B.Tech (Electronics and Communication Engineering)
ProgrammeSyllabus

Regulations 2020

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

(AUTONOMUS)

SRI VENKATESWARA UNIVERSITY

TIRUPATI-517502 (A.P), INDIA.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION

To be a lead department imparting quality and value embedded higher education and research emphasizing freedom of learning and practice.

MISSION

- Transforming students into full-fledged professionals and to become leaders in dynamic global environment.
- Augmenting knowledge and technologies in rapidly advancing fields of Electronics and Communication Engineering**.**
- Promoting in depth research and create centre of excellence in thrust areas.

Program Educational Objectives (PEOs) of ECE:

The Educational Objectives of UG Program in Electronics and Communication Engineering are:

1. To produce competent graduates in core areas of Electronics and Communication Engineering with adequate analytical capabilities and practical knowledge to attend to the current challenging tasks and to absorb futuristic trends.

2. To provide strong foundation in basic sciences and communication skills.

3. To keep the students abreast with the latest hardware and software design techniques and cutting edge technologies

4. To enhance the knowledge and skills continually throughout their career and to make them capable to adapt in diverse environments.

5. To imbibe leadership qualities among the students to take up challenging roles in their career by ensuring professional ethics with high sense of social responsibility.

PROGRAM OUTCOMES of ECE:

The program outcomes are the skills and knowledge which the graduates have at the time of graduation:

A. An ability to apply knowledge of mathematics, science, and engineering to solve engineering problems.

B. Capability to design and conduct experiments, as well as to analyze and interpret data

C. Identify, formulate, and solve engineering problems

D. Solving different types of problems associated with multi-disciplinary areas

E. Apply ethical principles and professional ethics and norms of engineering practice

F. Equipped to design a engineering system, component, or process that meets the specific needs with proper eco system

G. Disseminating knowledge effectively with engineering community and in general society.

H. The broad knowledge provided to understand the impact of engineering solutions in a global, economic, environmental, and societal context

I. A recognition of the need for, and an ability to engage in life-long learning

J. A knowledge of contemporary issues

K. An ability to select and use the appropriate advanced techniques, skills, and modern engineering tools necessary for engineering practice, with an understanding of limitations.

L. Will be in a position to participate and become successful in competitive examinations like GATE, IES,GRE,CAT,Civil services etc.

Program Educational Objectives	Program Outcomes											
	A	B	C	D	E	F	G	H	I	J	K	L
1		X	X	X		X					X	X
2	X		X	X		X	X				X	X
3		X		X		X		X		X	X	
4	X			X	X		X	X	X	X	X	X
5			X		X		X	X	X	X		X

Abstract about B.Tech syllabus in ECE

Department of Electronics and Communication Engineering is offering a B.Tech program with an intake of 66(Plus 10% in the Second year through EECET). The syllabus revision was carried out in 2018 and 2020 as per the AICTE model curriculum and APCHE. A standard academic format common for all UG programs describing numbers of credits, weightage for lectures, laboratory work, and projects has been fixed considering the scope of the study. Mandatory Induction program for students to be offered right at the start of the first year with a duration of One weeks which cover Physical activity like Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas Familiarization to Dept./Branch & Innovations. Mandatory courses that are introduced are Constitution of India/Essence of Indian Traditional Knowledge. These courses will help students to deal with the outside world. Students are encouraged to enroll in open electives through MOOCs. The MOOCs can be done

through Nptel, Coursera, Udemy, Skillshare, EdX, Udacity, Pluralsight, etc., The weightage is up to 40% of the total credits offered to the Program.-.The project work is initiated in the VII semester as Project Stage-I and Project Stage-II in the VIII semester. The internship is made mandatory which will make them get exposed to industrial needs. New courses are added to the curriculum whenever it is needed. This ensures they are on par with others.

R-20 – Scheme of Instruction effective from the academic year 2020-2021

B.Tech. (Electronics& Communication Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
PY 102	Basic Sci	Modern Physics	3	1	-	4	**4**
CS 103	Basic Eng	Programming for Problem Solving	2	1	-	3	**3**
EC 104	Basic Eng	Electronic Devices	3	1	-	4	**4**
ME 105	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 106	Basic Engg. Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 107	Audit Course	Environmental Science	4	-	-	4	**0**
		TOTAL	15	4	6	25	**18**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
CY 202	Basic Sci	Engineering Chemistry	3	1	-	4	**4**
EN 203	Humanities	English	2	-	-	2	**2**
EE 205	Basic Eng	Basic Electrical Engineering	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Engineering Graphics and design	2	-	3	5	**3.5**
EN206	Humanities lab	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

SRI VENKATESW  NIVERSITY

COLLEGE OF ENGINEERING: TIRUPATI 517 502

R-20 – Scheme of Instruction effective from the academic year 2020-2021

B.Tech. (Electronics& Communication Engineering)

III Semester

Code	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA301B	**Mathematics – III**	3	1	-	4	**4**
EC302C	**-Network Theory**	3	1	-	4	**4**
EC303C	**Signals and Systems**	2	1	-	3	**3**
EC304C	**ElectroMagnetic Waves and Transmission Lines**	3	1	-	4	**4**
EC305C	**Digital Logic Design**	-	-	3	3	**1.5**
EC306C	**Analog Circuits**	-	-	3	3	**1.5**
EC309S	**Entrepreneurship and Design Thinking**	4	-	-	4	**0**
MC310A	**Constitution of India**					
EC307L	**Basic Electrical Engineering Laboratory**					
EC308L	**Electronic Devices Laboratory**					
EC311L	**Simulation Laboratory**					
	TOTAL	15	4	6	25	**18**

IV Semester

Code	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
EC401C-	**Linear Control Systems**	3	1	-	4	**4**
EC402C-	**Probability Theory and Stochastic Processes**	3	1	-	4	**4**
HS403C-	**Managerial**	2	-	-	2	**2**

	Economics and Accountancy					
EC404C-	**IC Applications**	3	1	-	4	**4**
EC405C-	**Analog Communications**	2	-	3	5	**3.5**
EC409S-	**Python Programming**	-	-	3	3	**1.5**
EC406L	**-Digital Logic Design Laboratory**					
EC407L	**-Analog Circuits Laboratory**					
EC408L	**-IC Applications Laboratory**					
	TOTAL	13	3	6	22	**19**

SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

SYLLABUS – I & II Semesters B.Tech

I Semester **MA 101MATHEMATICS –I**

(I Semester - Common for all branches)

Instruction: 3(L) +1(T) /week **Credits:4** **Assessment: 40 + 60**

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients- method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

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

1. analyze differential equations and solve them
2. apply differential equations to engineering problems.
3. Use transformation to convert one type into another type presumably easier to solve.
4. use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
5. solve an initial value problem for an n^{th} order ordinary differential equation using the Laplace transform.
6. expand functions as power series using Maclaurin's and Talor's series
7. optimize the problems related to OR, Computer science, Probability and Statistics
8. draw an approximate shape by the study of some of its important characteristics such as symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
9. use multiple integral in evaluating area and volume of any region bounded by the given curves.

I & II Semesters CY 101/ CY 202 ENGINEERING CHEMISTRY

(I Semester - CY 101 for Civil & Mechanical Engg)

(II Semester -CY 202 for EEE, ECE & CSE)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Atomic and molecular structure (12 lectures)

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cellpotentials, the Nernst equation and applications.

Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular

geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, Organic reactions and synthesis of a drug molecule

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistryby P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Ed.
7. Principles of physical chemistry, Puri, Sharma and Pattania

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

1. analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. rationalize bulk properties and processes using thermodynamic considerations.
3. distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
4. rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. list major chemical reactions that are used in the synthesis of molecules.

I & II Semesters **EN 103/ EN 203 ENGLISH**

(I Semester - EN 103 forChE,CE & ME)

(II Semester - EN 203 for EEE, ECE & CSE)

Instruction: 2(L) **Credits: 2** **Assessment: 40 + 60**

UNIT I Vocabulary Building

The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II Basic Writing Skills

Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents -Techniques for writing precisely

UNIT III Identifying Common Errors in Writing

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions -Redundancies -Clichés

UNIT IV Nature and Style of sensible Writing

Describing - Defining - Classifying –Providingexamples or evidence –Writingintroductionand conclusion

UNIT V Writing Practices

Comprehension - Précis Writing –EssayWriting

Reference/Textbooks:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper ResourceBook. 2001
4. Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay KumarandPushpalata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press

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

1. learn the elements of grammar and composition of English Language.
2. Learn literary texts such as Short stories and prose passages.
3. maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
4. develop communication skills by cultivating the habit of reading comprehension passages.
5. develop the language skills like listening, speaking, reading and writing.
6. Make use of self-instructed learner friendly modes of language learning through competence.

I Semester **EE104BASIC ELECTRICAL AND ELECTRONICS ENGG.**

(I Semester – for ChE, CE & ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Unit-I

Electric DC Circuits: Kirchhoff's Voltage & Current laws, Superposition Theorem, Star – Delta Transformations. AC Circuits: Complex representation of Impedance, Phasor diagrams, Power & Power Factor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II

Single Phase Transformers: Principle of Operation of a Single phase Transformer, EMF equation, regulation and Efficiency of a single phase transformer.
DC Machines: Principle of Operation, Classification, EMF and Torque equations, Characteristics of Generators and Motors

UNIT-III

Three Phase Induction Motor: Principle of Rotating Magnetic Field, Principle of Operation of 3- φ I.M., Torque-Speed Characteristics of 3-φ I.M.

UNIT-IV

p-n junction operation, diode applications, Zener diode as regulator.
Transistor and applications: Introduction to transistors, BJT Characteristics, biasing and applications

UNIT-V

Integrated Circuits: Operational amplifiers, Applications: adder, subtractor, Integrator and Differentiator.
Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, counters and shift registers, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Textbooks:

1. Electrical Technology by Edward Hughes
2. Basic Electrical Engineering by Nagrath and Kothari

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

1. understand the basic concepts of D.C. single phase and 3- phase supply and circuits and solve basic electrical circuit problems
2. understand the basic concepts of transformers and motors used as various industrial drives

3. understand the concept of power factor improvement for industrial installations and concepts of most economical power factor
4. understand the operation and characteristics of diodes, transistors, integrated circuits and digital circuits.

I & II Semesters

ME 105 / ME 205ENGINEERING GRAPHICS AND DESIGN

(I Semester - ME105 for ChE, CE & ME)
(II Semester - ME205 for EEE,ECE & CSE)

Instruction: 2(L) +3 (Drg) /week Credits: 3.5 **Assessment: 40 + 60**

Unit I Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epi-cycloid, Hypo- cycloid and Involutes.

Unit II

Scales- Scales– construction of Plain &Diagonal Scales.

Projections of points, lines - Projections of Points and lines inclined to both planes, including traces;

Question Paper
Modular – 4 questions from
Units I t0 IV, 15 marks each

Unit III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes

Projections of Regular Solids (Simple solids – cylinder, cone, prism & pyramid) those inclined

to both the Planes-Auxiliary Views

Unit IV

Isometric Projections& Orthographic projections

Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit V Introduction to CAD

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. Agrawal B. & Agrawal C.M.(2012),Engineering Graphics, TMH Publication
4. Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, Scitech Publishers
5. Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes: At the end of the course, the student will be able to

1. make a distinction between first angle projection and third angle projection of drawing.
2. draw hyperbola, parabola, Involutes and Cycloidal curves.
3. draw sections of solids including cylinders, cones, prisms and pyramids.
4. draw projections of lines, planes, solids and sections of solids.
5. draw orthographic projections of lines, planes, and solids.

I & II Semesters EN 106 / EN 206 ENGLISH COMMUNICATION LAB
(I Semester - EN 106 for ChE, CE & ME)
(II Semester - EN206 for EEE, ECE & CSE)

Instruction: 0(L) +3(Lab) /week Credits: 1.5 Assessment: 40 + 60

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. LizHamp– Lyons and Ben Heasly. Cambridge Univ. Press. 2006
5. Communication Skills. Sanjay Kumar and Pushpalata. Oxford Univ. Press.2011
6.Exercises in Spoken English. PartsI-III.CIEFL, Hyderabad. Oxford Univ. Press

Course Outcomes:
The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

I Semester **PY 102 MODERN PHYSICS**

(for I Semester –EEE,ECE & CSE)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I

Quantum Mechanics : Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P. Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT II

Band Theory of Solids : Classical Free Electron Theory of Metals – Success and Failures – Quantum Free Electron Theory – Fermi Factor – Electron in Periodic Potential – Bloch Theorem – Kronig – Penney Model – Distinction between Metals , Insulators and semiconductors- Energy Band Structures.

UNIT III

Semiconductors – Introduction- Intrinsic and Extrinsic Semiconductors – Density of states – Carrier Concentrations at Equilibrium – Hall Effect. PN Junction Diode – Energy Band Diagram – Forward and Reverse Bias- Current – Voltage characteristics – Applications- Zener Diode – Light Emitting Diode- Photo diode -Solar Cell – Semiconductor Laser.

UNIT IV

Electromagnetism and magnetic properties of Materials:

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwell Equations – Polarization – Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization – Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and hysteresis, Applications of ferromagnetic materials.

UNIT V

NanoPhysics and Nanotechnology : Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials. 10 hrs.

Text Books / Reference Books:

1. R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi

2. S.P.Basava Raju `` A Detailed Text Book of Engineering Physics" Sole Distributors, Subhash Stores Book Corner, Bangalore
3. HitendraK.Malik and A.K.Singh ``Engineering Physics" Tata MC Graw Hill Education PVt.Ltd., New Delhi

4. M.N.Avadhanulu and P.G.Kshirsagar ``A Textbook of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi
5. John Allison, ``Electronic Engineering Materials and Devices" TataMcGraw Hill Publications.
6. B.L Theraja, "Modern physics", S.Chand& Company.
7. V. Raghavan "Material Science", Tata McGraw Hill Publications.
8. M.S.RamachandraRao and Shubra Singh, ``Nanoscience and Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

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

1. develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
3. identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
4. apply knowledge of band theory in the area of electronics and understanding the basic electron transportation phenomenon in microdevices.
5. understand the principles in electrostatics and electromagnetics and magnetic properties of materials.
6. understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
7. think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
8. learn the basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
9. provide multidisciplinary experiences throughout the curriculum.

I & II Semesters CS 103 / CS203 PROGRAMMING FOR PROBLEM SOLVING

(I Semester –CS 103 for EEE, ECE & CSE)
(II Semester –CS 203 for ChE, CE & ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Course Objectives:

1. To acquire problem solving skills
2. To be able to develop flowcharts and algorithms for the given problem
3. To learn how to write modular programs in C
4. To enable to use arrays, pointers, strings and structures in solving problems.
5. To explain the difference between object-oriented programming and procedural programming.
6. To understand principles of object-oriented programming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

Course Outcomes: At the end of the course, student will be able to

1. Develop and test programs in C and correct syntax and logical errors.
2. Implement conditional branching, iteration and recursion.
3. Decompose a problem into functions and synthesize a complete program.
4. Use arrays, pointers, strings and structures to formulate algorithms and programs
5. Use files to perform read and write operations.
6. Handle programming assignments based on class,abstraction, encapsulation, overloading and inheritance.

Text Books

1. Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Hanly J R &Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
5. Herbert Schildt,The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.
5. The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
6. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

I Semester **EC 104 ELECTRONIC DEVICES**

(I Semester - for ECE only)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I

Semiconductor Materials: Atomic structure, Electrons in periodic Lattices, Classifying Materials: Semiconductors, conductors and insulators, Semiconductor material groups, Covalent bonding, Energy Bandgaps, Energy bands in intrinsic and extrinsic silicon /Germanium, Density of Impurity States, Electrical Conductivity and Mobility, , Electronic Properties of N-type and P-type semiconductors, Carrier transport: diffusion current, drift current, mobility and resistivity; sheet

resistance, design of resistors. Generation and recombination of carriers; Poisson and continuity equation, P-N junction characteristics, I-V Characteristics, and small signal switching models, Diode resistances and diode capacitances.

UNIT II

Diode models, Avalanche breakdown, Zener diode, Schottky diode, Tunnel diode, Varactor diode and their applications, Testing a diode.

Rectifiers: Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Half-wave, Full-wave and Bridge rectifiers, Analysis of filters (C, L, LC, and CLC) used with Full- wave rectifiers, line regulation and load regulation.

UNIT III

Bipolar Junction Transistors: Bipolar Junction Transistor action, PNP and NPN transistors, CB, CE, and CC configurations and their I-V characteristics, Analytical expressions for transistor characteristics, Typical junction voltages and maximum ratings. Determination of h-parameters from BJT characteristics, Ebers-Moll Model, Multi Emitter transistor.

UNIT IV

Bipolar Junction Transistor Biasing: Operating point, stabilization, thermal runaway.

Field Effect Transistors: Characteristics and parameters of JFET, Pinch off and saturation regions, MOS capacitor, Depletion and Enhancement type of MOSFET, I-V characteristics, and small signal models of MOS transistor, UJT and its I-V characteristics, Metal Semiconductor FET, FET biasing schemes.

UNIT V

Optoelectronic Devices: Principle of operation and characteristics of LED. LCD, LDR, Photoconductor, Photodiode, Phototransistor, Solar cell, PIN photodiode, Charge-Coupled Devices, APD (avalanche photodiode) and their applications.

Power Semiconductor Devices: Device structure, equivalent circuit and characteristics of PNPN Diode, SCR, DIAC and TRIAC.

Text /Reference Books:

1. Ben G. Steetman and Sanjay Kumar Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson Publishers, 2015.
2. Jacob Millman, Christos Halkias, Chetan D Parikh, “**Integrated Electronics**: Analog and Digital Circuits and Systems”, 2nd Edition, Tata Mcgraw Hill Education Private Limited, 2011.
3. **Allen Mottershead, “Electronic Devices and Circuits:** An Introduction”, PHILearning , 2011.
4. D. Neamen , D. Biswas "Semiconductor Physics and Devices", McGraw-Hill Education.
5. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley & Sons, 2006.
6. C.T. Sah, “Fundamentals of solid state electronics,” World Scientific Publishing Co. Inc, 1991.
7. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford University Press, 2011.

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

1. understand the principles of semiconductor physics of the intrinsic, *p* and *n* type materials.
2. understand the characteristics of the diode and some special function diodes and their application in electronic circuits.
3. use mathematics to analyze electronic devices typical of those in switching and rectifier circuits.
4. understand and utilize the mathematical models of semiconductor junctions and transistors for circuits and systems.
5. understand the characteristics of the Transistors and opto-electronic devices and their application in electronic circuits.
6. Apply thyristors in power switching and control circuits.

I & II Semesters ME 105 / ME 205 WORKSHOP/MANUFACTURING PRACTICE

(ME 105 for EEE, ECE & CSE)

(ME 205 for ChE,CE & ME)

Instruction: 0(L) +3 (lab)/week Credits: 1.5 Assessment: 40 + 60

Workshop Practice: Five practices among

1. Machine shop 2.Fittingshop 3.Carpentry 4.Electrical wiring

1. Welding shop 6.Casting 7.Smithy 8.Plasticmoulding&GlassCutting

Examinations could involve the actual fabrication of simple components, utilizing one or

More of the techniques covered above.

Detailed Contents

1. ManufacturingMethods-casting,forming,machining,joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools.
4. Electrical &Electronics
5. Carpentry
6. Plastic moulding. Glass cutting
7. Metal casting.
8. Welding(arc welding & gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text/ReferenceBooks:

1. HajraChoudhury S.K., HajraChoudhury A.K.andNirjharRoy S. K., Elements of Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
2. Kalpakjian S. and Steven S. Schmid ManufacturingFngineeringand Technology", 4th edition, PearsonEducationIndiaEdition,2002.
3. GowriP.Hariharanand A. SureshBabu, Manufacturing Technology–I" Pearson Education,2008.
4. Roy A. Lindberg, Processes and Materials of Manufacture",4 th India,1998.

edition, Prentice Hall
5. RaoP.N., “ManufacturingTechnology”,Vol. I & II,TataMcGrawHillHouse, 2017

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.

- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Outcomes : Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricatecomponents using different materials.

I & II Sem CS 106/ CS206 PROGRAMMING FOR PROBLEM SOLVING LAB
(CS 106 for EEE, ECE & CSE)
(CS 206 for ChE, CE & ME)

Instruction: 0(L) +3 (Lab)) /week Credits: 1.5 Assessment: 40 + 60

Course Objectives:

1. To provide exposure to problem-solving through programming
2. To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

1. Programs on conditional control constructs.
2. Programs on iterative statements (while, do-while, for).
3. Programs on recursive procedures
4. Programs on arrays, matrices (single and multi-dimensional arrays).
5. Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
6. Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
7. Programs using pointers (int pointers, char pointers) and pointer arrays.
8. Programs on structures and unions
9. Programs on File Processing.
10. Programs on Pointers to structures and Self-referential structures

Course Outcomes: After Completion of this course the student would be able to

1. Develop the C code for the given algorithm.
2. Understand, debug and trace the execution of programs written in C language.

Reference Books:

1. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
2. Hanly J R &Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning

II Semester **MA 201MATHEMATICS II**

(II Semester - for all branches)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley- Hamilton theorem-quadratic forms-diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals-Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

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

1. use ranks of matrices to decide whether the system of linear equations is consistent or not
2. use Cayley-Hamilton theorem to find inverses or powers of matrices.
3. use Eigen values and vectors to reduce Quadratic forms to normal form.
4. to analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
5. use Green's theorem to evaluate line integrals along simple closed contours on the plane
6. use Stokes' theorem to give a physical interpretation of the curl of a vector field
7. use the divergence theorem to give a physical interpretation of the divergence of a vector field.

8. find the Fourier Series to represent a function as a series of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
9. Evaluate certain improper integrals to make them simple with introduction of Gamma and Beta functions.
10. study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena.

CE 107 / CE 207 ENVIRONMENTAL SCIENCE *Audit Course*

(CE 107 for EEE, ECE &CSE) *No Univ.Exam*
(CE 207 for ChE, CE & ME)

Instruction: 4(L) Credits: 0(Zero) Assessment: 40 + 60

UNIT I

Environmental Studies and Natural Resources

Definition, Scope and importance of Environment, Environmental studies, Need for public awareness

Components of Environment- Atmosphere, Hydrosphere, Lithosphere.

Renewable and **Non-Renewable Resources and associated problems**

Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dam benefits and problems.

Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.

Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.

Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Role of an individual in conservation of natural resources.

UNIT II

Ecosystem and Biodiversity

Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem.

(a) Forest ecosystem. (b) Grassland ecosystem
(c) Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation:

Definition, genetic species and ecosystem diversity, Biogeographically classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.

Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III

Environmental pollution and Global Effects

Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an

individual in prevention of pollution.

Pollution case studies.

Disaster management: Floods, earthquakes, cyclone, landslides, Tsunami. Climate

change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

1. AnubhaKaushik& C P Kaushik, Environmental studies, New age International Publishers, 2008
2. Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
3. M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
4. Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
5. AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
6. SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
7. Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
8. William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

Course Outcomes:

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

1. acquire knowledge in
   - diverse components of environment and natural resources
   - ecosystem and biodiversity & its conservation methods
   - population growth and human health
   - green technology
2. identify and resolve the issues related to sources of different types of pollutions
3. provide solutions to individuals, industries and government for sustainable development of natural resources
4. apply environmental ethics in protection of diversified ecosystems.

****

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
TIRUPATI-517502 (A.P), INDIA
Department of Electronics and Communication Engineering

MA301B-Mathematics – III

Instruction: Hours/Week: **3L:1T:0P** Credits**: 4**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Objectives:

1. To introduce the solutionin Vector Analysis and Numerical Methods.
2. To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering.
3. To provide an overview of probability and statistics to engineers
4. To provide an overview of Test of significance

UNIT – I
Complex analysis - I: Analytical functions - Cauchy- Reimann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT – II
Complex analysis - II**:** Taylor's and Laurents' series- Transformations- Conformal mapping - Bilinear transformations - Transformation of 1/z, z^2, sin z and cos z.

UNIT – III
Complex anaylasis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals

UNIT – IV
Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Legranges' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT- V
Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Text/Reference Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

TIRUPATI-517502 (A.P), INDIA

Department of Electronics and Communication Engineering

Course Outcomes: At the end of this course students will demonstrate the ability to

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

EC302C-Network Theory

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Objectives:

1.To Understand basics electrical circuits with nodal and mesh analysis.
2. To Appreciate electrical network theorems.
3. To Apply Laplace Transform for steady state and transient analysis.
4. To Determine different network functions.
5. To Appreciate the frequency domain techniques

UNIT-I

Network Theorems: Superposition Theorem– Reciprocity theorem -Thevenin's and Norton's Theorems – Maximum Power Transfer Theorem- Millman's Theorem —Tellegen's Theorem – Compensation Theorem - Application of these Theorems for D.C. circuits and sinusoidal steady state A.C. circuits, Introduction to Three Phase Circuits.

UNIT-II

Resonance: Series and Parallel Resonance – Resonant frequency, Half power frequencies, bandwidth and Quality Factor.

Locus diagrams: Current locus diagrams of RL and RC series circuits and two branch parallel circuits.

UNIT-III

Transient Analysis: Time domain analysis of RL, RC, and RLC circuits for D.C. and sinusoidal excitations – Determination of initial conditions – Concept of time constant –Laplace transforms of signals and periodic functions and initial and final value theorems – Transient response of RL, RC, and RLC circuits using Laplace Transform techniques.

UNIT-IV

Network Functions: One-port and Two-port networks – Driving point and transfer functions of networks – Properties of driving point and transfer functions – Concept of complex frequency, poles and zeros – Time domain response from pole-zero diagram – Restrictions on pole-zero locations.

UNIT-V

Two-port Network Parameters: Open circuit impedance and short circuit admittance parameters – Hybrid and inverse-hybrid parameters – Transmission and inverse transmission parameters – Inter relationships between parameter sets – Series, Parallel, and Cascade connection of two-ports – Conditions for reciprocity and symmetry of two-port networks. Terminated two-port networks – Image parameters.

Text/Reference Books:

1. Sudhakar and Shyammohan: Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill
2. Ravish R. Singh: Network Analysis and Synthesis, Tata Mc. Graw Hill.
3. Abhijit Chakrabarti: Circuit Theory Analysis and Synthesis, 7th Revised Edition, Dhanpat Rai & Co
4. M. E. Van Valkenburg; “Network analysis”; Pearson Education, Third Revised Edition.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	-	-	-	-	-	-	-	2
CO2	2	2	2	2	-	-	-	-	-	-	-	2
CO3	2	2	3	2	-	-	-	-	-	-	-	2
CO4	2	2	2	2	-	-	-	-	-	-	-	2

EC303C-Signals and Systems
(Common to EEE, ECE and CSE)

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course objectives

1. To create a foundation in signals and systems which will facilitate better understanding of higher level subjects like signal processing, control systems, communication systems etc.
2. To intrude signals and their representation in various domain and understand classification of signals.
3. To understand the transmission of signals through linear time invariant (LTI) system and introduce the types of convolution filters and their responses.
4. To introduce the concept of correlation and their properties.
5. To discuss the importance and application of Laplace transform.
6. To discuss the significance of Z-transform and its properties.

UNIT I

Introduction to Signals and Systems:

Definition and classification of signals and systems**,** Basic operations on signals, Elementary signals, Classification of Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems, Convolution Sum, Continuous-Time LTI Systems Convolution Integral. Causal LTI Systems Described by Differential and Difference Equations.

Signal Analysis:

Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT II

Fourier series and Fourier Transform:

Fourier series Representation of Continuous-Time Periodic Signals, Dirichlet's conditions, Properties of Continuous-Time Fourier Series. Trigonometric Fourier Series and Exponential Fourier Series with examples, Complex Fourier spectrum.

Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Continuous-Time Fourier Transform,
Magnitude-Phase responses, Parseval's theorem, Inverse Fourier transform.

Discrete-Time Fourier Transform – Properties, Inverse Discrete-time Fourier Transform. Introduction to Hilbert Transform.

UNIT III

Convolution and Correlation:

Continuous-time convolution, Convolution sum, Correlation between signals, Cross correlation, Autocorrelation, Properties, Energy spectral density, Power spectral density, Relation between convolution and correlation.

UNIT IV

Behavior of continuous time LTI systems:

Distortion less transmission through a system, signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth

and rise time.

Sampling:

Sampling Theorem, Reconstruction of a Signal from its Samples Using Interpolation, types of sampling-natural sampling, flat- top sampling and impulse sampling, Effect of under sampling -Aliasing.

UNIT V

System Analysis using Laplace and z -Transforms:

Laplace Transform - Region of Convergence – Relation between Laplace and Fourier Transform, Inverse Laplace Transform, Properties, Analysis and Characterization of LTI Systems Using Laplace Transform, Z-Transform -Region of Convergence - Properties, Inverse z-Transform, Analysis and Characterization of LTI Systems Using z-Transforms.

Text / Reference Books:

1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid Nawab, "Signals and Systems," Pearson Higher Education, 2nd Ed., 1997.
2. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson, 2006.
3. Simon Haykin and B. Van Veen, "Signals & Systems," John Wiley and Sons, 2nd Edition, 2007.
4. B.P. Lathi, "Principles of LINEAR SYSTEMS and SIGNALS," Oxford Univ. Press, Second Edition, International version, 2009.
5. A. Anand Kumar, Signals & Systems, PHI, 2011.
6. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.
7. Luis F. Chaparro, "Signals and Systems using MATLAB," Academic Press, 2011.
8. C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms," Pearson Education, 4th Edition, 2008.

Course Outcomes: At the end of this course students will have the ability to

1. Differentiate between various types of signals and understand the implication of operations of signals
2. Understand and classify systems based on the impulse response behavior of both continuous-time and discrete-time systems
3. Perform domain transformation from time to frequency and understand the energy distribution as a function of frequency
4. Usefulness of convolution for analyzing the LTI systems and understand the concepts of power spectral density through correlation.
5. Solve differential and difference equations with initial conditions using Laplace and Z- transforms.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	3
CO2	-	1	-	-	-	2	-	-	-	-	-	-
CO3	-	2	2	-	-	-	-	-	-	-	2	2
CO4	-	2	-	-	-	-	-	-	-	-	-	2
CO5	2	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
TIRUPATI-517502 (A.P), INDIA
Department of Electronics and Communication Engineering

EC304C-ElectroMagnetic Waves and Transmission Lines

Instruction: (Hours/Week) **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course objectives:

1. To study the fundamental concepts of transmission lines at higher frequencies
2. Understand and analyze power flow in transmission line
3. Ability to analyze and design impedance matching methods
4. Ability to Understand Wave Propagation between parallel planes
5. Exposé the learner to waveguides their types and modes of transmissions

UNIT-1

Electrostatic Fields: Coulomb's law, Electric field intensity, Electric fields due to continuous charge distributions, Electric flux density, Gauss's law, Applications of Gauss's law, Electric scalar potential, Relation between E and V, Energy stored in electrostatic field, Electrostatic Boundary conditions, Capacitances.

UNIT-2

Magnetostatic fields: Biot-Savart's law, Magnetic field intensity, Magnetic fields due to continuous current distributions, Magnetic flux density, Ampere's circuital law, Applications of Ampere's circuital law, Magnetic vector potential, Relation between B and A, Energy stored in Magnetostatic field, Magnetostatic Boundary conditions, Inductances.

UNIT-3

Time-Varying EM Fields: Faraday's Law, Transformer EMF, Displacement current, Maxwell's Equations in Point Form and in Integral Form, Phasor notation for fields, Maxwell's Equations in time harmonic form.
Introduction to waves: Uniform plane wave, Wave equations, Derivation for **γ,** solutions for free space-conditions, Derivation for **α** and **β,** Derivation for $\boldsymbol{\eta}$,

UNIT-4

EM waves in a homogeneous medium: Wave propagation in lossy dielectrics, Wave propagation in lossless dielectrics, Wave propagation in free space, Wave propagation in good conductors, Skin Depth, Skin Resistance, Polarization, Power, Poynting theorem and Poynting vector.
EM waves in a heterogeneous medium: Reflection of a plane wave at normal incidence: transmission coefficient, reflection coefficient, Reflection of a plane wave at oblique incidence: transmission coefficient, reflection coefficient and Brewster angle in both parallel and perpendicular polarizations.

UNIT-5

Transmission Lines: Transmission line parameters, Transmission line Equations, Input impedance, Reflection coefficient, VSWR and Power of Transmission line, Smith Chart.
Applications of transmission lines: Load matching measurement, Load impedance measurement.

Text/Reference Books:

1. Mathew N.O.Sadiku and S.V. Kulkarni, "Principles of Electromagnetics", Oxford University Press
2. William H. Hayt, John A. Buck, "Engineering Electromagnetics", 8th Edition, McGraw-Hill, 2010.
3. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India
4. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India Education, 2008
5. David K. Cheng, Field and Wave Electromagnetics, Pearson, second edition.

Course Outcomes: At the end of this course students will have the ability to

1. Solve electric field intensity and electric flux density in Electrostatic fields.
2. Solve magnetic field intensity and magnetic flux density in Magnetostatic fields.
3. Analyze Maxwell's equations in static fields, time varying fields, time harmonic fields and study Uniform plane wave characteristics.

4. Compute reflection coefficient and transmission coefficient of waves at media interface.
5. Understand characteristics of high frequency transmission lines and its applications.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	-	-	2	-	-	-	-	-	3
CO2	3	-	3	-	-	2	-	-	-	-	-	3
CO3	3	-	3	-	-	2	-	-	-	-	-	3
CO4	3	-	3	-	-	2	-	-	-	-	-	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3

EC305C-Digital Logic Design

Instruction: Hours/Week: **3L:0T:0P** **Credits: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course objectives:

1. Provides introduction to logic designs and the basic building blocks used in digital systems.
2. To understand the number systems and codes, Boolean algebra, and logic gates.
3. To minimize the logical functions using Boolean algebra, K-maps, tabular method, and also to understand combinational circuits.
4. To understand different sequential circuits.
5. To understand different Arithmetic circuits.
6. To understand different programmable circuits

UNIT I

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

UNIT II

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

UNIT III

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudorandom Binary Sequence generator.

UNIT IV

Clock generation Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

UNIT V

VLSI Design flow: Design entry, Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Text / Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd Edition, 2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

Course outcomes: At the end of this course students will demonstrate the ability to

1. Design and analyze combinational logic circuits.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
3. Design & analyze synchronous sequential logic circuits.
4. Use HDL & appropriate EDA tools for digital logic design and simulation.

Mapping of course outcomes with program outcomes:

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

EC306C-Analog Circuits

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course objectives:

1. This course focuses on the characteristics and applications of various analog integrated circuits using operational amplifiers
2. To learn basics of the design and analysis of selected analog circuits including some specialized linear integrated circuits.

UNIT-I

General Amplifiers Characteristics: Concept of Amplifier, Voltage gain, Current gain, Power gain, Input and Output resistances, Conversion efficiency, Frequency response, Bandwidth, Distortion,

BJT Amplifiers: Small signal low frequency model of the transistor, Analysis of CE, CB and CC amplifiers, Approximate model analysis, Effects of coupling and bypass capacitors on low frequency response, Hybrid-Π model at high frequencies, Calculation of High-Frequency parameters in terms of Low Frequency parameters, CE short circuit gain, CE current gain with resistive load.

UNIT-II

FET Amplifiers: Small signal model, Analysis of CS, CD and CG amplifiers, comparison of performance of the three configurations, High frequency FET circuits, CS amplifier at high frequencies, CD amplifier at high frequencies.

Multistage Amplifiers: Types of coupling, Choice of amplifier configuration, overall voltage gain and Bandwidth of n-stage amplifier, Darlington and Bootstrap circuits.

UNIT-III

Feedback amplifiers: Feedback concept, Classification, Effects of negative feedback on gain, Stability, Noise, Distortion, Bandwidth, input resistance and output resistance.

Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), Crystal oscillators.

UNIT-IV

Power Amplifiers: Series-Fed Class-A power amplifiers, Transformer coupled class-A power amplifiers, harmonic distortion, Push-pull amplifiers, Class-B amplifiers, Class-AB operation, Complementary symmetry Push-Pull class-B Power amplifiers, Cross-over distortion.

UNIT-V

Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR, circuits to improve CMRR, transfer characteristics.

Operational Amplifier: Ideal op-amp characteristics, Op-amp internal circuit, examples of IC op-amps, DC and AC characteristics, Inverting and non-inverting modes of operation, voltage follower.

Text/Reference Books:

1. Millman and Halkias, “Integrated Electronics”, McGraw-Hill Co
2. Mottershed, “Electronic devices and circuits”, PHI
3. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
4. Salivahanan, “Electronic Devices and circuits”, TMH.
5. David A. Bell, “Electronic Devices and circuits”, PHI
6. D.Roy Choudary, Shail Bala Jain, “Linear Integrated circuits”, New Age International publishers, 2018

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

TIRUPATI-517502 (A.P), INDIA

Department of Electronics and Communication Engineering

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Design and analyze various amplifier circuits.
2. Design sinusoidal oscillators.
3. Understand the functioning of OP-AMP and design OP-AMP based circuits.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2

EC309S- Entrepreneurship and Design Thinking

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

UNIT-I

Introduction to Entrepreneurship and Design Thinking

What is an idea, how to generate an idea, basic requirements to start an enterprise/start-up.
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

Activity: Form into groups and discuss about the requirements to start a business

UNIT-II

Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development

Activity: Every student presents their idea in three minutes, every student can present design process in the form of flow diagram/flow chart etc. Every student should explain about product development.

UNIT-III

Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT-IV

Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT-V

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

1. Change by design, Tim Brown, Harper Bollins (2009)
2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

Reference Books:

1. Design Thinking in the Classroom by David Lee, Ulysses press
2. Design the Future, by Shrrutin N Shetty, Norton Press
3. Universal principles of design- William lidwell, kritinaholden, Jill butter.
4. The era of open innovation – chesbrough.H

Course Outcomes: After completion of the course student will be able to:

1. Able to know the concepts related to Entrepreneurship & design thinking.
2. Explain the fundamentals of Design Thinking and innovation and will equip with design thinking techniques for solving problems in various sectors.
3. Analyse to work in a multidisciplinary environment and Evaluate the value of creativity
4. Formulate specific problem statements of real time issues

Mapping of course outcomes with program outcomes:

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

MC310A Constitution of India

Instruction: Hours/Week: **2L:0T:0P** **Credits: 0**
Evaluation Scheme: 100 Marks

Course Objectives: Students will be able to

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT-I

History of Making of the Indian Constitution: History
Drafting Committee, (Composition & Working)
Philosophy of the Indian Constitution: Preamble
Salient Features

UNIT-II

- **Contours of Constitutional Rights & Duties:**
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT-III

- **Organs of Governance:**
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications

Powers and Functions

UNIT-IV

- **Local Administration:**
- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.
- Pachayati raj: Introduction, PRI: Zila Pachayat.

- Elected officials and their roles, CEO Zila Pachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

UNIT-V

- **Election Commission:**

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books/References:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes: At the end of this course students will demonstrate the ability to

1 Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

Discuss the passage of the Hindu Code Bill of 1956.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												

EC307L-Basic Electrical Engineering Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits: **1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

List of Experiments:

1. Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope).
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
4. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).
5. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
7. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
8. Torque Speed Characteristic of separately excited dc motor.
9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super synchronous speed.
10. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
11. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Course Outcomes: After completion of the course student will be able to:

CO1: Get an exposure to common electrical components and their ratings.

CO2: Make electrical connections by wires of appropriate ratings.

CO3: Understand the usage of common electrical measuring instruments.

CO4: Understand the basic characteristics of transformers and electrical machines.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	2
CO2	2	2	1	1	-	-	-	-	-	-	-	2
CO3	2	2	1	1	-	-	-	-	-	-	-	2
CO4	2	2	1	1	-	-	-	-	-	-	-	2

EC308L-Electronic Devices Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits: **1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

Hands-on experiments related to the course contents Electronic Devices Laboratory
List of Experiments:

1. P-N Junction Diode Characteristics
2. Zener Diode Characteristics
3. Half Wave Rectifiers (without and with filter)
4. Full Wave Rectifiers (without and with filter)
5. CB Characteristics
6. CE Characteristics
7. CC Characteristics
8. FET Characteristics
9. BJT Biasing
10. SCR Characteristics
11. UJT Characteristics
12. LDR characteristics
13. LED Characteristics
14. Photodiode characteristics
15. Phototransistor characteristics.

Some of the experiments can be done using any Simulation Software.

Prerequisites: None

Course Outcomes: After completion of the course student will be able to:

CO1: Plot the characteristics of electronic devices to understand their behaviour.

CO2: Design, construct and test amplifier circuits, Rectifiers, Special devices and interpret the results.

CO3: Operate electronic test equipment using hardware/software tools to characterize the behaviour of devices and circuits.

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	-	-	-	1	2	-	-	3	-
CO2	3	2	3	-	-	-	-	2	-	-	3	-
CO3	3	3	3	3	-	-	-	2	-	-	3	-

EC311L-Simulation Laboratory

Instruction: Hours/Week: **0L:0T:2P** Credits: **01**
Sessional Marks: **40** End Semester Examination Marks: **60**

- **All the experiments are to be simulated using MATLAB or equivalent software.**
- **Minimum of 12 - 15 experiments are to be completed.**

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function and verify its stability.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
15. Write a program to find autocorrelation and cross correlation of given sequences. Removal of noise by Autocorrelation / Cross correlation.

16. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System
17. Extraction of Periodic Signal masked by noise using Correlation.
18. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
19. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
20. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
21. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.

Prerequisites: None

Course Outcomes: After completion of the course student will be able to:

CO1: Learn how to use the MATLAB software and know syntax of MATLAB programming.

CO2: Understand how to simulate different types of signals and system response.

CO3: Find the Fourier Transform of a given signal and plot amplitude and phase characteristics.

CO4: Analyze the response of different systems when they are excited by different signals and plot power spectral density of signals.

Mapping of course outcomes with program outcomes:

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

EC401C-Linear Control Systems

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Objectives:

1. To create a foundation in signals and systems which will facilitate better understanding of higher level subjects like signal processing, control systems, communication systems etc.
2. To intrude signals and their representation in various domain and understand classification of signals.
3. To understand the transmission of signals through linear time invariant (LTI) system and introduce the types of convolution filters and their responses.
4. To introduce the concept of correlation and their properties.
5. To discuss the importance and application of Laplace transform.

To discuss the significance of Z-transform and its properties

Unit-I

Introduction to control problem:

Industrial Control examples, System Representation, Classification of systems, Feedback Control, Benefits of Feedback- Open-Loop and Closed-loop systems, Advantages and Disadvantages of control systems, Industrial Control examples.

Mathematical models of physical systems: Electrical, Mechanical and Electro-Mechanical, Transfer function models of linear time-invariant systems: Potentiometers, Synchros, LVDT, dc and ac servomotors, Tacho-generators, electro hydraulic valves, hydraulic servomotors, electro pneumatic valves, pneumatic actuators. Closed-loop systems, Block diagram algebra, Reduction techniques and Signal flow graph.

Unit-II

Time Response Analysis:

Standard test signals, Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness. Design specifications for second-order systems based on the time-response, Steady state errors and error constants, Performance specifications in time-domain error, Static and Generalized error constants, Concept of stability, Routh-Hurwitz Criteria, Relative Stability analysis, Root-Locus technique, Construction of Root-loci.

Unit-III

Frequency-response analysis:

Introduction to Frequency domain specifications -Relationship between time and frequency response, Polar plots, Bode plot, stability in frequency domain, Nyquist plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Performance specifications in frequency-domain, Frequency domain methods of design.

Unit-IV

Introduction to Controller Design:

Compensation & their realization in time & frequency domain, Introduction to controllers (PI, PD, PID), Application of Proportional, Integral and Derivative Controllers, Need for Lead and Lag compensators, Applications of compensators, Comparison of controllers and compensators, Problems.

Unit-V

State variable Analysis:

Concepts of state, state variables, State space model for linear continuous time functions, Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability.

Text/Reference Books:

1. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. B. C. Kuo, "Automatic Control System", Prentice Hall, Seventh edition, 1995.
3. K. Ogata, "Modern Control Engineering", Prentice Hall, second edition, 1991.
4. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009K. L. Chung.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Identify the various control system components and their representations.
2. Analyze the various time domain parameters.
3. Analysis the various frequency response plots and its system.
4. Apply the concepts of various system stability criterions and design various transfer functions of digital control system using state variable models.

Mapping of course outcomes with program outcomes:

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

EC402C-Probability Theory and Stochastic Processes

Instruction: Hours/Week: **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course objectives:

1. To find Distribution function, Density function, Characteristic and moment generating functions for different Random variables.
2. To find Joint distribution / Density functions – Conditional density / Distribution functions on multiple Random variables
3. To study properties of Random Processes.
4. To study different Linear Systems with Random Inputs
5. To evaluate Optimum Linear Systems.

UNIT-1

Sets and set operations, Probability space, Conditional probability Total Probability, and Bayes theorem, Combinatorial probability and sampling models.

Discrete random variables, probability mass function, probability distribution function, example random variables and distributions. Continuous random variables, probability density function, probability distribution function, example distributions.

UNIT-2

Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments, Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds.

UNIT-3

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, Central Limit Theorem, (Proof not expected), Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-4

Random Process: Classification of Processes, Stationary processes, Mean and covariance functions, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function & Its Properties, Cross-Correlation Function & its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Power spectral density, Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT-5

Transmission of random process through LTI systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, properties of white noise, Band pass, Band-Limited and Narrowband Processes, Properties.

UNIT-V

Transmission of random process through LTI systems: System Response, Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, properties of white noise, Band pass, Band-Limited and Narrowband Processes, Properties.

Text / Reference Books:

1. H. Stark and J. Woods, Probability and Random Processes with Applications to Signal Processing, 3rd Edition, Pearson Education.
2. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles, Tata McGraw Hill, 4th Edition, 2001.
3. Athanasios Papoulis and S. Unnikrishnan Pillai, Probability, Random Variables and Stochastic Processes, PHI, 4th Edition, 2002.
4. Hisashi Kobayashi, Brian L. Mark and William Turin, Probability, Random Processes, and Statistical Analysis, Cambridge University Press, 2012.
5. John J. Shynk, Probability, Random Variables, and Random Processes Theory and Signal Processing Applications, John Wiley & Sons, Inc., Hoboken, New Jersey, 2013, ISBN: 978-0-470-24209-4.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand representation of random signals.
2. Obtain Distribution function, Density functions, and Conditional density functions for different Random variables.
3. Make use of theorems related to random signals.
4. Investigate temporal and spectral characteristics of random processes.
5. Able to Model of different Noise Sources and understand propagation of random signals in LTI systems.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	-	-	-	3	-	-	2
CO2	3	3	2	2	1	-	-	-	3	-	-	2
CO3	2	2	2	2	2	-	-	-	3	-	-	2
CO4	3	2	3	3	2	-	-	-	3	-	-	1
CO5	3	3	3	2	3	-	-	-	3	-	-	2

HS403C-Managerial Economics and Accountancy

Instruction: Hours/Week: 3**L:0T:0P** Credits**: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course Objectives:

1. To introduce to managerial Economics, Cost Analysis Production and Supply Analysis
2. To gain Knowledge in Price and Output Decisions Under Different Market StructuresAnd Profit Management

UNIT – I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

UNIT – II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

UNIT – III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

UNIT – IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

UNIT – V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

Text/ Reference Books:

1. Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
2. Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
3. A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
4. Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
5. Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand Macro Economic environment of the business and its impact on enterprise.
2. Identify various cost elements of the product and its effect on decision making.
3. Understand the concepts of financial management and smart investment.
4. Prepare the Accounting records and interpret the data for Managerial Decisions.

Mapping of course outcomes with program outcomes:

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	1	-	-	-	-	-	-	-		2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-
CO3	-	1	-	-	-	-	-	-	-	-	3	-
CO4	2	-	-	-	-	-	-	-	-	-	3	-

EC404C-IC Applications

Instruction: Hours/Week: 3**L:0T:0P** Credits**: 3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course objectives:

1. To study the applications of IC 741 as Scalar, Voltage follower, Adder and Comparator
2. To study the applications of IC 741 as AC coupled amplifier, integrator and differentiator c
3. To study the rectifier circuits using operational amplifiers and precision diodes.
4. To study R-2R Ladder and Weighted resistor type DAC.
5. To study the astable operation using operational amplifier
6. To generate triangular and square waveforms using 741 IC and IC 8038
7. To study the voltage regulator using IC 723
8. To study an operational amplifier as LPF and BPF

UNIT – I

Op-Amp Applications: Scale changer/inverter, Summing amplifier, Instrumentation amplifier, Instrumentation amplifier IC-AD620, DC and AC amplifiers, V to I and I to V converters, Precision rectifiers, Log and Antilog amplifiers, multiplier and divider, Analog multiplier IC-AD633, Differentiator, Integrator, Analog computation.

UNIT – II

Comparators and waveform generators: Comparator, Regenerative comparator (Schmitt Trigger), Astable and mono-stable multi-vibrators using op-amp, Triangular wave generator, Sine wave generators using op-amp. IC waveform generator (8038).

UNIT – III

Voltage regulators: Series op-amp regulator, IC voltage regulators, 723 General purpose regulator, Switching regulators. Active filters: Low pass, high pass, band pass, band reject and all pass filters, transformation, State variable filter, Switched capacitor filters, Switched capacitor filter ICs.

UNIT – IV

555 Timer: Description of functional diagram, Monostable operation. Applications in monostable mode, Astable operation, Applications in astable mode, Schmitt trigger. Phase Locked Loops: PLL- introduction, block schematic, principles and description individual blocks, IC PLL (565), Voltage controlled oscillator (566), PLL applications- Frequency multiplication, Frequency translation, FM & FSK demodulation.

UNIT – V

D-A and A-D Converters: Basic DAC Techniques, Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R ladder, Monolithic DAC IC-1409, A-D converters, direct type ADCs, the parallel comparator(flash) A/D converter, The counter type A/D converter, Servo tracking A/D converter, Successive approximation converter, Integrating type of ADCs, Charge balancing ADC, Dual-slope ADC, DAC/ADC specifications.

Text/ Reference Books:

1. D.Roy Choudary, Shail Bala Jain, "Linear Integrated circuits", New Age International publishers, 2018.
2. Ramakant A.Gayakward, "Op-amps and linear Integrated circuits", LPE, 4th edition, Pearson Education.
3. S.Salivahanan, V.S.Kanchana Bhaaskaran "Linear Integrated circuits", TMH, 2008.
4. David A. Bell, "Operational amplifiers and Linear ICs", PHI, EEE, 1997.
5. 5. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand the functioning of OP-AMP and design OP-AMP based circuits.
2. Understand the functioning of voltage regulators and design IC based voltage regulators,
3. Understand the functioning of 555 timer and design 555 timer-based circuits.
4. Understand the functioning of PLL and design PLL based circuits.
5. Design ADC and DAC circuits

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	-	-	-	-	1	2
CO2	3	3	2	2	-	1	-	-	-	-	1	2
CO3	3	3	2	2	-	1	-	-	-	-	1	2
CO4	3	3	2	2	-	1	-	-	-	-	1	1
CO5	3	3	2	2	-	1	-	-	-	-	1	1

EC405C-Analog Communications

Instruction: (Hours/Week) **3L:0T:0P** Credits: **3**
Sessional Marks: **40** End Semester Examination Marks: **60**

Course objectives:

1. Understand concept of modulation and design of major building blocks of communication system.
2. Modulation techniques will be analyzed both in time and frequency domains.
3. To understand the communication systems. Signal modulation techniques will be emphasized.
4. Able to understand Signal Modulation (amplitude, frequency, and phase) and transmission techniques (base band, band pass) will be emphasized.
5. To develop a clear insight into the relations between the input and output ac signals in various stages of a transmitter and a receiver of AM & FM systems.

Unit – I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.
Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Frequency division multiplexing (FDM), Illustrative Problems.

UNIT-II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation- Frequency Modulation & Phase modulation : Bandwidth of angle modulated waves, Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves-Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM Capture Effect, Illustrative Problems.

UNIT-III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

UNIT-IV

Radio Receivers: Working principle of Super heterodyne AM and FM Receivers along with suitable block diagrams, Sensitivity, Selectivity and fidelity.

Analog Pulse Modulation Schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.

UNIT-V

Information Theory: Introduction, Information and Entropy, and its properties, source coding Theorem, Data Compaction – Prefix coding, Huffman coding, Discrete Memory less channels, Mutual Information, and its properties, Channel capacity, Channel coding Theorem, Application to binary symmetric channels, differential entropy and mutual information, Information capacity theorem, implication of information capacity theorem, Rate Distortion, Illustrative problems.

Text Books:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Simon Haykin, "Communication Systems," by John Wiley & Sons,3rdEdition, 2010.
3. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.

REFERENCES:

1. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Herbert Taub&Donald L Schilling, "Principles of Communication Systems", Tata McGraw- Hill, 3rd Edition, 2009.
3. R.E. Ziemer& W.H. Tranter, "Principles of Communication-Systems Modulation & Noise", Jaico Publishing House, 5thedition, 2001.
4. George Kennedy and Bernard Davis, "Electronics & Communication System", TMH,2004.

Course Outcomes: At the end of this course students will have the ability to

CO1: Understand the concepts of various Amplitude, Angle and Pulse Modulation schemes. Understand the concepts of information theory with random processes. (L1)

CO2: Apply the concepts to solve problems in analog and pulse modulation schemes. (L2)

CO3: Analysis of analog communication system in the presence of noise. (L3)

CO4: Compare and contrast design issues, advantages, disadvantages and limitations of various modulation schemes in analog communication systems. (L4)

CO5: Solve basic communication problems & calculate information rate and channel capacity of a discrete communication channel. (L5)

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	3	2	1	1	1	3	3
CO2	3	3	3	3	1	2	2	2	1	1	2	3
CO3	3	2	3	3	1	2	1	2	2	-	2	3
CO4	2	2	2	2	2	2	2	2	2	-	2	2
CO5	3	2	3	3	2	3	2	2	2	-	2	2

EC409S- Python Programming

Instruction: (Hours/Week) **1L:0T:2P** Credits: **2**
Evaluation Scheme: 100 Marks

Unit – I

Introduction to Python Programming Language

Introduction to Python Language: What is Python? Why Python? Installing Python on Windows, Python IDLE, Python Literals, Python Data Types Basic Input-Output operations, Operators in Python, Decision making in Python, Conditional execution in Python, Logical and bit operations in Python, Naming Conventions, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Data type conversion, Built in Functions.

UNIT-II

Python Built-in Data Structures

Introduction, List, Tuples, Dictionary, Sets, List Operations append, extend, insert, remove, pop, slice, and reverse, List Comprehension, Dictionary operations, Sorting Dictionaries, Copying Collections, Set operations. Standard python modules math, time, IO and time, Regular expressions, multi-threading.

UNIT-III

Classes & Objects

Classes in Python, Principles of Object-Oriented programming, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

UNIT-IV

Functions, I/O, Exception Handling in Python

Introduction: Defining your own functions, keyword and optional parameters, mapping functions, lambda functions, ·Data Streams · Creating Your Own Data Streams · Access Modes · Writing Data to a File · Reading Data from a File · Additional File Methods · Using Pipes as Data Streams · Handling IO Exceptions · Working with Directories · Metadata · Errors · Run Time Errors · The Exception Model · Exception Hierarchy · Handling Multiple Exceptions.

UNIT-V

Python API development.

Introduction to API, Python API programming, Python web application frameworks, REST API, Python Flask, Flask Environment, Routing, Cookies, Sessions, Running Flask Application, Testing API with POSTMAN client

Text Books:

1. Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher, Revised and Expanded version (Referred by MIT)
2. Python Programming using problem solving Approach by Reema Thareja, Oxford University, Higher Education Oxford University Press; First edition (10 June 2017), ISBN-10: 0199480173
3. Data Structures and Algorithms in Python by Michael T Goodrich and Robertto Thamassia, Micheal S Goldwasser, Wiley Publisher (2016)
4. Fundamentals of Python first Programmes by Kenneth A Lambert, Copyrighted material Course Technology Inc. 1 st edition (6th February 2009)

REFERENCES:

1. Dive into Python, Mike 2. Learning Python, 4th Edition by Mark Lutz 3. Programming Python, 4th Edition by Mark L
2. Fundamentals of Python Programming, Richard L. Halterman Updated content of the book is maintained under the URL:http://python.cs.southern.edu/pythonbook/pythonbook.pdf
3. The official Python Tutorial. http://docs.python.org/tut/ How to think like a computer scientist (interactive) http://interactivepython.org/runestone/static/thinkcspy/index.html
4. How to think like a computer scientist http://openbookproject.net/thinkcs/python/english3e/
5. Code Academy Python http://www.codecademy.com/tracks/python
6. A useful hands-on book: http://anh.cs.luc.edu/python/hands-on/3.1/Hands-onPythonTutorial.pdf

Course Outcomes: At the end of this course students will have the ability to

1. Apply the OOP principles and best practices of python programming.
2. Write clear and effective pythonic code.
3. Create applications using python programming.
4. Implementing databases using SQLite and Access databases using python programming.
5. Understand and feel comfortable in working with web application frameworks.
6. Develop APIs required for the web applications using web frameworks like Flask and Fast API.

Mapping of course outcomes with program outcomes:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

EC406L-Digital Logic Design Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits: **1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

LIST OF EXPERIMENTS

1. Realization of Boolean Expressions using Gates
2. Design and realization of logic gates using universal gates
3. Design and realization of a 4 – bit Gray to Binary and Binary to Gray Converter
4. Verify the functionality of Mux and Decoder ICs
5. Design and realization of 4-bit comparator
6. Verify the functionality of Flip-Flop ICs
7. Mod-N counter using 7490 and 74190.
8. Shift register IC 7495.

Note: Implement using digital ICs.

VHDL Programming:

1. Write structural and dataflow VHDL models for
   a) 4-bit ripple carry adder. b) 4-bit carry Adder – cum Subtractor.
   c) 2-digit BCD adder /subtractor d) 4-bit carry look ahead adder e) 8-bit comparator

2. Write a VHDL program in structural model for
   a) 16:1 mux realization b) 3:8 decoder realization through 2:4 decoder
3. Write a VHDL program in behavioral model for
   a) 16:1 mux b) 3:8 decoder c) 8:3 encoder d) 8 bit parity generator and checker

4. Write a VHDL program in structural and behavioral models for
   a) 8 bit asynchronous up-down counter b) 8 bit synchronous up-down counter

5. Write a VHDL program for 4-bit sequence detector through Mealy and Moore state machines.

6. Write a VHDL program in behavioral model for 8-bit shift and add multiplier.

7. Write a VHDL program in structural model for 8-bit Universal Shift Register.

Some of the experiments can be done using any Simulation Software.

Course Outcomes: At the end of this course students will have the ability to

1. Construct Basic combinational Circuits and Verification of its functionality
2. Construct Sequential Circuits and Verification of its functionality
3. Write structural, behavioral and data flow models for digital circuits
4. Simulate VHDL models of digital circuits

Mapping of course outcomes with program outcomes:

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

EC407L-Analog Circuits Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits**: 1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

Hands-on experiments related to the course contents Analog Circuits.
Prerequisites: Electronic Devices Laboratory.

Course Outcomes:

After completion of the course student will be able to:

List of Experiments:

1. Common Emitter Amplifier.
2. Common Collector amplifier
3. Two Stage RC coupled amplifier
4. Voltage series feedback amplifier
5. Voltage shunt feedback amplifier
6. Current series feedback amplifier
7. Current shunt feedback amplifier
8. RC phase shift oscillator
9. Wien bridge oscillator
10. LC/ crystal oscillator.
11. Class A Power Amplifier (Transformer less)
12. Class B Complementary Symmetry Amplifier
12. Differential amplifier
13. Operational amplifier as (i) Inverting amplifies, (ii) Non-Inverting amplifier (III) Voltage follower

Some of the experiments can be done using any Simulation Software.

Course Outcomes:
At the end of this course students will have the ability to

1. Know about the usage of equipment/components/software tools used to conduct the experiments in analog circuits.
2. Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs to find the important parameters of the circuit (viz. Voltage gain, Current gain, bandwidth, input and output impedances etc) experimentally.
3. Analyze the given analog circuit to find required important metrics of it theoretically and Compare the experimental results with that of theoretical ones and infer the conclusions.
4. Draw the relevant graphs between important metrics of the system from the observed measurements.

Mapping of course outcomes with program outcomes:

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

EC408L-IC Applications Laboratory

Instruction: Hours/Week: **0L:0T:3P** Credits**: 1.5**
Sessional Marks: **40** End Semester Examination Marks: **60**

Hands-on experiments related to the course contents EC408L.

List of Experiments:

1. Study and Operation of IC testers, pulse generator and digital trainer.
2. Frequency response of inverting and non-inverting amplifier.
3. Measurement of Op.amp parameters: (i) Offset voltage (ii) Offset current (iii) CMRR and (iv) Slew rate
4. Op-amp monostable and astable multivibrators.
5. Design 2's complement adder/subtractor using IC74283 and verify experimentally.
6. Low voltage regulator IC 723.
7. 555 timer: Monostable and astable multivibrators.
8. IC PLL (565) applications- Frequency multiplication, Frequency translation, FM & FSK demodulation.
9. Voltage controlled oscillator (566)

Course Outcomes: After the completion of the course the student will be able to

1. Measure the parameters of IC 741 Op-amp.
2. Design applications of IC 741 Op-amp
3. Realize analog filters using Op-amp.
4. Design multivibrators using 555 IC.

Mapping of course outcomes with program outcomes:

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