REGULATIONS – 2013

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI OF
I & II YEAR
B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING
NATIONAL ENGINEERING COLLEGE, K.R.NAGAR, KOVILPATTI  
(An Autonomous Institution, Affiliated to Anna University, Chennai)

COLLEGE VISION

• Transforming lives through quality Education and research with human values

COLLEGE MISSION

• To maintain excellent infrastructure and highly qualified and dedicated faculty

• To provide a conducive learning environment with an ambience of humanity, wisdom, creativity and team spirit

• To promote the values of ethical behavior and commitment to the society

• To partner with academic, industrial and government entities to attain collaborative research
Department Of Electronics and Communication Engineering

VISION

• To produce communication engineers capable of generating a knowledge economy with social responsibility

MISSION

• To impart high quality education with ethical behavior.
• To equip the students compatible with recent trends in Electronic industries.
• To develop leadership qualities with humanity, wisdom, creativity and team spirit.
• To provide a passionate environment for continual learning.

Program Educational Objectives (PEO)

• Graduate will have successful technical career in core and related fields.
• Graduates will pursue higher education and work in Research and Development for solving real world problems.
• Graduates will have leadership qualities with social consciousness and ethics.
Program Outcomes (PO)

1. An ability to apply knowledge of mathematics, science, engineering and technology to solve complex Electronics and communication Engineering problems.

2. An ability to identify, formulate and analyze engineering problems using knowledge of Basic Mathematics and Engineering sciences.

3. An ability to provide solution and to design Electronics and Communication systems that meets out the social needs.

4. An ability to investigate the problems in an Electronics and Communication systems and rectifying it.

5. An ability to use latest hardware and software tools to solve complex engineering problems.

6. An ability to gain knowledge on contemporary issues which influence engineering design.

7. Awareness on society and environment to have sustainable solution for Electronics and Communication engineering problems.

8. An ability to demonstrate understanding of professional and ethical responsibilities.

9. An ability to work efficiently as an individual and in multidisciplinary teams.

10. An ability to communicate effectively and efficiently both in verbal and written form.

11. An ability to develop confidence for self education and understanding the value for life-long learning.

12. Able to implement Electronic system projects for real world applications.
REGULATIONS 2013 – CURRICULUM AND SYLLABI

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER I (Common to all B.E. / B.Tech., Degree Programmes)

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**Total Number of Credits:** 27
### SEMESTER – II

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**Total Number of Credits:** 29
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SH100  
**TECHNICAL ENGLISH – I**  
(Common to all B.E. / B.Tech., Degree Programmes)  

**COURSE OUTCOMES**  
The Student will  
- apply basic grammar in Writing and Speaking.  
- prepare formal Letter Writings.  
- come out with proper pronunciation.  
- speak confidently in interactions.  
- develop interest to read any article.  

**UNIT I**  
**Language Focus:** Technical Vocabulary, Word Formation, Concord, Tense (Present).  
**Writing:** Leave Application Letter, Paragraph writing.  
**Listening:** Listening to correct pronunciation of words.  
**Speaking:** Self - Introduction, Greetings.  

**UNIT II**  
**Language Focus:** Words often misspelled, Articles, Tense (Past)  
**Writing:** Permission letters (In-plant training/Seminar/Workshop), Chart description.  
**Listening:** Listening to the Sentences with correct stress and Intonation.  
**Speaking:** Situational Conversations.  

**UNIT III**  
**Language Focus:** Compound nouns, Tense (Future), Preposition, Comparative Adjectives.  
**Writing:** Invitation Letter, Acceptance Letter, Declining Letter.  
**Listening:** Listening to the conversations.  
**Speaking:** One minute speech.  

**UNIT IV**  
**Language Focus:** Modal verbs, Gerund, Infinitives, Voice.  
**Writing:** Writing Instructions, Letters to Editor.  
**Listening:** Listening to the different Tonal Expressions.  
**Speaking:** Giving Opinions.  

**UNIT V**  
**Language Focus:** ‘If’ Conditionals, ‘Wh’ questions, Question Tags.  
**Writing:** Reading and Note - taking  
**Speaking:** Group Discussion.  
**Reading:** ERC, one word questions from the suggested book.  

**SUGGESTED ACTIVITIES**  
2. Exercises on gap filling and correction of errors on Concord (Subject – Verb Agreement).  
3. Gap filling exercises using the appropriate Tense forms.  
4. Exercises on transferring information from Graph to Text – Bar charts, Flow charts.  
5. Making sentences using Modal verbs to express probability, compulsion, etc.  
6. Exercises on Writing Instructions.  
7. Exercises on framing Questions.  
8. Other relevant classroom activities.  

L: 45 T: 15  TOTAL: 60 PERIODS
BOOK SUGGESTED FOR READING

REFERENCES
SH101 MATRICES AND DIFFERENTIAL CALCULUS
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
- Ability to find inverse and integral powers of matrices and to perform transformations of matrices.
- Ability to find the evolutes of various curves.
- Ability to solve ordinary and partial differential equations.
- Ability to obtain constrained maxima and minima.

UNIT I MATRICES
Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties (excluding proofs); Cayley – Hamilton theorem (excluding proof) – Inverse and integral powers of a matrix using Cayley – Hamilton theorem; Diagonalisation of a matrix by orthogonal transformation; Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II DIFFERENTIAL CALCULUS
Curvature in cartesian, parametric and polar forms; Centre, radius and circle of curvature; Evolutes.

UNIT III FUNCTIONS OF SEVERAL VARIABLES
Partial derivatives; Total derivatives; Differentiation of implicit functions; Jacobians; Maxima and Minima - Method of Lagrangian multipliers.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS
Higher order linear differential equations with constant coefficients; Method of variation of parameters; Cauchy’s and Legendre’s linear equations; Simultaneous first order linear equations with constant coefficients.

UNIT V PARTIAL DIFFERENTIAL EQUATIONS
Formation of partial differential equations; Lagrange’s linear equations; Solutions of standard types of first order partial differential equations; Linear partial differential equations of second and higher order with constant coefficients.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
SH102  APPLIED PHYSICS  
(Common to all B.E. / B.Tech., Degree Programmes) 

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COURSE OUTCOMES
The students will be able to
- gain knowledge on the properties of matter and hydrodynamics.
- study and apply the ultrasonic methods for industrial and medical field.
- understand Lasers and to identify the appropriate Laser technique for industrial and medical field.
- understand the different types, fabrication, losses of optical fibers and the applications of fiber optics in communication and instrumentation.
- understand the physical properties of photons and electrons and to study the different Electron Microscopes.

UNIT I  PROPERTIES OF MATTER AND HYDRODYNAMICS  

**Properties of Matter**
Stress, Strain, Hooke’s law; Types of moduli of elasticity; Torsional pendulum – Determination of Rigidity modulus of a wire; Bending of beams – Expression for bending moment – Measurement of Young’s modulus by uniform and Non-uniform bending – I Shaped girders.

**Hydrodynamics**
Stream line flow, Turbulent flow, Poiseuille’s formula for flow of liquid through a capillary tube, Determination of coefficient of viscosity of a liquid.

UNIT II  ULTRASONICS  


UNIT III  LASERS  

Principle of spontaneous emission and stimulated emission, Population inversion, Pumping, Einstein’s A and B coefficients – derivation; Types of Lasers - CO₂ Laser, Nd-YAG Laser, Semiconductor Laser (Homojunction); Determination of wavelength of Laser using grating and Particle size; Applications of Lasers: Industrial applications – Welding, Cutting and Heat treatment; Medical applications; Holography (construction and reconstruction).

UNIT IV  FIBER OPTICS AND ITS APPLICATIONS  

Principle and propagation of light in optical fibers; Numerical aperture and Acceptance angle; Types of optical fibers – material, refractive index and mode; Double crucible technique of fiber drawing; Splicing – fusion splicing; Loss in optical fiber – attenuation, dispersion and bending; Fiber optical communication system (Block diagram); Advantages and Applications of optical fiber; Fiber optic sensors – temperature and displacement; Endoscope.

UNIT V  QUANTUM PHYSICS AND MICROSCOPY  

Black body radiation – Planck’s theory (derivation) – Deduction of Wien’s displacement law and Rayleigh Jean’s Law from Planck’s theory; Photoelectric effect – Law of Photoelectric effect – Photoelectric equation; Matter Waves – De Broglie wavelength - Schrodinger’s wave equation – time independent and time dependent equations – Particle in one dimensional box; Heisenberg’s Uncertainty principle; Linear Harmonic oscillator; Electron microscope – scanning electron microscope – transmission electron microscope.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
SH103 ENGINEERING CHEMISTRY
(Common to all B.E. / B.Tech., Degree Programmes) L T P C 3 0 0 3

COURSE OUTCOMES
The students will be able to
- select suitable water treatment techniques for industrial and domestic purpose.
- acquire knowledge of electrochemistry.
- apply the contextual knowledge of adsorption techniques for industrial applications.
- synthesize polymers for domestic and industrial applications.
- understand the knowledge of nano materials for their applications in Science and Engineering.

UNIT I WATER TREATMENT 9

UNIT II ELECTRO ANALYTICAL TECHNIQUES 9
Electrode potential: definition, measurement of electrode potential, Nernst equation – problems; EMF: definition, measurement of EMF – Poggendorff’s method; reference electrode: standard hydrogen electrode, calomel electrode, glass electrode – measurement of pH using glass electrode; CO₂ sensing electrode; conductometric titrations: acid-base titration (HCl vs NaOH); potentiometric titrations: redox titration (Fe²⁺ vs K₂Cr₂O₇), precipitation titration (Ag⁺ vs NaCl).

UNIT III CATALYSIS AND SURFACE PHENOMENA 9
Types of catalysis – homogeneous catalysis – heterogeneous catalysis, mechanism of catalytic action - contact theory, catalytic promoters, catalytic poison; enzyme catalysis: Michaelis-Menton equation; adsorption: definition, types – physical adsorption – chemical adsorption – differences between physical and chemical adsorption; adsorption isotherms: definition, Freundlich and Langmuir adsorption isotherms, applications of adsorption.

UNIT IV ENGINEERING POLYMERS 9

UNIT V NANO MATERIALS 9
Nanoparticles: definition, carbon nanotubes (CNT), types of carbon nano tubes – single walled and multi walled carbon nanotubes – fullerene; synthesis of carbon nanotubes: chemical vapour deposition – laser ablation – arc-discharge method; properties of CNT: mechanical, electrical, thermal and optical properties; applications of carbon nanotubes in chemical field, medicinal field, mechanical field and current applications.

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES

SH104 FUNDAMENTALS OF COMPUTING AND PROGRAMMING IN C  
(Common to all B.E. / B.Tech., Degree Programmes)  

COURSE OUTCOMES  
• Learn the major components of a computer system.  
• Formulate the algorithms and analyze their complexity.  
• Identify the correct and efficient ways of solving problems.  
• Acquire knowledge about dynamic memory allocation, modular programming and data organization.  
• Develop real time applications using the power of C language features.  

UNIT I COMPUTER FUNDAMENTALS 10  
Classification of Computers – Basic Computer organization – Number Systems – Problem Analysis – 

UNIT II BASIC C PROGRAMMING 9  
Structure of C Program – Keywords, Constants, Variables and Data Types – Operators and 

UNIT III FUNCTIONS, ARRAYS AND POINTERS 9  
Functions: User-defined functions – Definitions – Declarations - Call by reference – Call by value.  
Arrays: Declaration – Definition – Multidimensional Arrays – Functions with array as arguments.  
Pointers: Initialization – Pointers as Arguments – Pointers to Pointers – Dynamic Memory Management Functions.  

UNIT IV STRUCTURES AND UNIONS 9  
Derived types – Structures: Declaration – Definition – Initialization of structures – Accessing 

UNIT V FILE HANDLING 8  

TOTAL: 45 PERIODS  

TEXT BOOKS  
 Kindersley (India), 2011.  

REFERENCES  
SH105 ENGINEERING GRAPHICS  
(Common to all B.E. / B.Tech., Degree Programmes)  
L T P C  
2 3 0 4  

COURSE OUTCOMES  
- Students will be able to use the drawing instruments effectively.  
- An ability to draw the basic engineering curves and problems related to projections of points, straight lines, planes and solids.  
- Able to apply the knowledge acquired on practical applications of sectioning and development of solids.  
- Able to draw simple solids and its sections in isometric view and projections and also to draw its perspective views.  

Drawing Instruments – IS specifications on lines – drawing sheets – Printing letters and dimensioning – scales (not for examination) – First angle projection should be followed.  

UNIT I PLANE CURVES  
Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloids – Epi and Hypo cycloids - construction of involutes of square and circle – Drawing of tangents and normal to the above curves.  

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES  
Projection of points and straight lines located in the first quadrant – Traces – Determination of true lengths and true inclinations.  
Projection of regular polygonal surfaces and circular lamina inclined to any one reference plane.  

UNIT III PROJECTION OF SOLIDS  
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.  

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES  
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – obtaining true shape of section.  
Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinder and cone – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.  

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS  
Perspective projection of prisms, pyramids and cylinders by visual ray method and vanishing point method.  

TOTAL: 60 PERIODS  

Note: In end semester examination from each unit one question with either or pattern may be asked. No short questions.  

TEXT BOOK  
REFERENCES
SH106  C PROGRAMMING LABORATORY  
(Common to all B.E. / B.Tech., Degree Programmes)  L T P C  
0 0 3 2

COURSE OUTCOMES

• Acquire logical thinking and problem solving skills.
• Implement the algorithms and analyze their complexity.
• Identify the correct and efficient ways of solving problems.
• Acquire hands on practice in dynamic memory allocation, modular programming and data organization.
• Implement real time applications using the power of C language features.

LIST OF EXPERIMENTS

1. Solve problems such as temperature conversion, student grading, interest calculation.
2. Finding the 2’s complement of a binary number.
3. Generation of the first ‘n’ terms of the Fibonacci sequence and prime sequence.
5. Given distance traveled by a vehicle as \( d = ut + \frac{1}{2}at^2 \), where ‘u’ and ‘a’ are the initial velocity and acceleration. Calculate the distance traveled for different time intervals.
6. Solving the roots of a quadratic equation.
7. Designing a simple arithmetic calculator. (Use switch statement)
8. Performing the following operations: (Use loop statement)  
   i. Generate Pascal’s triangle.  
   ii. Construct a Pyramid of numbers.
9. Performing the following operations to a string:  
   i. To insert a sub-string into main string at a given position.  
   ii. To delete ‘n’ characters from a given position in a string.  
   iii. To replace a character of string either from beginning or ending or at a specified location.
10. Performing the following operations: (Use arrays)  
    i. Matrix addition.  
    ii. Transpose of a matrix.  
    iii. Matrix multiplication by checking compatibility.
11. Performing the following operations: (Use recursive functions)  
    i. To find the factorial of a given integer.  
    ii. To find the GCD (Greatest Common Divisor) of two given integers.  
    iii. To solve Towers of Hanoi problem.
12. Performing the Student Information Processing using File Handling concepts.

TOTAL: 45 PERIODS

SOFTWARE REQUIREMENTS

• Turbo C/ ANSI C Compiler  
• Gcc compiler
SH107  PHYSICS AND CHEMISTRY LABORATORY – I
(Common to all B.E. / B.Tech., Degree Programmes)  L T P C
0 0 3 2

PART A – PHYSICS LABORATORY – I

COURSE OUTCOMES
At the end of the Laboratory classes, the students are able to
• develop collaborative learning skills and to add some of their own ideas to the experiments and their explanations.
• understand the optical properties, mechanical properties and electrical properties.

LIST OF EXPERIMENTS
1. (a) Particle size determination using Diode Laser.
   (b) Determination of Laser parameters – Wavelength, and angle of divergence.
   (c) Determination of Numerical aperture and acceptance angle of an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of the liquid – Ultrasonic Interferometer.
5. Determination of Young’s modulus – Non-uniform bending method.
7. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge.
   • A minimum of FIVE experiments shall be offered.

PART B - CHEMISTRY LABORATORY – I

COURSE OUTCOMES
The student
• can estimate the amount of hardness and acidity present in the water sample.
• gain knowledge about the estimation of nickel in an alloy.
• quantify the electrolyte by measuring the conductance and pH.

LIST OF EXPERIMENTS
1. Estimation of hardness of Water sample by EDTA method.
2. Estimation of acidity of Water sample.
3. Estimation of Nickel by EDTA method.
4. Conductometric titration (HCl Vs NaOH).
5. Conductometric titration (BaCl₂ Vs Na₂SO₄).
6. pH metric titration (HCl Vs NaOH).
7. Determination of molecular weight and degree of polymerization using Viscometry.
   • A minimum of FIVE experiments shall be offered.
   • Laboratory classes on alternate weeks for Physics and Chemistry.

TOTAL: 45 PERIODS
SH108  ENGINEERING PRACTICES LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)  

COURSE OUTCOMES
- Students will be able to prepare the pipe connections and identify the various components used in plumbing.
- An ability to prepare simple wooden joints using wood working tools.
- An ability to prepare simple lap, butt and tee joints using arc welding equipments.
- An ability to prepare simple components using lathe and drilling machine.

PART A – MECHANICAL AND CIVIL ENGINEERING PRACTICES

I  PLUMBING WORKS:  
5
Study of components related to plumbing.
Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

II  CARPENTRY PRACTICES:  
6
Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planning and cutting.

III  WELDING:  
5
Study of the tools used in welding Gas welding practice.
Preparation of butt joints, lap joints and tee joints using arc welding.

IV  BASIC MACHINING:  
7
(a) Simple Turning and Taper turning.
(b) Drilling Practice.

REFERENCES
PART B – ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICES

COURSE OUTCOMES

• An ability to develop familiarity with rudimentary measurement equipment – signal generators, oscilloscopes, multimeters and power supplies.
• Ability to demonstrate and evaluate the parameters of basic electronic components (wires, resistors, capacitors, diodes etc.) based on their physical parameters and dimensions.
• Define, describe, and analyze fundamentals of Boolean algebra and digital logic gates.
• An ability to predict qualitatively and quantitatively compute the steady state AC responses of basic circuits using the phasor method.
• Gain experience in the documentation of measurements and procedures as well as the preparation of formal reports.

I ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
5. Measurement of energy using single phase energy meter.

II ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipments – Resistor, colour coding, measurement of AC signal parameters (peak-peak, rms period, frequency) using CRO
2. Study of logic gates AND, OR, XOR and NOT.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

REFERENCES

13B20 TECHNICAL ENGLISH – II
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
The student will be able to
• apply correct form of language while Speaking and Writing.
• prepare his own Professional letter writings.
• interpret any passage after listening.
• interact at different situations fluently.

UNIT I
Language Focus: Homonyms, Different grammatical forms of the same word, correct usage
of words / phrases.
Writing: Recommendation writing.
Listening: Interpreting Poetic lines.
Speaking: Telephone English.

UNIT II
Language Focus: Cause and Effect, Phrasal Verbs.
Listening: Conversations.
Speaking: Asking questions.

UNIT III
Language Focus: Idioms and Phrases with animal names.
Writing: Checklist, Process Description.
Speaking: Presentations.

UNIT IV
Language Focus: Technical Definitions, Transformation of Sentences.
Writing: Job Application Letter, Curriculum Vitae, Bio-data, Resume.
Speaking: Mock Interview.

UNIT V
Language Focus: British and American Vocabulary, Numerical Expressions.
Writing: E-mail Writing, Report Writing.
Speaking: Group Discussion.

SUGGESTED ACTIVITIES
1. Making sentences using different grammatical forms of the same word.
2. Exercises on combining sentences using Cause and Effect expressions.
4. Writing exercises on Recommendations.
5. Exercises on Idioms and Phrases.
7. Exercises on British and American English words with meanings.

TOTAL: 45 PERIODS

BOOK SUGGESTED FOR READING
REFERENCES


13B21 INTEGRAL CALCULUS AND TRANSFORMS
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 1 0 4

COURSE OUTCOMES
- Ability to find area and volume of objects using double and triple integrals.
- Ability to analyze the concepts related to vector calculus and to apply them in engineering field.
- Ability to perform the ideas of Laplace transform and Z-transform in their respective engineering subjects.

UNIT I  MULTIPLE INTEGRALS 12
Double integration – Cartesian and polar coordinates; Change of order of integration; Change of variables between cartesian and polar coordinates; Triple integration in cartesian coordinates; Area as double integral; Volume as triple integral.

UNIT II  VECTOR CALCULUS 12
Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields; Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT III  LAPLACE TRANSFORM 12

UNIT IV  INVERSE LAPLACE TRANSFORM 12
Definition of Inverse Laplace transform – Convolution theorem – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transformation techniques and solution of simultaneous differential equations of first order with constant coefficients using Laplace transformation techniques.

UNIT V  Z – TRANSFORM 12

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13B22 SOLID STATE PHYSICS
(Common to ECE, CSE, EEE, EIE and IT)

COURSE OUTCOMES
The Student will be able to

• identify the crystal lattices, their structures and how the structure influences its major properties at different levels.
• choose the major functional and structural properties required for specific applications of conducting materials
• check the parameter that satisfies superconducting behaviour.
• relate technology to the physics of semiconductor devices.
• classify the magnetic materials and their storage applications.
• design optical materials that are able to be manufactured and measured using the state of art optical fabrication technologies.

UNIT I CRYSTAL PHYSICS 9
Lattice, Unit cell, Bravais lattice, Lattice planes; Miller indices – d-spacing in cubic lattice; Calculation of number of atoms per unit cell, Atomic radius, Coordination number and Packing factor for SC, BCC, FCC and HCP structures; Crystal defects – point, line and surface defects; Burger vector.

UNIT II CONDUCTING MATERIALS AND SUPERCONDUCTORS 9
Conductors
Superconductors
Superconductivity: Properties – Meissner effect – Isotopic effect; Types of superconductors – Type I and Type II superconductors; Applications of superconductors – Magnetic levitation.

UNIT III SEMICONDUCTORS 9
Intrinsic semiconductor – carrier concentration derivation – Fermi level – variation of Fermi level with temperature – electrical conductivity – bandgap determination; Extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level – with temperature and impurity concentration; Hall effect – Determination of Hall coefficient – Applications.

UNIT IV MAGNETIC MATERIALS AND STORAGE DEVICES 9
Origin of magnetic moment, Bohr magneton, Dia and Para magnetism, Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials; Anti-ferromagnetic materials; Ferrites – structure and applications; magnetic recording and readout – storage of magnetic data – tapes, floppy, Hard disk and CD ROM.

UNIT V OPTICAL MATERIALS 9
Optical properties of metals, insulators and semiconductors; Phosphorescence and fluorescence; Excitons traps and color centre and their importance; Different phosphors used in CRO screens, liquid crystal display, LED – working of LED; Thermography and its applications; Solar cell – PN junction solar cell – Conversion efficiency and solar concentration – Hetero junction solar cell.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
13B23 CHEMISTRY OF ELECTRICAL AND ELECTRONIC MATERIALS  
(Common to ECE, CSE, EEE, EIE and IT)  

L T P C  3 0 0 3

COURSE OUTCOMES
The students can
- apply the knowledge in designing new energy storing devices.
- identify the types of corrosion and to design a method to control the corrosion.
- apply the knowledge of photochemistry in designing the various electronic materials.
- choose proper analytical technique for analyzing the synthesized electronic materials.

UNIT I ENERGY SOURCES AND STORAGE DEVICES  9

UNIT II CORROSION AND ITS CONTROL  9

UNIT III PHOTOCHEMICAL PROCESSES  9

UNIT IV ELECTRONIC MATERIALS  9

UNIT V ANALYTICAL INSTRUMENTATION  9

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, students will be able to
- Analyze the circuits using various network theorems
- Compute the transient response of RL, RC and RLC circuits for AC and DC inputs.
- Determine the resonance condition for series and parallel circuits.
- Describe the operation and characteristics of different types of semiconductor diodes.

UNIT I  CIRCUIT ANALYSIS TECHNIQUES FOR DC CIRCUITS  12

UNIT II  CIRCUIT ANALYSIS TECHNIQUES FOR AC CIRCUITS  12
Mesh current and node voltage method of analysis – Thevenin’s theorem, Superposition theorem, Norton’s theorem, Maximum power transfer theorem.

UNIT III  RESONANT CIRCUITS  12

UNIT IV  TRANSIENT RESPONSE FOR CIRCUITS  12
Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and AC with sinusoidal input.

UNIT V  SEMICONDUCTOR DIODES  12

TEXT BOOKS

REFERENCES
13B25 BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to ECE, CSE, EEE, EIE and IT)

L T P C
4 0 0 4

COURSE OUTCOMES

- An ability to identify the various systems and its components of various power plants.
- An ability to state and differentiate the working principles of IC engines.
- Students will be able to identify the various systems and components of refrigeration and air conditioning systems.

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15

UNIT II BUILDING COMPONENTS AND STRUCTURES 15
Foundations: Types, Bearing capacity – Requirement of good foundations.

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

UNIT IV IC ENGINES 10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10
Terminology of refrigeration and air conditioning – Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air Conditioner.

TOTAL: 60 PERIODS

REFERENCES
13B26 COMPUTER PROGRAMMING LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

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

- Demonstrate how to use the UNIX Shell commands.
- Use the Shell programming constructs.
- Learn tracing mechanisms (for debugging), user variables, Shell variables, read-only variables, positional parameters, reading input to a Shell script.
- Test on numeric values, test on file type, and test on character strings using shell scripts.
- Write moderately complex Shell scripts and make them executable.

Execute programs written in C under UNIX environment.

LIST OF EXPERIMENTS

1. Study of UNIX OS, vi Editor.

2. Use of Basic UNIX Shell Commands:
   - ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.

3. Shell Programming:
   i. Interactive shell scripts
   ii. Positional parameters
   iii. Arithmetic Operators
   iv. if-then-fi, if-then-else-fi, nested if-else
   v. Logical operators
   vi. if - elif, case structure
   vii. while, until, for loops, use of break
   viii. Metacharacters

4. Shell scripts for the following:
   i. Showing the count of users logged in
   ii. Printing column wise list of files in your home directory
   iii. To count lines, words and characters in its input (do not use wc)

5. C Programming on UNIX:
   i. Dynamic Storage Allocation
   ii. Pointers
   iii. Functions
   iv. File Handling

SOFTWARE REQUIREMENTS
- UNIX/LINUX OS
- Gcc compiler

TOTAL: 45 PERIODS
13B27 PHYSICS AND CHEMISTRY LABORATORY – II
(Common to all B.E. / B.Tech., Degree Programmes)

PART A - PHYSICS LABORATORY – II

COURSE OUTCOMES
At the end of the Laboratory classes, the students
- demonstrate and report the elastic behaviour of materials
- demonstrate the interference property of light waves
- demonstrate the diffraction property of light waves
- measure the thermal properties of conducting materials
- identify the substance that deforms continuously when subjected to shearing stress.

LIST OF EXPERIMENTS
1. Determination of Young’s modulus – Uniform bending method.
2. Determination of Band Gap of a semiconductor material.
3. Determination of Hall Co-efficient.
5. Determination of wavelength of mercury spectrum using spectrometer and grating
7. Torsional pendulum – Determination of Moment of Inertia of the disc and Rigidity modulus of the material of the wire.

* A minimum of FIVE experiments shall be offered.

PART B - CHEMISTRY LABORATORY – II

COURSE OUTCOMES
The student
- can estimate the amount of alkalinity and Dissolved Oxygen (DO) present in the water sample.
- gain knowledge in the estimation of copper in an alloy and iron in rust.
- quantify electrolyte and ion by measuring the conductance and emf.

LIST OF EXPERIMENTS
1. Estimation of copper in brass by EDTA method.
2. Determination of Dissolved Oxygen (DO) in water (Winkler’s method)
3. Estimation of alkalinity of Water sample
4. Estimation of Fe³⁺ ion in rust by Dichrometry
5. Conductometric titration (Mixture of acids vs NaOH)
6. Potentiometric Titration (Fe²⁺ vs K₂Cr₂O₇)
7. Estimation of Fe²⁺ ion by spectrophotometry.

TOTAL: 45 PERIODS

* A minimum of FIVE experiments shall be offered.
* Laboratory classes on alternate weeks for Physics and Chemistry.
13B28 CIRCUITS AND DEVICES LABORATORY  
(ECE)  
L T P C  
0 0 3 2  
COURSE OUTCOMES  
Upon successful completion of this course, students will be able to  
- Analyze the circuits using various network theorems and laws.  
- Determine the parameters from the characteristics of diodes.  
- Analyze the given circuit from their transient and steady state response  
LIST OF EXPERIMENTS:  
1. Verification of Ohm’s laws  
2. Verification of Mesh and Nodal analysis  
3. Verification of KVL and KCL  
4. Verification of Thevenin’s Theorem  
5. Verification of Norton’s Theorem.  
6. Verification of superposition Theorem  
7. Verification of Maximum power transfer Theorem  
8. Transient response of RL and RC circuits for DC input  
9. Frequency response of series and parallel resonance circuits  
10. Characteristics of PN diode  
11. Characteristics of Zener diode  
12. Characteristics of Photodiode  
TOTAL: 45 PERIODS
13B29 ENGLISH LANGUAGE SKILL LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
The Student will
• improve their pronunciation skill.
• gather information from any speech.
• imbibe the stress and intonation of the native speakers’ accent.

1. Micro Skills
   ▪ Spotting the Homonyms / Silent letter words / mispronounced words
   ▪ Identifying the missing words in native speech
   ▪ Finding the cluster words
   ▪ Marking correct punctuation
   ▪ Marking word chunks
   ▪ Identification of sentences

2. Content Comprehension and making inferences
   ▪ Listening to audio files of Speech, Poetry, Recent Issues, News clippings, etc
     a. True / False
     b. Multiple Choice Questions
     c. Filling the blanks
     d. Filling the charts

3. Listen and Act
   ▪ Drawing the map using audio
   ▪ Picture completing task
   ▪ Transferring data to Graph

4. Interpreting the video clippings

5. Listening to Conversations

TOTAL: 30 PERIODS
13EC31 FOURIER TRANSFORMS AND COMPLEX ANALYSIS  

COURSE OUTCOMES
On successful completion of the course, the students should be able to

- Perform Fourier series analysis of the functions.
- Implement the properties of Fourier transforms and Compute the Fourier transforms of various function.
- Calculate the Fourier series solution of Wave and Heat equations.
- Grasp analytic functions and their properties and be introduced to the host of conformal mappings with suitable examples that have direct application.
- Understand the basics of complex integration and the concept of contour integration encountered in practice.

UNIT I  FOURIER SERIES  
12

UNIT II  FOURIER TRANSFORMS  
12

UNIT III  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  
12
Solutions of one dimensional wave equation – One dimensional equation of heat conduction– Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV  ANALYTIC FUNCTIONS  
12
Functions of a complex variable – Analytic functions – Necessary and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic functions – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z and bilinear transformation.

UNIT V  COMPLEX INTEGRATION  
12
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s expansions – Singular points – Residues – Residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour(excluding poles on boundaries).

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EC32 ENVIRONMENTAL SCIENCE AND ENGINEERING  L  T  P  C  
(Common to all B.E./B.Tech. Degree Programmes)  3 0 0 3  

COURSE OUTCOMES
Upon successful completion of course the student will be able to

- Understand the various ecosystem and biodiversity
- Classify the different types of natural resources and identify the role of individual in conservation of resources
- Identify and analyse the causes, effects and control measures of environmental pollution
- Identify the different types of environmental hazards and their management
- Analyse the social issues related to the environment and how human population affect the environment.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  9
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers—energy flow in the ecosystem – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) aquatic (pond) ecosystems. Field study of simple ecosystems —pond and forest. Introduction to biodiversity: definition genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - India as a mega-diversity nation – hot spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation. Field study of common plants, insects, birds.

UNIT II NATURAL RESOURCES  9
Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water – Food resources: World food problems, changes caused by 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, case studies – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain

UNIT III ENVIRONMENTAL POLLUTION  9
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Noise pollution (e) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – e-Waste: Definition-dimension of the problem - source-toxic Substances in e-waste - risks related to toxic substances - environmental problems-role of an individual in prevention of pollution.

UNIT IV ENVIRONMENTAL HAZARDS  9
Environmental hazards: Definition – Hazard- Types-Natural and man-made hazards – Natural hazards: Causes, effect and management of Earthquake, Flood, Landslide, Cyclones and Tsunami; Man-made Hazards: Hazards due to dams and reservoirs, hazards due to nuclear power plant, Industrial hazards. Case study: Chernobyl disaster, Bhopal gas tragedy.

UNIT V SOCIAL ISSUES, HUMAN POPULATION AND THE ENVIRONMENT  9

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
13EC33 DIGITAL ELECTRONICS  

L T P C  

3 1 0 4  

COURSE OUTCOMES

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

- Acquire knowledge about the fundamental concepts of digital logic and optimize the gates in the digital circuits using Boolean algebra, Karnaugh map and Tabulation method.
- Analyze and design combinational circuits using logic gates and digital IC’s.
- Design a synchronous and asynchronous sequential circuit to meet the given specifications.
- Comprehend the basics of programmable logic devices and implement circuits using PLDs.

UNIT I MINIMIZATION TECHNIQUES  
Minimization Techniques: Boolean postulates and laws, De-Morgan's Theorem, Principle of Duality, Boolean expression, Minimization of Boolean expressions, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method of minimization.

UNIT II COMBINATIONAL CIRCUITS  

UNIT III SEQUENTIAL CIRCUITS  
Latches, Flip-flops - SR, JK, D, T, and Master-Slave, Characteristic table and equation, Application table, Edge Triggering, Level Triggering, Realization of one flip flop using other flip flops, Asynchronous Ripple or serial counter, Design of Synchronous counters: state diagram, State table, State minimization, State assignment, Excitation table and maps, Circuit implementation, Modulo-n counter, Registers, Shift registers, Universal shift registers, Shift register counters, Ring counter, Shift counters, Sequence generators.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS  

UNIT V MEMORY DEVICES  
Classification of memories, ROM - ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM - RAM organization, Write operation, Read operation, Memory cycle, Timing wave forms, Memory decoding, Memory expansion, Static RAM Cell, Bipolar RAM cell, MOSFET RAM cell, Dynamic RAM cell, Programmable Logic Devices, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Arrays (FPGA), Implementation of combinational logic circuits using ROM, PLA, PAL.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES
13EC34 ELECTROMAGNETIC FIELDS

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

• Apply vector calculus to understand the behavior of static electric and magnetic fields in standard configurations.
• Calculate electric and magnetic fields from stationary and dynamic charge and current distributions.
• Analyze various geometries of conductors, charge distribution, and current to determine the terminal behavior of capacitors and inductors.
• Develop field equations starting from a basic knowledge of Maxwell’s Equations.
• Analyze the propagation of plane waves in various materials.

UNIT I STATIC ELECTRIC FIELDS
Introduction to Co-ordinate System - Rectangular, Cylindrical and Spherical Co-ordinate System, Introduction to line, Surface and Volume Integrals, Definition of Curl, Divergence and Gradient, Meaning of Stokes theorem and Divergence theorem. Coulomb's Law in Vector Form, Definition of Electric Field Intensity, Principle of Superposition, Electric Field due to discrete charges, Electric field due to continuous charge distribution, Electric Field due to charges distributed uniformly on an infinite and finite line, Electric Field on the axis of a uniformly charged circular disc, Electric Field due to an infinite uniformly charged sheet. Electric Scalar Potential, Relationship between potential and electric field, Potential due to electrical dipole, Electric Flux Density, Gauss Law, Gauss Law application.

UNIT II STATIC MAGNETIC FIELD

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS
Poisson's and Laplace's equation, Electric Polarization, Nature of dielectric materials, Definition of Capacitance, Capacitance of various geometries using Laplace's equation, Electrostatic energy and energy density, Boundary conditions for electric fields, Electric current, Current density, point form of ohm's law. Definition of Inductance, Inductance of loops and solenoids, Definition of mutual inductance, simple examples. Energy density in magnetic fields, magnetization and permeability, magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS

UNIT V ELECTRO MAGNETIC WAVES
Derivation of Wave Equation, Uniform Plane Waves, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect, Wave polarization.

L: 45 T: 15 TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES
13EC35 ELECTRONIC CIRCUITS - I

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

- Compare the characteristics of various transistors.
- Analyze BJT and FET amplifier circuits with respect to various parameters such as dc biasing, Q-point stability.
- Derive expressions relating amplifier parameters based on various small-signal transistor models.
- Perform frequency analysis of BJT and FET amplifiers.
- Demonstrate knowledge of rectifier circuits, voltage regulators and filter circuits.

UNIT I TRANSISTORS AND SPECIAL SEMICONDUCTOR DEVICES 12

BJT: Construction and Operation of NPN and PNP Transistors - Study of CE, CB and CC Configurations and comparison of their characteristics – Breakdown in Transistors.
FET: Construction and Operation of N-Channel JFET – Expression for Drain Current, Comparison of JFET and BJT. MOSFET: Structure and Operation of Enhancement and Depletion MOSFET – Comparison of MOSFET with JFET

SPECIAL SEMICONDUCTOR DEVICES: SCR Characteristics and Two Transistor Equivalent model – UJT – DIAC and TRIAC – Phototransistor.

UNIT II TRANSISTOR BIASING AND STABILITY ANALYSIS 12

Need for Biasing – Fixed Bias Circuit: Load line and quiescent point, Selection of operating point, Variation of quiescent point – Stability Factors – Different Types of biasing circuits: Collector to base bias, Voltage divider bias (Self Bias) – Advantage of self-bias over other types of biasing – Bias compensation: Diode, Thermistor and Sensistor compensations – Biasing circuits for JFET and MOSFET.

UNIT III MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 12

Single stage CE, CB and CC Amplifiers - Two-Port Devices and Network Parameters – Hybrid model for Two-Port Network – Analysis of a Transistor Amplifier Circuit using $h$-Parameters – Simplified CE hybrid model – Analysis of CE, CC and CB amplifiers using Approximate Model – Miller’s Theorem – Methods of increasing input impedance using Darlington connection and Bootstrapping – Multistage Amplifiers. CS, CG and CD (FET) Amplifiers, Basic Emitter Coupled Differential Amplifier Circuit – Operation, CMRR, Use of constant current circuit to improve CMRR.

UNIT IV FREQUENCY RESPONSE OF AMPLIFIERS 12

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency - Hybrid – Π equivalent circuit of BJT - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency, Gain bandwidth Product - High frequency equivalent circuit of FETs - High frequency analysis of FET amplifiers – Gain bandwidth product of FETs - General expression for frequency response of multistage amplifiers - Calculation of overall upper and lower cutoff frequencies of multistage amplifiers - Amplifier rise time, sag and their relation to cutoff frequencies.

UNIT V RECTIFIERS AND POWER SUPPLIES 12

Classification of power supplies – Rectifiers: Half-wave, full-wave and bridge rectifiers with resistive load - Analysis for $V_{dc}$ and ripple voltage with C, L, LC and CLC filters - Voltage multipliers - Voltage regulators: Zener diode shunt regulator, Transistorised series and shunt regulators - Switched mode power supply (SMPS) - Power control using SCR.

L: 45 T: 15 TOTAL: 60PERIODS
TEXT BOOKS

REFERENCES
13EC36 C++ AND DATA STRUCTURES L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
- Recognize and use object oriented programming constructs to write object oriented programs
- Describe encapsulation, polymorphism and inheritance.
- Identify the suitable data organization structure and its implementation methods.
- Analyze the importance of self-balancing trees for effective organizing the data.
- Enumerate the systematic way of solving problems.

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 9
Introduction – Tokens – Expressions - C++ classes and objects - constructors and destructors – operators overloading and type conversions.

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING 9

UNIT III LINEAR DATA STRUCTURES 9

UNIT IV NONLINEAR DATA STRUCTURES 9

UNIT V SORTING AND SEARCHING 9

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13EC37  ELECTRONIC CIRCUITS LABORATORY  L  T  P  C  0  0  3  2

COURSE OUTCOMES
. Upon successful completion of this course, students will be able to:
  • Determine the parameters from the characteristics of transistors.
  • Acquire a basic knowledge in Transistor amplifier and Various Biasing techniques.
  • Construct a simple power supply circuit.
  • Calculate the CMRR of differential amplifier.

LIST OF EXPERIMENTS
1. Characteristics of CE configuration.
   • Determination of h-parameters from I/O characteristics.
2. Characteristics of CB configuration.
   • Determination of h-parameters from I/O characteristics.
3. Characteristics of UJT and SCR.
   • Plot the V/I Characteristics
4. Characteristics of JFET.
   • Determination of FET parameters from I/O characteristics
5. Fixed Bias amplifier circuit using BJT.
   • Determination of bias resistance to locate Q-point at center of load line.
   • Plot the frequency response.
6. Voltage divider bias (self-bias) circuit using BJT.
   • Plot the frequency response.
7. Darlington Amplifier using BJT.
   • Measurement of gain, input resistance and output resistance.
8. Source follower with Bootstrapped gate resistance.
   • Measurement of gain, input resistance and output resistance with and without Bootstrapping.
9. Differential amplifier using BJT.
   • Measurement of CMRR.
   • Measurement of DC output voltage under different loading conditions.
   • Plot the Load regulation characteristics and calculate the Load regulation.

TOTAL: 45 PERIODS
13EC38 C++ AND DATA STRUCTURES LABORATORY L T P C
0 0 3 2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to
• Implement common data structures, such as trees, lists.
• Design and apply appropriate data structures for solving computing problems.
• Develop the appropriate objects required to solve a programming problem.
• Practice exception handling mechanisms to handle runtime errors.
• Solve problems using advanced object-oriented concepts like inheritance, polymorphism, and generic programming.

LIST OF EXPERIMENTS

1. Design C++ classes with static members, methods with default arguments, friend functions.
   (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication).
2. Develop C++ class hierarchy for various types of inheritances.
3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor and overloading of assignment operator.
4. Design a simple application to demonstrate dynamic polymorphism and RTTI.
5. Design stack and queue classes with necessary exception handling
6. Implement singly and doubly linked lists.
7. Represent a polynomial as a linked list and write functions for polynomial addition.
8. Implement stack and use it to convert infix to postfix expression.
9. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
10. Implement binary search tree and AVL Tree.

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (PER BATCH)

HARDWARE
• 30 Personal Computers with Pentium III or Pentium IV
• RAM – 256 MB or higher
• Hard disk – 40 GB or higher

SOFTWARE
• Turbo C++ (freeware) – to be installed in all PCs
• OS – Linux (or) Windows 2000/ Windows XP/ NT.
13EC41 PROBABILITY AND RANDOM PROCESSES  

COURSE OUTCOMES
On successful completion of the course, the students should be able to
- Have a well-founded knowledge of random variables and standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable.
- Understand and characterize the phenomena which evolve with respect to time in probabilistic manner.
- Implement the concepts of correlation and spectral densities.
- Analyze the response of random inputs to linear time invariant systems.

UNIT I RANDOM VARIABLES 12
Discrete and continuous random variables – Moments - Moment generating function and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT II TWO DIMENSIONAL RANDOM VARIABLE 12
Joint distributions - Marginal and conditional distributions - Covariance - Correlation and Regression – Transformation of random variables.

UNIT III CLASSIFICATION OF RANDOM PROCESSES 12

UNIT IV CORRELATION AND SPECTRAL DENSITIES 12

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS 12
Linear time invariant system - System transfer function – Linear systems with random inputs–Auto correlation and cross correlation functions of input and output – White noise.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EC42     ELECTRONIC CIRCUITS – II     L T P C
            3  1  0  4

COURSE OUTCOMES
Upon successful completion of this course, students will be able to:
• Classify amplifiers by mode of operation.
• Compare the various feedback topologies to get desired performance.
• Construct a circuit to generate sine wave for a particular frequency.
• Design an amplifier to tune to the particular frequency.
• Design a square wave generator for a particular frequency.

UNIT I     LARGE SIGNAL AMPLIFIERS
Classification of amplifiers, Class A large signal amplifiers, and second harmonic distortion, higher
order harmonic distortion, transformer-coupled class A audio amplifier, efficiency of class A
amplifier. Class B amplifier, efficiency, push-pull amplifier, distortion in amplifiers, complementary – symmetry (class B) push-pull amplifier, Class C, Class D amplifier, class S amplifier, MOSFET
power amplifier, thermal stability and heat sink.

UNIT II    FEEDBACK AMPLIFIERS
Block diagram, Loop gain, Gain with feedback, Effects of negative feedback, Sensitivity and
desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance
with feedback, Four types of negative feedback connections, voltage series feedback, voltage shunt
feedback, current series feedback and current shunt feedback, Method of identifying feedback
topology and feedback factor.

UNIT III   OSCILLATORS
Classification, Barkhausen Criterion, Mechanism for start of oscillation and stabilization of
amplitude, General form of an Oscillator, Analysis of LC oscillators, Hartley, Colpitts, Clapp,
Franklin, Armstrong, Tuned collector oscillators, RC oscillators, phase shift, Wien bridge, Twin-T
Oscillators, Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical
equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators.

UNIT IV    TUNED AMPLIFIERS
Small signal tuned amplifiers, Analysis of capacitor coupled single tuned amplifier, double tuned
amplifier, effect of cascading single tuned and double tuned amplifiers on bandwidth, Stagger tuned
amplifiers, large signal tuned amplifiers, Class C tuned amplifier, Efficiency and applications of
Class C tuned amplifier, Stability of tuned amplifiers, Neutralization, Hazeltine neutralization
method.

UNIT V     WAVE SHAPING AND MULTIVIBRATOR CIRCUITS
RC & RL Integrator and Differentiator circuits, Storage, Delay and Calculation of Transistor
Switching Times, Speed-up Capacitor, Diode clippers, Diode comparator, Clampers. Collector
coupled Astable multivibrator, Monostable multivibrator, Bistable multivibrators, Triggering
methods for Bistable multivibrators, Schmitt trigger circuit using BJT.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS
3. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, “Electronic Devices and Circuits”, 2nd
REFERENCES
13EC43  
**ELECTRICAL ENGINEERING**  
L T P C  
3 0 0 3  

**COURSE OUTCOMES**  
On the successful completion of the course, the students should be able to:  
- Understand the constructional details and characteristics of DC machines.  
- Illustrate the performance of single phase transformers under no load and loaded conditions.  
- Discriminate the construction and operation of single phase and three phase induction motor.  
- Evaluate the voltage regulation of synchronous machines and describe the operation of various special machines.  
- Outline the basic structure of electrical power system and its components.

**UNIT I  D.C. MACHINES**  

**UNIT II  TRANSFORMERS**  

**UNIT III  INDUCTION MOTORS**  

**UNIT IV  SYNCHRONOUS AND SPECIAL MACHINES**  

**UNIT V  TRANSMISSION AND DISTRIBUTION**  

Total: 45 PERIODS

**TEXT BOOKS**

**REFERENCES**
13EC44 TRANSMISSION LINES AND WAVEGUIDES L T P C
3 1 0 4

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

- Explain the meaning and use of fundamental transmission line concepts: traveling and Standing waves, wavelength, characteristic impedance, attenuation.
- Analyze common transmission lines (coaxial, micro strip, etc.) and examine their Characteristic impedance.
- Use the Smith chart (generalized reflection coefficient plane) for fundamental Transmission line calculations.
- Design simple matching networks using lumped elements, quarter-wave sections, and Stub tuners.
- Discuss basic principles associated with waveguides (metallic and dielectric): mode (TM, TE, and TEM), cutoff frequency, guide wavelength, velocities.
- Select proper common waveguides (metallic parallel-plate and rectangular, dielectric Slab) for the given specifications such as frequency range, attenuation.

UNIT I LUMPED FILTERS
The neper - the decibel - Characteristic impedance of Symmetrical Networks – Current and voltage ratios - Propagation constant, Properties of Symmetrical Networks - Filter fundamentals – Low pass, High pass, band pass, band elimination filters and Constant K Filters - Behaviour of the Characteristic impedance- m derived sections - Filter circuit design - Filter performance - Crystal Filters.

UNIT II TRANSMISSION LINE PARAMETERS
A line of cascaded T sections - Transmission lines - General Solution, Physical Significance of the equations, the infinite line, wavelength, velocity, propagation, Distortion line, coaxial cable, Reflection on a line not terminated in \( Z_0 \), Reflection Coefficient, Open and short circuited lines, Insertion loss.

UNIT III THE LINE AT RADIO FREQUENCY
Parameters of open wire line and Coaxial cable at RF - Line constants for dissipation - voltages and currents on the dissipation less line - standing waves - nodes - standing wave ratio - input impedance of open and short circuited lines - power and impedance measurement on lines \( \lambda/4 \) line, Impedance matching - single and double-stub matching, circle diagram, smith chart and its applications - Problem solving using Smith chart.

UNIT IV GUIDED WAVES BETWEEN PARALLEL PLANES
Application of the restrictions to Maxwell's equations - transmission of TM, TE and TEM waves between Parallel planes - wave propagation - Velocities of the waves - characteristic impedance – Attenuators.

UNIT V WAVEGUIDES
Application of Maxwell's equations to the Rectangular waveguide – TM and TE waves in Rectangular waveguide - Cylindrical waveguide - The TEM wave in coaxial lines - Excitation of wave guides - Guide termination and resonant cavities.

TEXT BOOKS

REFERENCES
13EC45  LINEAR INTEGRATED CIRCUITS  

COURSE OUTCOMES
Upon successful completion of this course, students will be able to:
- Describe the construction of OP-AMP IC and also DC, AC characteristics of OP-AMP.
- Design a circuit using OP-AMP for various applications such as Inverting, Non-inverting, Logarithmic and anti-logarithmic amplifiers, Precision rectifier, active filters etc.
- Design AM and FM modulator and demodulators using PLL logic.
- Design ADC Circuit using comparator and ADC IC.
- Design a function generator for various waveforms such as sine wave, triangular wave, square wave etc using 555 timer or OP amp ICs or 566 or 565 ICs.

UNIT I  IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR ICs  
Advantages of IC over discrete components, Manufacturing process of monolithic IC, Construction of monolithic bipolar transistor, Monolithic diodes, Integrated Resistors, Monolithic Capacitors, Inductors. Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, General operational amplifier stages, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

UNIT II  APPLICATIONS OF OPERATIONAL AMPLIFIERS  
Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-l and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters, Sine-wave generators, Triangular wave generator, Saw-tooth wave generator, Astable and Monostable Multivibrators.

UNIT III  ANALOG MULTIPLIER AND PLL  
Analog Multiplier using Emitter Coupled Transistor Pair, Gilbert Multiplier cell, Variable transconductance technique, Analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

UNIT IV  ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS  
Analog and Digital Data Conversions, D/A converter, specifications, weighted resistor type, R-2R Ladder type, Voltage Mode and Current Mode R-2R Ladder types, switches for D/A converters, high speed sample and hold circuits, A/D Converters, specifications, Flash type, Successive Approximation type, Single Slope type, Dual Slope type.

UNIT V  TIMER, VOLTAGE REGULATORS AND FUNCTION GENERATOR ICs  
Timer IC 555 - Description and Functional Diagram, Monostable operation, Astable operation, IC Voltage regulators, Three terminal fixed and adjustable voltage regulators, IC 723 general purpose regulator, IC L8038 function generator - Description and Functional Diagram, SMPS

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13EC46       SIGNALS AND SYSTEMS       L  T  P  C
3 1 0 4

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

- Recognize, analyze and manipulate basic continuous time (CT) and discrete time (DT) signals.
- Classify continuous and discrete time systems as to their linearity, time invariance, causality and stability.
- Represent and analyze both CT and DT Signals using appropriate transforms.
- Analyze both CT and DT Linear Time Invariant systems using appropriate transforms.

UNIT I     CLASSIFICATION OF SIGNALS AND SYSTEMS       12
Continuous time signals (CT signals), Discrete time signals (DT signals), Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals, periodic and aperiodic, random signals, CT systems and DT systems, Basic properties of systems, Linear Time Invariant systems and properties.

UNIT II     ANALYSIS OF CONTINUOUS TIME SIGNALS       12
Fourier series analysis, Spectrum of CT signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT III     LINEAR TIME INVARIANT - CONTINUOUS TIME SYSTEMS       12
Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response, LTI systems analysis using Fourier and Laplace transforms, State variable equations and matrix representation of systems.

UNIT IV     ANALYSIS OF DISCRETE TIME SIGNALS       12
Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z-transform.

UNIT V     LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS       12
Difference equation, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms, State variable equations and matrix representation of systems.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EC47  ELECTRONIC CIRCUITS AND SIMULATION LABORATORY  L  T  P  C
                                                      0  0  3  2

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

- Acquire a basic knowledge in various Transistor feedback amplifier and Transistor as Multivibrator.
- Analyze and design analog electronic circuits using discrete components.
- Design, construct and measure various analog circuits through simulation software and compare the results in the laboratory with theoretical analysis.

LIST OF EXPERIMENTS
1. Design and Construct negative feedback amplifiers. Plot the Frequency response and Determine the Input, output impedance with and without feedback.
2. Design and construct RC Phase shift oscillator for the given specifications.
3. Design and construct Hartley Oscillator and Colpitts Oscillator for the given specifications.
4. Construct various types of Clippers and Clampsers circuit.
5. Construct a Class A Power Amplifier and Determine the efficiency.
6. Construct a Class B Complementary Symmetry Power Amplifier and Determine the efficiency.
7. Construct and simulate Differential amplifier using PSPICE.
8. Construct and simulate Transistor based Astable, Monostable and Bistable multivibrator using PSPICE.
9. Construct and simulate Clipper, Clamer, Low pass RC circuit and High pass RC circuit using PSPICE.

TOTAL: 45 PERIODS
13EC48  DIGITAL AND LINEAR INTEGRATED CIRCUITS
LABORATORY

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

- Analyze, design, construct and troubleshoot broad range of combinational circuits using logic gates and digital IC’s.
- Analyze, design, construct and troubleshoot broad range of sequential circuits using digital IC’s.
- Experimentally verify the different kind of op-amp based circuits for the given design specifications.
- Design a simple DC power supply using discrete components and IC

LIST OF EXPERIMENTS

Digital IC’s
1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154.
3. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
4. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters.
5. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip-flops.

LINEAR IC
6. Design and verification of Inverting amplifier, Non inverting amplifier, Integrator and Differentiator.
7. Design and verification of the Instrumentation amplifier
8. Design and verification of Active low pass, high pass and band pass filters.
10. Design and verification of Astable and Monostable multivibrators using NE 555 Timer.
11. Design and verification of PLL characteristics and its use as Frequency Multiplier.
12. Design and verification of DC power supply using LM317 and LM723.

TOTAL: 45 PERIODS
13EC49 COMMUNICATION SKILLS AND TECHNICAL SEMINAR L T P C
(Common to all B.E. / B.Tech. Degree Programmes) 0 0 3 2

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
- Express themselves fluently and appropriately in social and professional contexts.
- Develop the sub-skills required for paper presentations and group discussions.
- Acquire the soft skills and interpersonal skills which will help them to excel in their workplace.

A) LANGUAGE FUNCTIONS (15 hrs)
1. Compare and contrast
2. Giving reasons
3. Reporting
4. Expressing agreement and disagreement
5. Evaluating different standpoints
6. Analyzing a problem and giving solution
7. Describing daily routines, events, and weather
8. Describing Objects
9. Defending a point of view
10. Talking about future plans and intentions

Language Functions:
The teacher should build micro activities to develop the use of language required to handle these sub-functions of communication. In the process, the learners should get used to the linguistic Elements needed for these functions.

B) SPEECH PRACTICE (15 hrs)
The themes are:
1. Cloning
2. Artificial satellites
3. Renewable sources
4. Telecommunication
5. Cyber Revolution
6. Space research
7. Polythene pollution
8. Fossil fuels
9. Safety measures in Automobiles
10. Ecological threats
11. Water resources
12. Nuclear technology
13. Scientific farming
14. Thermal power plants
15. Nano Technology
16. Robotics
17. Artificial intelligence
18. Role of Fibre Optics
19. Exploration of Mars
20. Gas turbines
21. Indian space missions
22. Converting agricultural wastes for useful purposes
23. Developments in transportation
24. Scientific Farming
25. Impact of global warming
26. Desalination of water
27. Technology for national security
28. Industrial development and ecological issues
29. Recent trends in Automobiles
30. Hazards of E-waste
31. Mobile Jammer
32. Touch Screen Technology
33. Tidal Power
34. 3G Technology
35. Tsunami Warning System
36. Blue Tooth Technology

Seminar presentation on the themes allotted:
Each student should collect materials from Books, Internet, Journals and Newspapers for his/her theme and prepare a short Seminar Paper for 4 to 5 Pages. The presentation should be for 10 minutes using power point frames. It should be followed by a Viva Voce during which others should come forward to question, clarify, supplement or evaluate.

C) GROUP DISCUSSION / DEBATE (10hrs)
Grouping (each group consisting of 12 members)
Topics (12 topics – 3 topics to be selected by each group - to be practiced in cycles)

Group Discussion / Debate Topics:
1. Advertising is a legalized form of lying- Discuss.
2. Communicative competency in English is the golden key for success in the Global arena.
3. Is it just to force people to retire?
4. Attitude decides one’s altitude in life.
5. Should an aspiring student go for a course which is in demand or for a course which he/she likes?
6. Is westernization a cultural degradation or enrichment?
7. Is Brain drain a threat to India?
9. Do Mobile phones spoil the youth?
10. No two generations see eye to eye- Discuss.
11. Is scientific advancement a boon or a bane?
12. Doesragging develop friendship?

D) SPEAKING ON THE GIVEN PICTURE/DIAGRAM/CHART/TABLE (5 hrs)

RECORD LAY OUT:
Every student has to maintain a record in which he/she has to incorporate the following details.
- First page containing learner details and the topic of specialization
- Use of appropriate Language used in Language Function should be listed.
- Three newspaper cuttings or journal or internet sources related to the specialized theme. (To be pasted on the pages)
- 10 Quiz questions of the specialized topic with expected answers.
- The seminar paper presented by the learner (to be pasted).
- Notes of observation - Lab. (Details about Interview skills – GD – Soft skills)
- The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practical.

TOTAL: 45 PERIODS

REFERENCES