, 2001

Reference Books

1. Dietel & Dietel : "Java2 How to Program", Prentice Hall.
2. Thamus Wu: "An Introduction to Object Oriented Programming With Java." TMH Balagurusamy:"Programming With Java": TMH.
3. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Addison WesleyPublishing
4. M.AWeiss, "Data Structures and Algorithm Analysis in C++", Benjamin Cummiys,1994.
5. AS. Tanenbaum, Langram Y, Augestein MJ, Data Structures Using C ", PHI, 1992.

MSCS 103C: OPERATING SYSTEMS

Department	Computer Science	Course Type	DSCC
Course Title	Operating Systems	Course Code	MSCS 103C
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:

Students will be able to

CO1: Have a thorough understanding of the fundamentals of Operating Systems.

CO2 : Learn the mechanisms of OS to handle processes and threads and their communicationCO3 : Learn the mechanisms involved in memory management in contemporary OS

CO4 : Gain knowledge on Mutual exclusion algorithms, deadlock detection algorithmsCO5 : Know the components and management aspects of concurrency management CO6 : Gain knowledge on file I/O operations and protection of various OS.

Course Outcomes:

After the course the students are expected to be able to

CLO1: Understand different structures, services of the operating system and the use of schedulingand operations on process.

CLO2: Understand the use of scheduling, operations on process, the process scheduling algorithmsand synchronization concepts.

CLO3: Understand the concepts of deadlock, memory and virtual memory management techniques.

CLO4: Understand the concepts of File System, Input/output systems and system protection ofvarious operating systems

UNIT I:

Introduction to Operating Systems, Types of Operating Systems, Computing Environments, Computer system operation, I/O structure, and Hierarchy, Hardware protection, Network structure,Operating system components and services – system calls, Systems programs, System Structure, Virtual machines, System design and Implantation.

UNIT II:

CPU Scheduling: Scheduling criteria, Scheduling Algorithms, Multiple processors Scheduling, Real-time scheduling. Process Synchronization:- The critical-section problem, Synchronization hardware,Semaphores, Classic problems of Synchronization, Critical regions, Monitors. Dead Locks:Deadlock characterization, Deadlock handling, Deadlock prevention, Deadlock avoidance, Deadlock detection, and Recovery.

UNIT III:

Memory Management: Swapping, Contiguous memory allocation, Paging, Segmentation with paring Concept of Virtual memory Demand paging Page replacement, Allocation of frames, Thrashing. File System Interface & Implementation: File concept, Access methods, Directory structure, File System Mounting File sharing Protection, File system structure, and implementation,

Directory implementation, Allocation methods. Free space management, Efficiency and performance, Recovery.

UNIT IV:

I/O Systems: overview, I/O hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O to Hard ware operations, STREAMS, Performance of I/O. Mass Storage Structure:- Disk Structure Disk Scheduling, Disk management, Swap-space Management, RAID Structure, Disk Attachment, Stable – Storage implementation, Tertiary – storage structure. Protection: Goals, Domain of protection, Access matrix and implementation, Access rights, capability – based systems, Language – based protection.

UNIT V:

User authentication, program threats, system threats, security systems Facilities,. Linux system: History, Design principles, Kernel modules, process management, Scheduling Memory Management, File Systems, Input and output, IPC, Network structure, security.

Text Books:

1. Silberschatz A, Galvin P.B, and Gaghe G. Operating System Concepts, 6th edition, John Wiley,2002. 2. Tenenbaum A.S., Modern Operating Systems, 2nd edition, Pearson Education, 2001.

Reference Books:

1. Dhamdhere D.M., Operating Systems – A concept based Approach, Tata McGraw-Hill, 2002.
2. Flym I M, and Mc Hoes A.M., Understanding Operating Systems, 3rd edition, ThomsonBrooks/Cole, 2001.
3. Bhatt P.C.P., An Introduction to Operating Systems – Concepts and Practice, PHI, 2003.
4. Harris J.A., Operating Systems, Tata McGraw-Hill (Schaum"s Outlines series), 2002.
5. Remy Card, Eric Dumas, Linux Kernal Book , Orielly

MSCS 104GE: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Department	Computer Science	Course Type	DSEC
Course Title	Mathematical Foundation of Computer Science	Course Code	MSCS 104GE
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:

Students will be able to

CO1: Understand set theory, relations and functions to read, understand Mathematical Inductionand construct mathematical arguments.

CO2: Understand combinatorics, logic and mathematical reasoning to count or enumerate objectsin systematic way.

CO3: Construct recurrence relations for elementary problems, and apply generating functions tosolve recurrence relations.

CO4: Understand the concept of lattices and graph theory.

Course Outcomes:

After the course the students are expected to be able to

CLO1: Verify the correctness of an argument using propositional and predicate logic and truth tables. CLO2: Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability.

CLO3: Solve problems involving recurrence relations and generating functions.

CLO4: Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

UNIT I

Mathematical Logic: Connectives Negation, Conjunction, disjunction, Statement Formulas and TT, Conditional and Biconditional, Well-formed formulas, tautologies, Equivalence of statement formulae, Duality law, Tautological implications, functionally complete set of connectives; Normal Forms Disjunctive, Conjunctive, Principal disjunctive and principal conjunctive normal forms.

UNIT II

The theory of inference for statement calculus, Validity using TT, rules of inference, consistency of premises and indirect method of proof, Automatic Theorem proving- Predicate Calculus, Predicates, the statement function, variables and quantifiers.

UNIT III

Set Theory : Basic Concepts of Set theory, Notation, Inclusion and equality , Power set, Operations on sets, Set identities, Ordered pairs and n-tuples, Cartesian products - Relations and Ordering , Relations, Properties of binary relation- relation matrix and graph of a relation, partition and

covering of a set, equivalence relations, composition of binary relations, partial ordering, partially ordered set - Functions, Definition, composition, Inverse, Binary and n-ary operations, characteristic function of a set, hashing function- Recursions, Functions, sets and predicates.

UNIT IV

Lattices and Boolean Algebra: Lattices as partially ordered sets, properties of lattices, Lattices as Algebraic systems, Some special lattices - Boolean algebra, functions, representation and minimization.

UNIT V

Graph theory: Definition, Examples, Paths and Cycles, Planarity, coloring graphs

Text Books:

1. J.P. Tremblay and R.Manohar, Discrete Mathematical structures with applications to ComputerScience, Tata McGraw Hill publishers, 2008.
2. Robin. J.Wilson, Introduction to Graph theory. (Fourth edition)

MSCS 104GE: COMPUTER ORIENTED OPERATIONS RESEARCH

Department	Computer Science	Course Type	DSEC
Course Title	Computer Oriented Operations Research	Course Code	MSCS 104GE
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Outcomes:

After the course the students are expected to be able to

CLO1: Formulate a given simplified description of a suitable real-world problem as a linearprogramming model

CLO2: Solve the transportation problem, and assignment problems to drive their optimal solution.

CLO3: Identify the best age of replacement and Use waiting line models to estimate systemperformance

CLO4: Describe the functions and costs of an inventory system and determine the order quantity.

CLO5: Solve simple games using various techniques. Identify the resources required for a projectand generate a plan and work schedule.

UNIT-I:

Introduction to Operations Research: Origin and Development of OR, Definition of OR, Applications of OR, Models and their classifications, Advantages and Limitations of OR

UNIT-II:

Linear programming problem (LPP): Formulation of LPP, Solution of LPP using graphical method and simplex method ($\leq$ inequality only).

UNIT-III:

Transportation problem: Mathematical formulation, IBFS of transportation problem using north- west corner rule, least-cost rule and Vogels approximation method, Simple problems.

UNIT-IV:

Assignment problem: definition, mathematical formulation of assignment problem, solution of transportation problem using Hungarian Algorithm, simple problems

UNIT-V:

Job Sequencing Problem: Introduction – Definition – Terminology and Notations Principal Assumptions, Problems with n Jobs through Two Machines, Problems with n Jobs through Three Machines

Text Book:

1. Operations Research (2nd Edition) by S.Kalavathi, Vikas Publications Towers Pvt. Ltd.

Reference Books:

1. Operations Research by Kanthi swaroop, P.K.Gupta, Manmohan by Sultan Chand & Sons
2. Operations Research by Paneerselvam by Prentice Hall of India
3. Operations Research by S.D.Sarma
4. Operations Research by Taha, H.A., Ninth Edition

MSCS 105CF: ENVIRONMENTAL STUDIES

Department	Computer Science	Course Type	AECC
Course Title	Environmental Studies	**Course Code**	MSCS 105CF
L–T–P	2-0-0	**Credits**	2
Contact Hours	60 Hrs	**Duration of SEE**	1.5 Hrs
SEE Marks	50	**CIE Marks**	00

Course Outcomes:

After the course the students are expected to be able to

       CLO1: Measure environmental variables and interpret results.

       CLO2: Evaluate local, regional and global environmental topics related to resource use andmanagement

       CLO3: Propose solutions to environmental problems related to resource use and management.CLO4: Interpret the results of scientific studies of environmental problems.

       CLO5: Describe threats to global biodiversity, their implications and potential solutions.

Unit I

       Definition -Scope and importance. -Need for public awareness

Unit II

Natural Resources, Ecosystems

Unit III

Environmental pollution

Unit IV

Social issues and the environment

Unit V

Human population and the environment

Text Books:

1. Environmental Studies - S.N. Chary
2. A text book on Ecology and Environmental Science – M. Prasanthrajan

MSCS 106EF: PC HARDWARE BASICS

Department	Computer Science	**Course Type**	SEC
Course Title	Pc Hardware Basics	**Course Code**	MSCS 106EF
L–T–P	2-0-0	**Credits**	2
Contact Hours	60 Hrs	**Duration of SEE**	1.5 Hrs
SEE Marks	50	**CIE Marks**	00

Objective of the Course:

To train the officials to acquire basic knowledge in computer hardware and peripherals for installation, PC assembly, trouble shooting and maintenance including system management and its backup and to undertake disaster prevention, a basic knowledge of TCP/IP networks work group, internet and intranet.

Learning Outcomes

CLO1: Identify the hardware components of a computer such as processor, memory, disk, mainboard, peripheral devices etc.

CLO2: Identify Mother Board & its types and set up and configure Networking System using variousnetwork devices.

CLO3: Install different Operating System and all other application software., Printer, Scanner andtroubleshoot their faults.

CLO4: Customize Operating System and maintenance of system application software.CLO5: Assemble

and repair Desktop Computer with all its hardware components.

CLO6: Implement Network Security to protect from various attacks on networking.CLO7: Install and

configure Windows and Linux server.

UNIT I

Basic concepts and architecture, Microprocessor, System, Memory, Control unit, Arithmetic & Logic Unit. Interrupts, Operating system, Virtual memory, Cache memory. Peripheral Devices: Keyboard, CRT, Display, Monitor, Printer. Magnetic Storage Devices: Floppy disk drive, Hard disk drive. PC Hardware overview: Hardware, BIOS-DOS Interaction, PC Hardware, Motherboard logic, I/O Data transfer, PC Hardware components & ICs, Computer memories.

UNIT II

Mother Board: Introduction to mother boards & its types, Ports, Slots, Connectors, Add on cards, Power supply units, Cabinet types, Mother boards Problem Diagnosis. Bus Standards and Networking: ISA, PCI, SCSI, IDE, USB – comparative study and characteristics, Network Interface Cards, Cables and connectors.

UNIT III

Maintenance & Troubleshooting: System configuration, Pre-Installation planning, Installation practice, Preventive maintenance tools, Procedures, Plan/schedule.

UNIT IV

Troubleshooting: Computer faults, Types of faults, Diagnostic programming & tools, Systematic troubleshooting, Symptom's observation & analysis, Fault diagnosis, Rectification, Troubleshooting levels, Different troubleshooting techniques - Functional area approach, Split half method, Divergent, Convergent and feedback path Method.

UNIT V

Installation and Troubleshooting: Hard drives, Operating system and software, Sound card, Video card, HDD, FDD, CD-Rom drive, Key board and Mouse, Modem, Power supply, I/O ports, Printer interface problems, Printer problems, Attaching Add-on cards. PC Assembling, up gradation and integration, Basic data recovery & disaster recovery.

Text Books:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", Tata McGraw-Hill.
2. Craig Zacker, John Rourke, "The Complete Reference: PC Hardware", Tata McGraw-Hill, NewDelhi.

Reference Books:

1. Scott Mueller "Upgrading and Repairing PCs", 20th Edition, Pearson Education, New Delhi,2012.
2. Ron Gilster, "PC Hardware – a beginner's Guide", Tata McGraw-Hill.
3. Mike Meyers, "Introduction to PC Hardware and Troubleshooting", Tata McGraw-Hill, NewDelhi.
4. Dan Gookin, "Troubleshooting Your PCs for Dummies", 3rd Edition, Willey Publishing Inc.

MSCS 106EF: STATISTICAL METHODS

Department	Computer Science	Course Type	SEC
Course Title	Statistical Methods	Course Code	MSCS 106EF
L–T–P	2-0-0	Credits	2
Contact Hours	60 Hrs	Duration of SEE	1.5 Hrs
SEE Marks	50	CIE Marks	00

Learning Outcomes

Upon successful completion of this course, students will be able to:

CLO1: Calculate and interpret the correlation between two variables. CLO2: Calculate the simple linear regression equation for a set of data.

CLO3: Employee the principles of linear regression and correlation, including least square method, predicting a particular value of Y for a given value of X and significance of the correlationcoefficient.

CLO4: Know the association between the attributes.

CLO5: Know the construction of point and interval estimators. • Evaluate the properties of estimators.

CLO6: Demonstrate understanding of the theory of maximum likelihood estimation. • Analyze Statistical data using MS-Excel.

UNIT-I

Introduction - scope and limitations of statistical methods - classification of data - Tabulation of data - Diagrammatic and Graphical representation of data - Graphical determination of percentiles andquartiles.

UNIT-II

Measures of location: Arithmetic mean, median, mode, geometric mean and Harmonic mean andtheir properties.

UNIT-III

Measures of dispersion: Range, Quartile deviation, mean deviation, Standard deviation, combinedstandard deviation, co-efficient of variation.

UNIT-IV

Measures of Skewness Karl Pearson's, Bowley's, kelly's and co-efficient of Skew ness and kurtosisbased on moments.

UNIT-V

Correlation - Karl Pearson - spearman's rank correlation - concurrent deviation methods. RegressionAnalysis: Simple Regression Equations.

Text Books

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand

Reference Books

1. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
2. Elements of Statistics - Mode . E.B. - Prentice Hall
3. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

MSCS 201C: ADVANCED DATABASE MANAGEMENT SYSTEMS

Department	Computer Science	Course Type	DSCC
Course Title	Advanced Database Management Systems	Course Code	MSCS 201C
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:

The objective of the course is to present an introduction to database management systems, with an emphasison how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Learning Outcomes:

Upon successful completion of this course, students should be able to:

CLO1: Describe the fundamental elements of relational database management systems, basic concepts of relational data model, entity-relationship model,

CLO2: Explain the relational database design, relational algebra and SQL, Convert the ER-model to relational tables, Design ER-models to represent simple database application scenarios populate relational database and formulate SQL queries on data.

CLO3: Improve the database design by normalization.

CLO4: Overview of Physical Storage Media, File Organization, B+ -Tree Index Files – B-Tree IndexFiles, Query Processing, Transaction Management

CLO5: To administer a database by recommending and implementing procedures includingdatabase tuning, backup, query processing, query optimization and recovery.

CLO6: Understand advanced querying and decision support system.

UNIT-I

File System Vs. DBMS - Database System Applications - View of Data-Database language –
Database design – ER Model _ Relational Model – Network Data Model – Hierarchical Data Model
– Data Storage & Querying – Data Architecture.

UNIT–II

Relational Model – Structure of Relational Databases – Relational Algebra and Calculus – SQL –Basic Structure – Set Operations – Aggregate Functions – Null Values – Nested Queries – Complex Queries – Views – Modification of the Database - Advanced SQL – Triggers.

UNIT-III

Functional Dependencies - Features of Relational designs – Decomposition and Normalization using Functional Dependencies and Multivalued Dependencies – Join dependencies- Domain key Normal form.

UNIT-IV

Overview of Physical Storage Media – Magnetic disks – RAID – Territory Storage - FileOrganization – Organization of records in Files – Indexing and Hashing – Ordered Indices – B+ - Tree Index Files – B-Tree Index Files – multiple Key Access – Static and Dynamic Hashing – Query Processing – Transaction Management – Transactions – Concurrency.

UNIT-V

Distributed Databases – Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control. Case Study : Oracle – Introduction – Basics elements of SQL – Operators – Expression Functions – SQL Statements – PL/SQL- Triggers – Cursor.

Text Books:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- "Database System Concepts", Fifth Edition, McGraw-Hill, 2006.

References Books:

1. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Tata McGraw-Hill Publishing Company, 2003.
2. Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", Third Edition, Pearson Education, 2003.
3. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000.
4. Narang," Database management systems",2nd ed.,PHI

MSCS 202C: COMPUTER NETWORKS

Department	Computer Science	Course Type	DSCC
Course Title	Computer Networks	**Course Code**	MSCS 202C
L–T–P	3-1-0	**Credits**	4
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	80	**CIE Marks**	20

Course Description:

The course introduces an overview of the concepts and fundamentals of computer networks, data communication concepts and techniques in a layered network architecture and their protocols, switching and routing, types of communication, various types of networks (LAN, MAN, WAN and Wireless networks); bridges, routers and gateways; , network congestion, network topologies, network configuration and management, network model components, error detection and recovery;and local and remote procedures.

Course Objectives

- Describe how computer networks are organized with the concept of layered approach.
- Implement a simple LAN with hubs, bridges and switches.
- Describe how packets in the Internet are delivered.
- Analyze the contents in a given Data Link layer packet, based on the layer concept.
- Describe how routing protocols work.

Course Outcomes (COs).

CO1: Understand fundamental underlying principles of computer networking, network components, categories of networks, OSI model and its functions.

CO2: Understand details and functionality of layered network architecture, express theirknowledge in various error detection and data flow control techniques

CO3: To analyze the various routing algorithms, analyze performance of various communicationprotocols.

CO5: Understand and compare, distinguish the various transport and application layer protocols

UNIT – I:

Introduction, Network models – Internet model, OSI model Physical Layer: Signals – Analog, Digital, Digital Transmission – Coding, Sampling, Analog Transmission – Modulation of digitaland analog signal, Multiplexing – FDM, WDM, TDM, Transmission Media – cable, wireless, Circuit switching and Telephone network, DSL Technology, Cable modern, SONET.

UNIT – II:

Data Link Layer: Error detection and correction, Data link control and Protocols – Stop and wait, Go-back-n, Selective repeat, HDLC, point to point access, Channelization, LANS – Traditional Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN‟s – IEEE 802.11, Blue tooth, Connecting

LANs – Connecting devices, Backbone networks, Virtual LANS, Cellular telephony, Satellite networks, Virtual circuit switching, Frame relay, ATM.

UNIT – III:

Network Layer: Inter-networks, Addressing, Routing, Network layer Protocols – ARP, IP, JCMP. IPV6, Routing – Introduction, Unicast routing, Protocols – RIP, OSPF, BGP, Multicast Routing, Protocols – DVMRP, MOSPF, CBT, PIM.

UNIT – IV:

Transport Layer: Process-to-Process Delivery, UDP, TCP, Data traffic, Congestion and Control, Quality of service (QOS) and techniques to improve QOS, Integrated services, QOS in Switched networks. Security: Introduction. Symmetric-key cryptography, public key cryptography, Message security, Digital signature, User authentication, Key management, Kerberos. Communication Security, Authentications Protocols, E-mail Security, Web security, Social Issues.

UNIT – V:

Application Layer: Design issues, file transfer, access and management. Client-Server model, Socket interface Introduction to DNS, Distribution of name space, DNS in the Internet. Electronic mail, SMTP, File Transfer, FTP, HTTP, World Wide web.

Text Books:

1. Forouzan B A, Data Communications and Networking, 4th edition, Tata McGraw-Hill, 2007.
2. Tanenbaum A S, Computer Networks, 4th edition, Pearson Education, 2003.

Reference Books:

1. Stallings W, Data and Computer Communications, 7th edition, Pearson Education, 2004.
2. Gallo M A, and Hancock W M, Computer Communications and Networking Technologies, Thomson Brooks/Cole, 2002.
3. Comer D E, Computer Networks – and Internets with Internet Applications, 4th edition, Pearson Education, 2004.
4. Kutose J F, and Ross K W, Computer Networking – A Top-down Approach Fealuring the Internet, Pearson Education, 2001.
5. Tomasi W, Introduction to Data Communications and Networking, Pearson Education, 2004.

MSCS 203C: COMPUTER GRAPHICS

Department	Computer Science	Course Type	DSCC
Course Title	Computer Graphics	**Course Code**	MSCS 203C
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	80	**CIE Marks**	20

Course Objectives:
1. The main objective of the course is to introduce students with fundamental concepts and theory ofcomputer graphics.
2. It presents the important drawing algorithm, polygon fitting, clipping and 2D transformation curvesand an introduction to 3D transformation.
3. It provides the basics of application programming interface which allows students to developprogramming skills in CG.

Course Outcomes:
Upon the completion of the course students will be able to :-

CO 1 – Explain the applications, areas, and graphic pipeline, display and hardcopy technologies.
CO 2 – Apply and compare the algorithms for drawing 2D images also explain aliasing, anti-aliasingand half toning techniques.
CO 3 – Apply 2D & 3D computer graphics.
CO 4 – Analyze and apply clipping algorithms and transformation on 2D images.
CO 5 – Solve the problems on viewing transformations and explain the projection and hidden surfaceremoval algorithms.
CO 6 – Explain basic ray tracing algorithm, shading, shadows, curves and surfaces and also solve theproblems of curves.

UNIT I
Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, Raster-scan systems, random scan systems, graphics monitors and work stations and inputdevices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT II
2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems. 2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT III

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

UNIT IV

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT V

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods Computer animation: Design of animation sequence, general computer animation functions, raster animatio, computer animation languages, key frame systems, motion specifications

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

REFERENCE BOOKS:

1. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc Graw Hill edition.
2. "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Graw hill, 2nd edition.
3. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
4. "Principles of Computer Graphics", Shalini, Govil-Pai, Springer.
5. "Computer Graphics", Steven Harrington, TMH.
6. Computer Graphics, F.S.Hill, S.M.Kelley, PHI.
7. Computer Graphics, P.Shirley, Steve Marschner & Others, Cengage Learning.
8. Computer Graphics & Animation, M.C.Trivedi, Jaico Publishing House.
9. An Integrated Introduction to Computer Graphics and Geometric Modelling, R.Goldman, CRCPress, Taylor & Francis Group.
10. Computer Graphics, Rajesh K.Maurya, Wiley India.

MSCS 204 GE: E-COMMERCE

Department	Computer Science	Course Type	DSEC
Course Title	E-Commerce	Course Code	MSCS 204GE
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Description and Objectives:

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundationfor understanding information systems

Learning Outcomes

After Completion of the subject student should able to

CLO1: Understand the basic concepts and technologies used in the field of management informationsystems

CLO2: Have the knowledge of the different types of management information systems CLO3: Understand the processes of developing and implementing information systems CLO4: Be aware of the ethical, social, and security issues of information systems

UNIT – I:

Electronic Commerce: Electronic Commerce Framework; Electronic Commerce and Media Convergence; The Anatomy of E-Commerce Application; Electronic Commerce Organization Applications- The Network Infrastructure for Electronic Commerce: Market Forces Influencing the I- Way; Components of the I Way; Network Access Equipment; the Last Mlle: Local Roads and Access Ramps; Global Information Distribution: Networks: Public Policy Issues Shaping the I-Way. Case study: B2B ecommerce

UNIT – II:

The Internet as a Network Infrastructure: The Internet Terminology; Chronological History of the Internet NSFNET: Architecture and Components: Globalization of the Academic Internet; Internet Governance: The Internet Society –An Overview of Internet Applications –Electronic Commerce; World Wide Web(WWW) as the Architecture: Web Background: Hypertext Publishing; Technology behind the Web: Security and the Web- Consumer-Oriented Electronic Commerce: Oriented Applications; Mercantile Process Models Mercantile Models from the Consumer‟s Perspective; Mercantile Models from the Merchant‟s Perspective. Case study: E-Commerce/High Security (PCI)

UNIT – III:

Electronic Payment Systems: Types of Electronic Payment Systems; Smart Cards and Electronic Payment Systems; Credit Card-Based Electronic Payment systems: Risk and Electronic Payment Systems Designing Electronic Payment systems – Inter organizational Commerce and EDI: Legal, security, and Privacy Issues: EDI and Electronic Commerce – EDI Implementation, MIME, andValue- Electronic Payment Systems: Types of Electronic Payment Systems; Smart Cards and Electronic Payment Systems;

Credit Card-Based Electronic Payment systems: Risk and Electronic Payment Systems Designing Electronic Payment systems – Inter organizational Commerce and EDI: Legal, security, and Privacy Issues: EDI and Electronic Commerce – EDI Implementation, MIME, and Value- Added Networks : Standardization and EDI;EDI Software Implementation: EDI Envelope for Message Transport: Value- Added Networks (VANs); Internet – Based EDI. Case study: Social Media Marketing

UNIT – IV:

Intra organization Electronic Commerce: Internal Information System: Macro forces and Internal Commerce; Work-Flow Automation and Coordination; Customization and Internal Commerce; Supply Chain Management (SCM) – The Corporate Digital Library: Dimensions of Internal Electronic Commerce Systems; Making a Business Case for a Document Library; Types of Digital Document Library; Types of Digital Documents; Issues behind Document Infrastructure; CorporateData Warehouses. Case study: Email Marketing, Email Personalization

UNIT-V:

M-Commerce: Introduction to Mobile Commerce, Limitations, history, applications, architecture, transaction models, payment methods, advantages, disadvantages Case study: Mobile app marketing case study: O2 Priority Moments gets small businesses on side

TEXT BOOK:

1. Kalakota and Andrew B.Whinston.Frontiers of Electronic Commerce, Pearson Education.

REFERENCE BOOKS:

1. Henry Chan, Raymond Lee. Tharan Dillan and E.Chany,E-Commerce, Wiley,2003.
2. Danjel Minoli and Emuna Mimoli, Web Commrece Technology, Tata MicGraw Hill, 1999.
3. Marilyn Greenstein and Todd M Feinman, aElectronic Commerce, TaraMcGraw Hill Edition.
4. Craig Patridge, Gigaibit Networking, Addison – Wesley, 1994
5. PaulM-Commerce: Book Your Business with the Power of Mobile Commerce

MSCS 204GE: ACCOUNTING AND FINANCIAL MANAGEMENT

Department	Computer Science	Course Type	DSEC
Course Title	Accounting And Financial Management	Course Code	MSCS 204GE
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Learning Outcomes: Financial Management Students will be
- Able to list, define and describe the sources of Finance, Financial Management, Working Capital, Inventory Management, approaches of working capital finances
- Able to compare, differentiate, identify, discuss & explain proposals with the help of capital budgeting, different sets of capital structure planning, gross working capital vs net working capital, impact of discounting factors for selection of proposal, positive & negative side of excessive working capital, financial management, ratio analysis, working capital, inventory management, cash management, receivables management, capital budgeting, capital structure, leverage, cost of capital
- Able to prepare, choose, select & compute Performa of financial statement, statement of working capital requirement, statement of inventory management, more suitable proposal with the help of capital budgeting, best suitable option among different proposals with the help of capital budgeting, optimal capital structure • Able to analyze, calculate financial statements using various ratios, working capital policies, Working capital requirement, optimal capital structure.

UNIT I
   1. Introduction; 2. Accounting System; 3. Inventory Control System; 4. Payroll System

UNIT II
   1. Starting with Tally 7.2; 2.Creating Accounts Masters; 3. Creating Inventory Masters; 4. EnteringAccounts Vouchers;

UNIT III
   5. Entering Inventory Vouchers; 6. Introduction to VAT (Value Added Tax); 7. Ledgers and VAT;
   8. More on VAT;

UNIT IV
   9. VAT Documents and Reports; 10. Introduction to TDS; 11. Display/Reports in Tally; 12. TheCollaborative Tally;

UNIT V
   13. The Administrative Tally A. Fundamentals of Accounting; B. Fundamentals of Inventory

TEXT BOOKS:
   1. Computer Accounting With Tally 7.2 , Firewall, Firewall Media, , Laxmi Publications
   2. Comdex Tally 9 Course Kit by Namrata Agrawal, Dream Tech Press

REFERENCE BOOKS:
   1. Tally 9 by Dinesh Maidarsani By Firewall Media
   2. Tally 9.0 English Edition Google EBook By Computer World

MSCS 205CF: HUMAN RIGHTS AND VALUE EDUCATION

Department	Computer Science	Course Type	AECC
Course Title	Human Rights and Value Education	Course Code	MSCS 205CF
L–T–P	2-1-0	Credits	2
Contact Hours	60 Hrs	Duration of SEE	1.5 Hrs
SEE Marks	50	CIE Marks	00

Course Objectives:
- To teach and inculcate the importance of value-based living.
- To give students a deeper understanding about the purpose of life.
- Explain the evolution and growth of human rights
- Identify the role of Indian Constitution and the inclusion of human rights in it.
- Analyze the efforts of education at various levels to create and develop an awareness onhuman rights, through curriculum, methods, techniques, strategies and activities.

Course Outcomes:
- Students will emerge as responsible citizens with clear conviction to practice values and ethicsin life.
- Students will contribute in building a healthy nation
- Recognize the importance of human rights to an individual.
- Classify rights into various categories which is helpful for the growth and development of anindividual.
- Realise how important to know and tackle issues that are socially, culturally, physically andemotionally important.
- Know about their rights and protect them, how rights contribute to the dignity of the humanpersonality.

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Books for study:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics – integrity at work' by Joseph A. Petrick and John F. Quinn, ResponseBooks: New Delhi.
4. "Ethics in management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian   system of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr. Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol.I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Kraran Sarma and Vaidya Bhagavan Dash, ChowkambhaSanskrit Series office, Varanasi I,II,III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning,2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to A pplied Ethics (Ed.) John H. Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of   Intermediate Education& Telugu Academic Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin & co Julundhar.

MSCS 206EF: PRINCIPLES OF MANAGEMENT

Department	Computer Science	Course Type	SEC
Course Title	Principles of Management	**Course Code**	MSCS 206EF
L–T–P	2-1-0	**Credits**	2
Contact Hours	60 Hrs	**Duration of SEE**	1.5 Hrs
SEE Marks	50	**CIE Marks**	00

Course Objectives:
- To enable the students to study the evolution of Management,
- To study the functions and principles of management.
- To learn the application of the principles in an organization.
- To enable the effective and barriers communication in the organization
- To study the system and process of effective controlling in the organization.

Course Outcomes:
At the end of the course, the student will be able to:.
- Upon completion of the course, students will be able to have clear understanding of managerialfunctions like planning, and have same basic knowledge on international aspect of management
- To understand the planning process in the organization
- To understand the concept of organization
- Demonstrate the ability to directing, leadership and communicate effectively
- To analysis isolate issues and formulate best control methods.

Unit-I: **Introduction to Management**
   Management - meaning - significance - management vs administration –functions of management –
   Leadership – Leader Vs Manager - Fayol's principles of management.
Unit-II: **Planning**
   Planning - meaning - significance – Steps in Panning - Decision making – Steps in decision makingprocess.
Unit-III: **Organization**
   Organizing - meaning – Principles of organization– Line and Staff Organisation - Organisation chart.
Unit-IV: **Delegation of Authority**
   Delegation - meaning - elements - principles - difficulties in delegation -   guidelines for making
   delegation effective - Centralization vs decentralization
Unit-V: **Staffing and Controlling**
   Staffing – selection procedure – Coordination - Control – meaning – Qualities of Good Control

Text Books

   1. R.K.Sharma and Shashi K Gupata Business Organization and Management - KalayaniPublications.

Reference Books:
1. Dr.C.D.Balaji and G.Prasad, Business Organization and Management - Margham Publications,Chennai-17.
2. C.B.Guptha Industrial Organization and Management, Sulthan Chand.
3. Y.K.Bushan Business organization and Management, Sulthan Chand.
4. Sherlekar Business Organization and Management, Himalaya Publications.

MSCS 206EF: INTERNET OF THINGS

Department	Computer Science	Course Type	SEC
Course Title	Internet of Things	Course Code	MSCS 206EF
L–T–P	2-1-0	Credits	2
Contact Hours	60 Hrs	Duration of SEE	1.5 Hrs
SEE Marks	50	CIE Marks	00

Course Description

The Internet of Things (IoT) is everywhere. It provides advanced data collection, connectivity, and analysis of information collected by computers everywhere—taking the concepts of Machine-to-Machine communication farther than ever before.

Course Objectives

- To understand about the fundamentals of Internet of Things and its building blocks along withtheir characteristics
- To understand the recent application domains of IoT in everyday life
- Discuss the architecture, operation, and business benefits of an IoT solution
- Examine the potential business opportunities that IoT can uncover
- Explore the relationship between IoT, cloud computing, and big data
- Identify how IoT differs from traditional data collection systems

Course Outcomes
- Able to understand building blocks of Internet of Things and characteristics and associatedtechnologies.
- The students will be able to use the IoT technologies in practical domains of society.
- The students will be able to gain knowledge about the state of the art methodologies in IoTapplication domains.
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
- Able to understand the application areas of IOT ·

UNIT I

FUNDAMENTALS OF IOT
Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

UNIT II

IOT DESIGN METHODOLOGY
IoT systems management – IoT Design Methodology – Specifications Integration and ApplicationDevelopment.

UNIT III

BUILDING IOT WITH RASPBERRY PI
Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services

UNIT IV

BUILDING IOT WITH GALILEO/ARDUINO

Intel Galileo Gen2 with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks

UNIT V

CASE STUDIES and ADVANCED TOPICS

Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – DataAnalytics for IoT – Software & Management Tools for IoT

REFERENCES:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", UniversitiesPress, 2015. 2. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen
2. API Features and Arduino Projects for Linux Programmers", Apress, 2014.
3. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.

SEMESTER-III
MSCS 301C: DATA WAREHOUSING AND DATAMINING

Department	Computer Science	Course Type	DSCC
Course Title	Data Warehousing and Datamining	Course Code	MSCS 301C
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Description:

This course is designed to expand students' knowledge and skills gained in database management courses and look in depth at data warehousing and data mining methods. The course examines the database architecture and technologies required for solving complex problems of data and information management, information retrieval, and knowledge discovery facing modern organizations. Case studies of organizations using these technologies to support business intelligence gathering and decision making are examined. Thiscourse also provides hands-on experience with state-of-the-art data warehousing and data mining methodsand tools.

Course Objectives:

CO1: Be familiar with mathematical foundations of data mining tools.

CO2: Understand and implement classical models and algorithms in data warehouses and datamining

CO3: Characterize the kinds of patterns that can be discovered by association rule mining,classification and clustering.

CO4: Master data mining techniques in various applications like social, scientific andenvironmental context.

CO5: Develop skill in selecting the appropriate data mining algorithm for solving practicalproblems.

Course Outcomes (COs):

At the end of this course students will be able to …

CLO1: Understand warehousing architectures and tools for systematically organizing largedatabase and use their data to make strategic decisions.

CLO2: Understand KDD process for finding interesting pattern from warehouse.

CLO3: Remove redundancy and incomplete data from the dataset using data preprocessingmethods.

CLO4: Characterize the kinds of patterns that can be discovered by association rule mining.

CLO5: Discover interesting patterns from large amounts of data to analyze for predictions andclassification.

CLO6: Develop a data mining application for data analysis using various tools.

Unit – I:

Chapter – I: Data Warehousing & OLAP Technologies [Kambler –chapter 3 (3.1,3.2,3.3)] Chapter –II: Basic Data Mining Tasks: Classification-Regression-Time series Analysis Prediction-Clustering- Summarization- Association rules-Sequence discovery-Data mining Versus Knowledge discovery in databases-the development of

Data Mining-Data Mining issues-Data mining Metrics-Social Implications of Data Mining-The future. [M.H.Dunhum – chapter 1(1.1 to 1.7)] Chapter- III: Data Preprocessing [Kambler –chapter 2(2.1 to 2.6)]

UNIT II:

Chapter –I: Basic Data mining Tasks [M.H.Dunhum –chapter 1(1.1 to 1.7)] Chapter –II: Principles of dimensional modeling-design decisions, Dimensional Modeling basics-R Modeling versus Dimensional modeling-use of case tools-The star schema-Review of a simple STAR schema, insidea Dimension table, inside the fact table, the fact less fact table, Data Granularity. Star Schema keys- primary keys, surrogate keys, foreign keys. Advantages of star schema. Chapter –III: Dimensional Modeling: Updates to the dimensional tables-Miscellaneous Dimensions-The Snowflake schema- Aggregate fact tables-Families of stars

UNIT–III:

Chapter –I: Classification: Introduction-Issues in classification-Statistical Based Algorithm Regression-Bayesian Classification-Distance based algorithm-Simple approach-K nearest approach- Decision tree based algorithms-ID3-C4.5 & C5.0-CART-Scalable DT Techniques Neural network based algorithms-Propagation-NN Supervised Learning-Radial basis function works-Perceptrons- Rule based algorithms [M.H.Dunhum –chapter 4(4.1 to 4.6)]

UNIT – IV:

Chapter –I: Clustering: Introduction-Similarity & distance measures-outliers-Hierarchical algorithms agglomerative algorithms-Divisive clustering-Partitional Algorithms-Minimum spanning tree Squared error clustering algorithm-K-means clustering-nearest neighbor algorithm-PAM algorithm-Bond energy algorithm-Clustering with Genetic Algorithms-Clustering with neural networks-Clustering large databases-BIRCH- DBSCAN-CURE algorithm-Clustering with categorical attributes. [M.H.Dunhum –chapter 5(5.1 to 5.7)]

UNIT-V:

Chapter –I: Associate Rules: - Introduction-Large Item sets-Basic Algorithms-Apriori Algorithm- Sampling algorithm-Partitioning- Parallel and Distributed algorithms-Data Parallelism-Task parallelism-Comparing Approaches-Incremental Rules- Advanced Association Rule Technique- Generalized association rules-Multiple level association rules-Multiple –level Association rules-Quantitative association rules-Using multiple minimum supports Measuring the Quality of a Rules. [M.H.Dunhum chapter 6(6.1 to 6.8)] Chapter –II: Mining objects-spatial, multimedia & text mining, www mining [Kambler chapter10 (10.1 to 10.5)]

Text Books:

1. Data Mining – Introductory & Advanced topics by Margaret H. Dunham. Pearson Educationpublishers.
2. Data mining concepts & techniques-Jiawei Han & Micheline Kamber
3. Fundamentals of Data warehousing –Paul Raj Ponniah

Reference Books:

1. Data Mining – Concepts and Techniques by Han and Kamber, 2001, Morgan KaufmannPublishers
2. Oracle 8i – Data Warehousing by Cohen, Abbey, Taub, Tata McGraw Hill

MSCS 302C: WEB TECHNOLOGIES

Department	Computer Science	Course Type	DSCC
Course Title	Web Technologies	Course Code	MSCS 302C
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course description:

On completion of this course, a student will be familiar with client server architecture and able to developa web application using java technologies. Students will gain the skills and project-based experience neededfor entry into web application and development careers.

Course Objectives:

- To teach students the basics of server-side scripting using PHP
- To explain web application development procedures

- To impart servlet technology for writing business logic
- To facilitate students to connect to databases using JDBC
- To familiarize various concepts of application development using JSP

Course Outcomes:
- Students are able to develop a dynamic webpage by the use of java script and DHTML, JQueryand PHP.
- Apply JDBC and ODBC technologies to create database connectivity
- Students will be able to write a server-side java application called Servlet to catch form data sentfrom client, process it and store it on database.
- Students will be able to write a server-side java application called JSP to catch form data sentfrom client and store it on database.

UNIT-I

Introduction to Internet-Browser Architecture-IE, Chrome-Search Engines-Introduction to HTML- 5-HTML-5 Tags-Audio, Video Tags – HTML-5 Forms-Controls-CSS Styling-CSS Tags Attributes.

UNIT-II

Java Script-JQuery- JavaScript Programming Scripts- Control structures- Functions Document, Browser, Date, Math, String Objects-Events- JQuery Libraries-JQuery Objects, Functions – JQuery Events-Animations. UNIT-III

AJAX Concepts- Simple AJAX objects-Ajax Libraries-Examples, Webservers IIS, Tomcat Hosting Website in a Webservers

UNIT-IV

Introduction to PHP-Control Structures-Arrays-Functions-Database connectivity Introduction to ZEND Framework and applications

UNIT-V

Introduction to Java Servlets, Servlets classes and interfaces - Java Database ConnectivityIntroduction to JSP-Java Server Page scriplets -JSP Objects-JSP Web applications

TEXT BOOK:

1. Deitel, Deitel and Goldberg Internet & World Wide Wide how to program" by End. PearsonEducation
2. Ivan Bayross, Web enabled commercial Application Development in Java 2.0 BPB.
3. Nicholas C. Zakas., Jeremy McPeak,Joe Fawcett, Professional AJAX,2nd Edition, Willeypublishing
4. HTML 5 Black book, Kogent Learning Solutions Inc.

REFERENCE BOOKS:

1. Raj Kamal Internet and web Technologies, Tata Mc Graw Hill, 2002.
2. Chirs Bates, Web Programming, John Wiley, 2nd Edition
3. E.V.Kumar and S.V.Subramanyam, Web Services. Tata Mc Graw Hill, 2004.

MSCS 303C: SOFTWARE ENGINEERING

Department	Computer Science	Course Type	DSCC
Course Title	Software Engineering	Course Code	MSCS 303C
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Overview:
Students will gain experience on various processes used in Software industry for the development of asoftware product. They also learn about testing and maintenance of software products

Prerequisite:

1. Basic Programming Skills 2. Innovative Thinking. 3. Enthusiasm to learn Management concepts.

Course Objectives:

CO1: To provide the idea of decomposing the given problem into Analysis, Design,Implementation, Testing and Maintenance phases.

CO2: To provide an idea of using various process models in the software industry according togiven circumstances.

CO3: To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenanceprocesses are conducted in a software project.

Course Outcomes:

CLO1: Students will be able to decompose the given project in various phases of a life cycle CLO2: Students will be able to choose the appropriate process model depending on the user
requirements

CLO3: Students will be able to perform various life cycle activities like analysis, design, CLO4:implementation, testing and maintenance.

CLO5: Students will be able to know various process used ion all the phases of the product

CLO6: Students can apply the knowledge, techniques and skills in the development of softwareproduct.

UNIT – I:

Software Engineering – Introduction, Generic view of process, models, an agile view of process. Software Engineering practice – Software Engineering, communication, planning, modeling, construction practices and deployment.

UNIT-II:

System Engineering – Computer-based systems, the system engineering Hierarchy, business process engineering, product engineering and system modeling. Building The Analysis Model – Requirement Analysis, Modeling Approaches, Data Modeling. Behavioral Model. The webengineering process, analysis models for web apps.

UNIT –III:

Design Engineering-Design process and quality, design concepts the design model, and pattern-usedsoftware design. Architectural design – Software architecture, data design, architectural styles and patterns, architectural design mapping data flow into a software architecture. Component-based software engineering, Critical systems development, Software reuse, User interface design, web appsdesign issues and architecture design.

UNIT –IV:

Testing strategies – Strategies and issues, testing strategies for and object-oriented software. Validation testing and system testing. Software testing tactics – Fundamentals, black-box and white-box testing white-box testing basis path testing. Control structure testing, black box testing, object- oriented testing methods. Testing methods applicable at the class level inter class testing case design.Testing for specialized environments, architectures and applications, web application testing – concepts, testing process, component level testing.

UNIT – V:

Product metrics – Software quality, framework, metrics for analysis model design model, source case and testing. Managing software projects – The management spectrum, the W5 HH principle, metrics in process, software measurement, and metrics for software quality integrating metrics within the software process. Estimation – observations, decomposition techniques, empirical models, estimation for object-oriented projects other estimation techniques, project scheduling, risk management, reengineering, Security engineering, Service-oriented software engineering, Aspect- oriented software development.

Text Book:

1. Roger, S, Pressman, Software Engineering, A Practitioner"s Approach, Six Edition, McGraw-Hill, International

Edition, 2005.
2. Ian Sommerville, Software Engineering, Pearson Education, 8th Edition.

Reference Books:
1. James F Peters, Software Engineering, John Wiley
2. Waruan S Jawadekar, Software Engineering, Tata McGraw Hill, 2004.
3. Carlo Ghezzi, Mehdi Jazayeri, Dino Manrioli, Fundamentals of Software Engineering, PHI, 2001Pankaj Jalote, An Integrated approach to Software Engineering Narosa

MSCS 304-GE-A: SYSTEMS PROGRAMMING

Department	Computer Science	Course Type	DSEC
Course Title	Systems Programming	Course Code	MSCS 304-GE-A
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Overview:
The aim of this course is to provide students with knowledge and abilities to design system programs such as assemblers, linkers, loaders, macro-processors, editors, interpreters, compilers and operating systems using modern methodologies and to implement their design using modern development tools.

Course Objectives:
- To introduce student the fundamental model of the processing of high-level language programsfor execution on computer system.
- To explain the basic operations that are performed from the time a computer is turned on until auser is able to execute programs.
- To understand and implement Assembler, Loader, Linkers, Macros & Compilers.
- To introduce students the process management and information management via differentsoftware tools.

Course Learning Outcomes
By the end of the course students will be able to
- Adequate knowledge in system programs (assemblers, loaders, linkers, macro-processors, text editors, debuggers, interpreters, compilers, operating systems).
- Ability to use theoretical and applied information in these areas to design system software with realistic constraints
- Recognize operating system functions such as memory management as pertaining to run time storage management
- Ability to conduct experiments, gather data, analyze and interpret results for investigating solutions to real life applications with assembly language programming and Unix shell programming.
- Ability to devise, select, and use modern techniques and tools needed for the design and implementation of system programs.

UNIT I:
Background introduction, system software and machine architecture, SIC, RISC, and CISC architecture. Assembler: basic assembler functions, machine dependent and independent assemblerfeatures, assembler design options, and implementation examples.

UNIT II:
Loading and linkers basic loader junction, machine dependent and independent loader features, loader design options and implementation examples. Macro processors, basic macro processor functions machines – independent macro processor features, macro processor design options, implementation examples.

UNIT III:
Compilers: basic compiler functions, machine dependent and independent compiler features, compiler design options and implementation examples. Other system software: text editors and interactive debugging systems

UNIT-IV

Introduction to Device Drivers, Design issues-Types of Drivers, Character driver-1 and Design issues, Character Driver-2- A/D converter and its design issues, Block driver-1 and its design issues- RAM DISK driver-Anatomy-Prologue of drivers and programming Considerations.

UNIT-V

Introduction to Linux- Linux Architecture- X-windows- Linux administration tools - Commands to use Linux OS-Executing Linux Shell scripts – Shell Programming conceptsShell scripts

Text Books:

1. Leland .Beck, System Software: An Introduction to systems Programming: 3/e, PearsonEducations Asia, 2003.
2. George pajari, Writing Unix Drivers, Addison – Wesley,1991.
3. Richard Petersen, Linux complete Reference, McGraw Hill Education (India) Private Limited; 6edition (21 November 2007

Reference Books:

1. Dhamdhere, System programming and operation Systems Book 2/E, Tata Mc Graw, Hill, 1999
2. A.V. Aho, Ravi Sethi and J D Ullman, "compilers, Techniques and Tools", Addison Wesley, 1986.
3. Jhon J. Donovan, System Programming Tata Mc Graw Hill 2005.

MSCS 304GE-A: COMPUTER ALGORITHMS

Department	Computer Science	**Course Type**	DSEC
Course Title	Computer Algorithms	**Course Code**	MSCS 304GE-A
L–T–P	3-1-0	**Credits**	4
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	80	**CIE Marks**	20

Course Description:

Introduction to the design and analysis of computer algorithms. Topics will include concepts of algorithm complexity, and various algorithmic design patterns like divide and conquer, dynamic programming and greedy algorithms. Course will also cover major algorithms and data structures for searching and sorting, graphs, and some optimization techniques.

Course objectives:

- To teach paradigms and approaches used to analyse and design algorithms and to appreciate the impact of algorithm design in practice.
- To make students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.
- To explain different computational models (e.g., divide-and-conquer), order notation and various complexity measures (e.g., running time, disk space) to analyse the complexity/performance of different algorithms.
- To teach various advanced design and analysis techniques such as greedy algorithms, dynamic programming & know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Course Learning Objectives:

- Able to Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic analysis.
- Able to explain important algorithmic design paradigms (divide-and-conquer, greedy method, dynamic-programming and Backtracking) and apply when an algorithmic design situation calls for it.
- Able to Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.
- Able to Compare between different data structures and pick an appropriate data structure for a designsituation.
- Able to Describe the classes P, NP, and NPComplete and be able to prove that a certain problem is NP-Complete.
- Able to analyze String matching algorithms.

UNIT I:

Divide – and-Conquer and Greedy Methods.

UNIT II:

Dynamic Programming; Basic Traversal and Search Technique.

UNIT III:

Backtracking; and Branch-and Bound Technique.

UNIT IV:

Lower bound Theory; NP-Hard and NP-Complete Problems

UNIT V:

Mesh and Hypercube Algorithms, the Fast Fourier Transform and its Applications.

Text Books:

1. Eills Horowliz, Sartaj sahni and Sanguthevar Rajasekaran. Computer Algorithms GalgotiaPublications, 1999.

Reference Books:

1. RCT Lec, SS Teang, RC Change and YT Tsai, Introduction to the Design and Analysis ofAlgorithms, McGraw-Hill 2005.
2. R. Jhonsonbaugh and Mschaefer, Algorithms, Pearson education 2004.
3. A. Levitin, Introduction to the Design and Analysis of Algorithms, Pearson Education 2005.
4. TH Coremen, CE Leiserson and RL Rivest, Introduction to Algorithms, PHI
5. G. Brassed and P. Bratley, Fundamentals of Algorithms, PHI

MSCS 304-GE-A: USER INTERFACE DESIGN USING .NET TECHNOLOGIES

Department	Computer Science	Course Type	DSEC
Course Title	User Interface Design Using .Net Technologies	**Course Code**	MSCS 304-GE-A
L-T-P	3-1-0	**Credits**	4
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	80	**CIE Marks**	20

Learning Outcomes:

On completion of this course, students will be able to:

- Understand the importance of user interface and benefits of good design.
- Understand the user interface design process and business function, Command and naturallanguages
- Understand the types of system menus and navigation schemes, Interaction Devices
- Understand the characteristics of windows and device-based controls.
- Understand the Dot Net technology screen-based controls and kinds of tests.

Unit – I:

Human factors of interactive software goals of system engineering and user-interface design, motivations, accommodation of human diversity goal for our profession. Theories, principles, and guidelines – High-level theories, object-action interface model, Principle 1.2 and 3, guide links for data display and data entry, balance of automation and human control. Managing design processes

– Usability, design pillars, development methodologies, ethnographic observation, usability testing, surveys, and continuing assessments – expert reviews, usability testing and laboratories, surveys acceptance tests, evaluation during active use, and controlled psychologically oriented experiments.

Unit – II:

Software tolls – Specification methods, interface- building tools and evaluation and critiquing tools. Direct manipulation and virtual environments – examples, explanations, programming, visual, thinking and icons home automation, remote direct manipulation, visual environments. Menuselection, form filling, and dialog boxes – Task – related organizations item presentation sequence, response time and display rate, fact movement through menus, menu layout, form fill in, and dialog boxes. Command and natural languages – Functionality to support users' tasks, command – organization strategies, the benefits of structure, naming and abbreviations, command menus, natural language in computing.

Unit – III:

Interaction Devices – Keyboards and function keys, pointing devices, speech recognition digitization and generation. Image and video displays, printers. Response time and display rate-Theoretical foundations, expectations and attitudes, user productivity, variability. Presentation styles: Balancing function and fashion – error messages, no anthropomorphic design, display design, color, Printed manuals, Online Help and tutorials – Reading from paper versus form displays, preparation of printed manuals, and preparation of online facilities.

Unit – IV:

Multiple – Window strategies – Individual – Window design, multiple-window design, Coordinator by tightly – coupled windows. Image browsing and tightly –coupled windows, personal role management and elastic windows. Computer-supported cooperative work-goals of cooperation, Asynchronous Interaction: Different time and place, Synchronous Distributed: Different place, sametime, face to face: same place, same time, Applying CSCW to Edition, Information search and visualization – Database Query and phrase search in textual documents, multimedia document searches, information visualization. Advanced filtering. Hypermedia and the world wide web (www).

Unit – V:

Introduction to Dot Net technology c#.Net Language – Control structures – GUI controls – Database GUI Controls and its connectivity to databases – ASP.Net Fundamentals and Web pages Interface designing.

Text Books:

1. Ben Shriderman, Designing the user Interface, strategies for effective human- Computerintroduction Third Edition, Pearson Education, 2004, (For units I, II, III and IV).
2. Beginning .NET 2.0 by wrox publications (For Unit V).

Reference Books:

1. Hix, Deborah and Hartgon, H.RR X; Developing use Interfaces, John Wiley, 1993.
2. Galitz, Wilbert O., It"s Time to Clear Your Windows: Designing GUIs that Work, John Wileyand Sons, New York(1994)
3. ASP.NET 2.0 Black Book , Dreamtech publications.
4. VB.NET 2.0 Black Book, Dreamtech publications.

MSCS 304-GE-A: IT IN FORENSIC SCIENCE

Department	Computer Science	Course Type	DSEC
Course Title	IT in Forensic Science	Course Code	MSCS 304-GE-A
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs

SEE Marks	80	CIE Marks	20

UNIT I

Overview of Biometrics, Biometric Identification, Biometric Verification, Biometric Enrollment, Biometric System Security. Authentication and Biometrics: Secure Authentication Protocols, AccessControl Security Services, Matching Biometric Samples, Verification by humans. Common biometrics: Finger Print Recognition, Face Recognition, Speaker Recognition, Iris Recognition, Hand Geometry, Signature Verification

UNIT II

Introduction to Information Hiding: Technical Steganography, Linguistic Steganography, Copy Right Enforcement, Wisdom from Cryptography Principles of Steganography: Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data , Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text.

UNIT III

A Survey of Steganographic Techniques: Substitution systems and Bit Plane Tools, Transform Domain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography, Distortion Techniques, Cover Generation Techniques. Steganalysis: Looking for Signatures: - Extracting hidden Information, Disabling Hidden Information.

UNIT IV

Watermarking and Copyright Protection: Basic Watermarking, Watermarking Applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking system. Transform Methods: Fourier Transformation, Fast Fourier Transformation, Discrete Cosine Transformation, Mellin-Fourier Transformation, Wavelets, Split Images in Perceptual Bands. Applications of Transformation in Steganography.

UNIT V

Computer Forensics, Rules of evidence, Evidence dynamics, Evidence collection, Data recovery,Preservation of digital evidence, surveillance tools for future warfare

References:

1. Katzendbisser, Petitcolas, " Information Hiding Techniques for Steganography and DigitalWatermarking", Artech House.
2. Peter Wayner, "Disappearing Cryptography: Information Hiding, Steganography and Watermarking 2/e", Elsevier
3. Bolle, Connell et. al., "Guide to Biometrics", Springer
4. John Vecca, "Computer Forensics: Crime scene Investigation", Firewall Media
5. Christopher L.T. Brown, "Computer Evidence: Collection and Preservation", Firewall Media

MSCS 304-GE-A: SOFTWARE TESTING

Department	Computer Science	Course Type	DSEC
Course Title	Software Testing	Course Code	MSCS 304-GE-A
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives

1. To study fundamental concepts in software testing, including software testing objectives, process,criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression,and system testing.
3. To learn how to planning a test project, design test cases and data, conduct testing operations,manage software problems and defects, generate a testing report.
4. To expose the advanced software testing topics, such as object-oriented software testing methods,and component-based software testing issues, challenges, and solutions.
5. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.

6. To understand software test automation problems and solutions.
7. To learn how to write software testing documents, and communicate with engineers in variousforms.
8. To gain the techniques and skills on how to use modern software testing tools to support softwaretesting projects

Learning Objectives

By the end of the course, you should:

1. Have an ability to apply software testing knowledge and engineering methods.
2. Have an ability to design and conduct a software test process for a software testing project.
3. Have an ability to identify the needs of software test automation, and define and develop a test toolto support test automation.
4. Have an ability understand and identify various software testing problems, and solve these problemsby designing and selecting software test models, criteria, strategies, and methods.
5. Have an ability to use various communication methods and skills to communicate with theirteammates to conduct their practice-oriented software testing projects.
6. Have basic understanding and knowledge of contemporary issues in software testing, such ascomponent-based software testing problems
7. Have an ability to use software testing methods and modern software testing tools for their testingprojects

UNIT I

Software Engineering Evaluation

- · Software Development Process Models
- · Requirements Management
- · Software Design
- · Coding and Unit Testing
- · Integration Testing
- · System testing
- · Installation and Acceptance
- · Customer Support / Maintenance

UNIT II

System Testing Process

- · System testing Process
- · System Test Commencement
- · System Test Planning
- · Test Design
- · Test Execution
- · Test Reporting and Defect Tracking

UNIT III

WinRunner 8.0

- · Introduction to WinRunner
- · checkpoints in WinRunner
- · Data Driven and Batch Testing
- · Improve Test Automation in WinRunner
- · GUI Mapping
- · Web test Option in WinRunner

UNIT IV

QTP 8.2

- · QuickTestPro Introduction
- · Edit Test Scripts
- · Improving Test Automation in QTP
- · Data Driven and Batch Testing, Web Test Options in QTP

UNIT V

Load Runner 8.0

- · Introduction to Performance Testing
- · VuserScript Creation Using LoadRunner
- · VuserScript Execution and Results Analysis

TestDirector 8.0

- · Site Administrator, Understanding Test Director

TEXT BOOK:

1. Software Testing Concepts and Tools by Nageshwar Rao Pusuluri, Dreamtech Press,

MSCS 305-GE-B: CLOUD COMPUTING

Department	Computer Science	Course Type	DSEC
Course Title	Cloud Computing	Course Code	MSCS 305-GE-B
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:
- Identify the technical foundations of cloud systems architectures.
- Analyze the problems and solutions to cloud application problems.
- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance.

Course Outcomes (COs)

CO1: Understand the fundamental principles of distributed computing.

CO2: Understand how the distributed computing environments known as Grids can be built fromlower-level services.

CO3: Understand the importance of virtualization in distributed computing and how this hasenabled the development of Cloud Computing.

CO4: Analyze the performance of Cloud Computing.CO5:

Understand the concept of Cloud Security.

CO6: Learn the Concept of Cloud Infrastructure Model

UNIT I

UNDERSTANDING CLOUD COMPUTING: Cloud Computing – History of Cloud Computing
– Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of CloudComputing –
Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT II

DEVELOPING CLOUD SERVICES: Web-Based Application – Pros and Cons of Cloud ServiceDevelopment – Types of Cloud Service Development – Software as a Service – Platform as a Service
– Web Services – On-Demand Computing – Discovering Cloud Services Development Services andTools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT III

CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

UNIT IV

USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on
Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files

UNIT V

OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

References:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

2. Kumar Saurabh, "Cloud Computing – Insights into New Era Infrastructure", Wiley Indian Edition, 2011.

3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for Ondemand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

MSCS 305-GE-B: BIG DATA ANALYTICS

Department	Computer Science	Course Type	DSEC
Course Title	Big Data Analytics	Course Code	MSCS 305-GE-B
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:
- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop and hands on Hodoop Eco System
- Apply analytics on Structured, Unstructured Data.
- Exposure to business analytics and predictive Analytics.

Learning Outcomes:
- Describe Big Data and its importance with its applications
- Differentiate various big data technologies like Hadoop MapReduce, Pig, Hive, Hbase and No-SQL.
- Apply tools and techniques to analyze Big Data.
- Design a solution for a given problem using suitable Big Data Techniques

UNIT-I

What is Big Data - Varieties of Data - Unstructured data – Trends in Data Storage- Industry Examples of Big Data

UNIT-II

Big data Technology – New and older approaches- Data Discovery – Open source technologies for Big Data Analytics- Cloud and Big Data –Big Data Foundation-Computation-Limitations Big Data Emerging Technologies

UNIT-III

Business Analytics- Consumption of Analytics- Creation to Consumption of Analytics-Data visualization by Organizations – 90/10 rule of critical thinking – Decision sciences and analytics- Learning over knowledge-Agility-Scale and convergence-Privacy and security in Big Data.

UNIT-IV

Predictive Analytics –Linear Regression – Decision trees-Neural networks-Classification trees Ensemble methods-Association Rules-Segmentation, Sequence Rules, Social Network analytics.

UNIT-V

Hadoop – Components of Hadoop – Hadoop File System –Hadoop Technology Stack-Datawarehousing Hadoop Concepts-Applications of Hadoop using PIG,YARN, HIVE.

Text Books

1. Micheal Minnelli,Ambiga Dhiraj,Chambers, Big Data and Big Analytics, Willey and Sons Inc,.
2. Bart Beasens, Analytics in Big Data World, Willey and Sons Inc
3 Sameer Wadker,Madhu Sidhalingaiah and Jason Winner,Apache Hadoop, APress

MSCS 305-GE-B: ARTIFICIAL NEURAL NETWORKS

Department	Computer Science	Course Type	DSEC
Course Title	Artificial Neural Networks	Course Code	MSCS 305-GE-B
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

UNIT I

INTRODUCTION - what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks (p. no's 1 –49) LEARNING PROCESS 1 – Error Correction learning, Memory based learning, Hebbian learing, (50-55)

UNIT II

LEARNING PROCESS 2: Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process, (p. no's 50 –116) SINGLE LAYER PERCEPTRONS – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception –convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment (p. no's 117 –155)

UNIT III

MULTILAYER PERCEPTRON – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection, (p. no's 156 –201) BACK PROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning. (p. no's 202 –234)

UNIT IV

SELF ORGANIZATION MAPS – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification, Hierarchal Vector quantilizer, contexmel Maps (p. no's 443 –469, 9.1
–9.8)

UNIT V

NEURO DYNAMICS – Dynamical systems, stavility of equilibrium states, attractors, neurodynamical models, manipulation of attractors' as a recurrent network paradigm (p. no's 664 –680, 14.1 –14.6) HOPFIELD MODELS – Hopfield models, computer experiment I (p. no's 680-701, 14.7 –14.8)

TEXT BOOK:
1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd Edition2004

REFERENCE BOOKS:
1. Artificial neural networks - B.Vegnanarayana Prentice Halll of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
3. Neural networks James A Freeman David M S kapura Pearson Education 2004

MSCS 305-GE-B: CYBER SECURITY

Department	Computer Science	Course Type	DSEC
Course Title	Cyber Security	Course Code	MSCS 305-GE-B
L–T–P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives

The educational objectives of the program are:
1. To prepare students with the technical knowledge and skills needed to protect and defendcomputer systems and networks.
2. To develop graduates that can plan, implement, and monitor cyber security mechanisms to helpensure the protection of information technology assets.
3. To develop graduates that can identify, analyze, and remediate computer security breaches.

Learning Outcomes

Upon completion of the degree program, students will be able to:
1. Analyze and evaluate the cyber security needs of an organization.
2. Conduct a cyber security risk assessment.
3. Measure the performance and troubleshoot cyber security systems.
4. Implement cyber security solutions.
5. Be able to use cyber security, information assurance, and cyber/computer forensics software/tools.
6. Identify the key cyber security vendors in the marketplace.
7. Design and develop a security architecture for an organization.
8. Design operational and strategic cyber security strategies and policies.

UNIT I

FUNDAMENTALS OF CYBER SECURITY Introduction-Cyber Security and its problem- Intervention Strategies: Redundancy, Diversity and Autarchy.

UNIT II

ISSUES IN CYBER SECURITY Private ordering solutions, Regulation and Jurisdiction for globalCyber security, Copy Rightsource of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Loss.

UNIT III

INTELLECTUAL PROPERTY RIGHTS Copy Right-Source of risks, Pirates, Internet Infringement, Fair Use, postings, Criminal Liability, First Amendments, Losing Data, Trademarks, Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity, Technology expanding privacy rights.

UNIT IV

PROCEDURAL ISSUES Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts & Digital Signatures, Misappropriation of information, Civil Rights, Tax, Evidence.

UNIT V

LEGAL ASPECTS OF CYBER SECURITY Ethics, Legal Developments, Late 1990 to 2000,Cyber security in Society, Security in cyber laws case. Studies, General Law and Cyber Law-a Swift Analysis.

Text Books:
1. Jonathan Rosenoer,"Cyber Law: The law of the Internet", Springer-Verlag, 1997.
2. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006.

MSCS 305-GE-B: MOBILE APP DEVELOPMENT

Department	Computer Science	Course Type	DSEC
Course Title	Mobile App Development	Course Code	MSCS 305-GE-B
L-T-P	3-1-0	Credits	4
Contact Hours	60 Hrs	Duration of SEE	3 Hrs
SEE Marks	80	CIE Marks	20

Course Objectives:
- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development
- To inculcate working knowledge of Android Studio development tool
- basic concepts in mobile application and understand the processes of producing mobile applications.They will also develop skills and techniques in designing and developing mobile application works.

Course Outcomes:

At the end of this course, students will be able to:

- identify the basic knowledge on mobile application environment and technology
- explain the concepts and processes of mobile application development
- discuss design and development issues specific to mobile applications
- design and develop mobile applications, using development tools and environments.
- Program mobile applications for the Android operating system and ios that use basic and advancedphone features, and Deploy applications

UNIT I

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II

BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III

ADVANCED DESIGN: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV

TECHNOLOGY I - ANDROID: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server-side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V

TECHNOLOGY II - IOS : Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application

– Using Wifi - iPhone marketplace.

References:

1. http://developer.android.com/develop/index.html
2. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
3. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012
4. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
5. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development:Exploring the iOS SDK", Apress, 2013.

MSCS -307EF: MULTIMEDIA

Department	Computer Science	Course Type	DSCC
Course Title	Multimedia	Course Code	MSCS 307EF
L–T–P	2-1-0	Credits	2
Contact Hours	60 Hrs	Duration of SEE	1.5 Hrs
SEE Marks	50	CIE Marks	00

Course Objectives:
- To identify a range of concepts, techniques and tools for creating and editing the interactive multimedia applications.
- To identify the current and future issues related to multimedia technology.
- To identify both theoretical and practical aspects in designing multimedia systems surrounding the emergence of multimedia technologies using contemporary hardware and software technologies.

Learning Outcomes:
Upon successful completion of this subject, students should:
- be able to critically analyze and synthesize the key components of multimedia technologiesincluding text, graphics, voice, video and animation;
- be able to define the characteristics of each media type and describe their application;
- be able to develop, edit and improve interactive web pages that incorporate a variety of digitalmedia such as graphics, voice, animation and video;
- Use and apply tools for image processing, video, sound and animation.
- Apply acquired knowledge in the field of multimedia in practice and independently continue toexpand knowledge in this field.

UNIT I

INTRODUCTION

Introduction to Multimedia – Characteristics – Utilities – Creation -Uses – Promotion – Digital Representation – Media and Data streams – Multimedia Architecture – Multimedia Documents

UNIT II

ELEMENTS OF MULTIMEDIA

Multimedia Building Blocks: Text, Graphics, Video Capturing, Sound Capturing, and Editing Intro to 2D & 3D Graphics -surface characteristics and texture - lights – Animation: key frames & Tweening, techniques, principles of animation, 3Danimation, file formats.

UNIT III

MULTIMEDIA SYSTEMS

Visual Display Systems – CRT - video adapter card - video adapter cable – LCD – PDP - opticalstorage media - CD technology - DVD Technology - Compression Types and Techniques – CODEC
- GIF coding standards – lossy and lossless – JPEG - MPEG-1 - MPEG-2 - MP3 - Fractals – MMDBS

UNIT IV

MULTIMEDIA TOOLS

Authoring tools – features and types - card and page-based tools - icon and object-based tools - time based tools - cross platform authoring tools – Editing tools - text editing and word processing tools -OCR software - painting and drawing tools –

UNIT V

3D modeling and animation tools - image editing tools –sound editing tools - digital movie tools – plug -ins and delivery vehicles for www

References:

1. Parekh R "Principles of Multimedia" Tata McGraw-Hill, 2006.
2. Ralf Steinmetz, Klara Nahrstedt, "Multimedia: Computing, Communications and Applications" Prentice Hall, 1995.
3. John Villamil and Louis Molina, "Multimedia; An Introduction", Prentice Hall, New Delhi 1998.
4. Tay Vaughan, "Multimedia: Making It Work" McGraw-Hill Professional, 2006
5. Deitel & Deitel "Internet & World Wide Web How to Program", Fourth Edition – Prentice Hall,2008
6. BANERJI ASHOK & GHOSH ANANDA MOHAN, Multimedia Technologies, TMH, New Delhi,2010
7. Li, Ze-Nian & Drew-Mark S, "Fundamentals of Multimedia," Phi Learning Private Limited, New Delhi, 2012

MSCS 401P : MAJOR PROJECT WORK:

Department	Computer Science	Course Type	DSEC
Course Title	Major Project Work	**Course Code**	MSCS 401P
L–T–P	0-0-24	**Credits**	12
Contact Hours	60 Hrs	**Duration of SEE**	3 Hrs
SEE Marks	200	**CIE Marks**	100

The project will be one semester duration. The student will be advised to approach different organizations involved in science communication activities as per interest and specialization of students, mostly located in the place of the study. They will have to carry out a project work related to the area of interest and submita project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

1. Project Seminar (Internal)   : 50 Marks
2. Project Report (Internal)   : 50 Marks
3. National / International Conference Publication Proceedings (External)   : 50 Marks
   (Paper based on project should be submitted to conference
   and published in the form of proceedings)
4. National / International Journal Publication (External)   : 50 Marks
   (Paper based on project should be submitted to the journal
   and should be published)
5. Viva Voce (External)   : 50 Marks
6. Project Execution (External)   : 50 Marks