REGULATIONS – 2013

DEPARTMENT OF
ELECTRONICS AND INSTRUMENTATION ENGINEERING

CURRICULUM AND SYLLABI OF
I & II YEAR
B.E. – ELECTRONICS AND INSTRUMENTATION ENGINEERING
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 INSTRUMENTATION ENGINEERING

VISION

- Achieving excellence in Teaching–Learning, Research and Consultancy among nationwide peer groups.

MISSION

The EIE department will achieve its vision by:

- Offering well–balanced curriculum to acquire professional competencies and transferable skills.

- Bringing innovations in Teaching-Learning process through effective content delivery and appropriate assessment methods.

- Catalyzing the research activities of both faculty members and students through more and more sponsored research projects.

- Rendering its consultancy services by providing instrumentation solutions to Industries.

Program Educational Objectives (PEO)

After quite-a-few years of graduation, the EIE graduates will

1) work in core Instrumentation, allied industries and software companies and / or become successful entrepreneurs.

2) pursue their higher studies at the institutes of repute in India and abroad and work in educational institutions, research organizations and engineering consultancy companies.
3) have the highest integrity, social responsibility, teamwork skills and leadership capabilities in their profession or career.

Program Outcomes (PO)

Upon successful completion of 4year B.E. degree programme, the EIE students will be able to

a. Apply knowledge of mathematics, science, engineering fundamentals and an instrumentation engineering specialization to arrive solution for complex engineering problems.

b. Identify, formulate and analyze complex engineering problems using first principles of mathematics, management and engineering.

c. Design solutions for instrumentation engineering problems and develop Instrumentation and related system components or processes that meet specified needs with appropriate consideration for public health, safety, cultural, societal and environmental issues.

d. Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

e. Create, select and apply appropriate state-of-the-art techniques, resources and modern engineering and computing tools with an understanding of the limitations

f. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

g. Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

h. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

i. Function effectively as an individual, and as a member or leader in multidisciplinary teams.
j. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

k. Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

l. Demonstrate knowledge and understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

REGULATIONS 2013 – CURRICULUM AND SYLLABII

B.E. – ELECTRONICS AND INSTRUMENTATION ENGINEERING

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

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Total Number of Credits : 27
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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                                                                                                                             12
Language Focus: Technical Vocabulary, Word Formation, Concord, Tense (Present).
Writing: Leave Application Letter, Paragraph writing.
Listening: Listening to correct pronunciation of words.

UNIT II                                                                                                                            12
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                                                                                                                         12
Language Focus: Compound nouns, Tense (Future), Preposition, Comparative Adjectives.
Listening: Listening to the conversations.
Speaking: One minute speech.

UNIT IV                                                                                                                         12
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                                                                                                                         12
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) L T P C
3 1 0 4

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 12
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 12
Curvature in cartesian, parametric and polar forms; Centre, radius and circle of curvature; Evolutes.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12
Partial derivatives; Total derivatives; Differentiation of implicit functions; Jacobians; Maxima and Minima - Method of Lagrangian multipliers.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS 12
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 12
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)

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

UNIT II    ELECTRO ANALYTICAL TECHNIQUES
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
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

UNIT V     NANO MATERIALS
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  
Classification of Computers – Basic Computer organization – Number Systems – Problem Analysis –  

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

UNIT III  FUNCTIONS, ARRAYS AND POINTERS  
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  
Derived types – Structures: Declaration – Definition – Initialization of structures – Accessing  
structures – Nested structures – Arrays of structures – Structures and functions – Pointers to  
structures – Self-referential structures – Unions.  

UNIT V  FILE HANDLING  

TOTAL: 45 PERIODS  

TEXT BOOKS  
   Kindersley (India), 2011.  

REFERENCES  
   Education Inc., 2005.
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           12
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        12
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            12
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        12
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      12
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:
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:
Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planning and cutting.

III WELDING:
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:
(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

13E20 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

13E21 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
13E22 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
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
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
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
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
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
13E23 CHEMISTRY OF ELECTRICAL AND ELECTRONIC MATERIALS
(Common to ECE, CSE, EEE, EIE and IT)

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

UNIT II CORROSION AND ITS CONTROL

UNIT III PHOTOCHEMICAL PROCESSES

UNIT IV ELECTRONIC MATERIALS

UNIT V ANALYTICAL INSTRUMENTATION

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
13E24 ELECTRIC CIRCUITS (EIE) L T P C 3 1 0 4

COURSE OUTCOMES
Students will be able to
• define basic electrical concepts, including electrical potential, electrical current, electrical power and electrical network topology including nodes, branches, and loops.
• define the relationship of voltage and current in resistors, capacitors, inductors, and mutual inductors.
• simplify and analyze the electric circuits using electric circuit theory.
• analyze the dynamic behavior of the first and second order AC and DC circuits.

UNIT I ELECTRIC CIRCUIT ELEMENTS AND ANALYSIS 12

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 12
Network reduction: voltage and current division, source transformation – star-delta conversion. Thevenin’s and Norton’s Theorem – Superposition Theorem – Maximum Power Transfer Theorem – Reciprocity Theorem and its applications.

UNIT III RESONANCE AND COUPLED CIRCUITS 12

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

UNIT V ANALYSING OF THREE PHASE CIRCUITS 12
Three phase balanced / unbalanced voltage sources – analysis of three phase 3–wire and 4–wire circuits with star and delta connected loads, balanced and unbalanced loads – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

L: 45 T:15 TOTAL :60 PERIODS

TEXT BOOKS

REFERENCES
13E25 BASIC CIVIL AND MECHANICAL ENGINEERING
(Regular 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
13E26  COMPUTER PROGRAMMING LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)  L T P C
0 1 2 2

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
13E27 PHYSICS AND CHEMISTRY LABORATORY – II  
(Common to all B.E. / B.Tech., Degree Programmes)  

L T P C  
0 0 3 2  

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 Fe$^{2+}$ ion in rust by Dichrometry  
5. Conductometric titration (Mixture of acids vs NaOH)  
6. Potentiometric Titration (Fe$^{2+}$ vs K$_2$Cr$_2$O$_7$)  
7. Estimation of Fe$^{2+}$ ion by spectrophotometry.  

TOTAL: 45 PERIODS  

* A minimum of FIVE experiments shall be offered.  
* Laboratory classes on alternate weeks for Physics and Chemistry.
13E28 ELECTRIC CIRCUITS LABORATORY
(Common to EEE and EIE) L T P C
0 0 3 2

COURSE OUTCOMES
• Illustrate the basic concepts of electric circuits.
• Relate the physical observations in network theorems of electrical circuits to theoretical principles.
• Examine the electric circuits using mesh and nodal analysis.
• Analyze the dynamic behavior of electric circuits using PSIM.
• Compute the frequency response of resonant and tuned circuits.

LIST OF EXPERIMENTS
1. Verification of Ohm’s laws and Kirchoff’s laws
2. Verification of Thevenin’s and Norton’s theorem
3. Verification of Superposition theorem
4. Verification of Maximum Power Transfer theorem
5. Verification of Reciprocity theorem
6. Measurement of self inductance of a coil
7. Verification of mesh and nodal analysis
8. Transient response of RL and RC circuits for DC input
9. Frequency response of series and parallel resonance circuits
10. Frequency response of single tuned coupled circuits

TOTAL: 45 PERIODS
13E29 ENGLISH LANGUAGE SKILL LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
0 0 3 2

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
13EI31 TRANSFORMS AND COMPLEX ANALYSIS  L T P C  3 1 0 4

COURSE OUTCOMES
Upon completion of the course, students will be able to,
• Perform Fourier series analysis of the functions
• Solve the problems using Fourier transform techniques in engineering
• Understand the concept of wavelet transform
• Acquire the knowledge of conformal mappings
• Perform integration of complex functions

UNIT I FOURIER SERIES  12
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half range sine series–
Half range cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic analysis.

UNIT II FOURIER TRANSFORMS  12
Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms–

UNIT III WAVELETS AND WAVELET TRANSFORMS  12
Introduction – Continuous Wavelet Transforms – Discrete Wavelet Transforms – Orthonormal
Wavelets

UNIT IV ANALYTIC FUNCTIONS  12
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann
equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of
analytic function – 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 – Taylor and Laurent expansions – Singular points – Residues – Residue theorem –
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
2. Lokenath Debnath and Dambaru Bhatta “Integral Transforms and their Applications”

REFERENCES
   Limited, New Delhi, 2007.
13EI32 ENVIRONMENTAL SCIENCE AND ENGINEERING
(Common to all B.E/B.Tech. Degree Programmes)

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
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
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
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
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

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
13EI33    DIGITAL CIRCUITS

COURSE OUTCOMES

Upon completion of the course, students will be able to

- Explain various number systems and to simplify the mathematical expressions using Boolean functions
- Design and implement combinational circuits and sequential circuits
- Comprehend the various memory devices.

UNIT I    NUMBER SYSTEMS AND BOOLEAN ALGEBRA  12
Review of number systems; types and conversion, codes. Boolean algebra: De-Morgan’s theorem, switching functions and simplification using K-maps and Quine McCluskey method.

UNIT II    COMBINATIONAL CIRCUITS  12

UNIT III   SYNCHRONOUS SEQUENTIAL CIRCUITS  12

UNIT IV    ASYNCHRONOUS SEQUENTIAL CIRCUITS  12
Analysis of asynchronous sequential machines, state assignment, asynchronous design problem.

UNIT V    MEMORY DEVICES, PROGRAMMABLE LOGIC DEVICES AND LOGIC FAMILIES  12
Memories: ROM, PROM, EPROM, PLA, PLD, FPGA, Digital logic families: TTL, ECL, CMOS.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES

13EI34  SENSORS AND TRANSDUCERS  L T P C
3 1 0 4

COURSE OUTCOMES
Upon completion of the course, students will be able to
• Define the basic need of measurement systems.
• Analyze the operation and construction of various transducers.
• Construct the various types of Resistive transducers.
• Demonstrate the features of Capacitive and Inductive Transducers
• Apply an appropriate transducer for various applications.

UNIT I  SCIENCE OF MEASUREMENTS AND CLASSIFICATION OF TRANSDUCERS  12
Generalized measurement system - Units and standards – Calibration methods – Static calibration –
Classification of errors -Limiting error and probable error – Error analysis – Statistical methods –
Odds and uncertainty – Classification of transducers – Selection of transducers.

UNIT II  CHARACTERISTICS OF TRANSDUCERS  12
Static characteristics – Accuracy, precision, resolution, sensitivity, linearity, repeatability,
reproducibility, loading effect, drift, static error, span and range, hysteresis, dead time and dead zone -
Dynamic characteristics – Mathematical model of transducer – Zero, I and II order transducers -
Response to impulse, step, ramp and sinusoidal inputs.

UNIT III  VARIABLE RESISTANCE TRANSDUCERS  12
Principle of operation, construction details, characteristics and applications of potentiometer-loading
effect - strain gauge – types - Resistance temperature detector (RTD) – Thermistor - hot-wire
anemometer - constant current and constant temperature operation - piezoresistive sensor - resistive
humidity sensor.

UNIT IV  VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS  12
Induction potentiometer – Variable reluctance transducers – Eddy current transducer – Principle of
operation, construction details, characteristics and applications of LVDT –Capacitive transducer and
types- differential capacitance arrangement – variation of dielectric constant for the measurement of
liquid level - Capacitor microphone – Frequency response.

UNIT V  MODERN TRANSDUCERS  12
Piezoelectric transducer –Hall Effect transducer – Magnetostrictive sensor- Digital displacement
transducer– Smart sensors – IC sensor for temperature - AD 590, LM 335 - Fiber optic sensors-
Introduction to SQUID sensors, Film sensors, Touch screen sensor, Photovoltaic and electromagnetic
sensor, MEMS and Nano sensors.

L : 45 T : 15, TOTAL : 60 PERIODS

TEXT BOOKS
Company, New Delhi, 2011.

REFERENCES
3. Neubert H.K.P., Instrument Transducers – An Introduction to their Performance and Design,
Private Limited, New Delhi, 2010.
13EI35  ELECTRONIC DEVICES AND CIRCUITS  L T P C  3 1 0 4

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

- Acquire basic knowledge about semiconductor devices and their implementation
- Design and analyze amplifiers, oscillators and wave generators using BJT and FET
- Design power amplifiers and how to implement them in circuits
- Design fixed and variable regulated power supply with various current range

UNIT I  DIODES  12
Diode applications: HWR –FWR– power supply filters –diode clipping and clamping circuits.
Special purpose diodes: Zener diodes – zener diode applications– Varactor diode– LED–photodiode – Schottky diode – Tunnel diode

UNIT II  BJTs  12

UNIT III  FETs  12
Field-EffectTransistors: JFET characteristics and parameters – JFET biasing, self bias, voltage divider bias – Q point stability over temperature – MOSFET D-MOSFET, E-MOSFET-MOSFET characteristics and parameters – MOSFET biasing – Introduction to FinFET.
FET amplifiers: JFET/Depletion MOSFET small signal model – small signal analysis of CS, CD and CG amplifiers – Frequency response of amplifiers

UNIT IV  POWER AMPLIFIERS AND FEEDBACK AMPLIFIERS  12
Feedback amplifiers: Positive feedback– Advantages of Negative feedback –Voltage / current, series / shunt feedback amplifiers

UNIT V  REAL TIME APPLICATIONS AND SPECIAL DEVICES  12
Sinusoidal signal generators: Oscillator – Condition for oscillation – Phase shift - Wein Bridge – Hartley - Colpitts and crystal oscillators.
Square wave generators: Multivibrators –Schmitt triggers
Power supply unit: linear regulator power supply – switched mode power supply – low drop out regulator
Special devices: Characteristics and applications of UJT, SCR, DIAC, TRIAC.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS
REFERENCES

13EI36            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
Inheritance, Extending classes, Pointers, Virtual functions and polymorphism, File handling,
Templates, Exception handling, Manipulating strings.

UNIT III  LINEAR DATA STRUCTURES          9
Lists, Stacks and queues: Array and linked list implementation of List, Stack, Queue – Applications
of List – Polynomial addition – sparse matrix – Applications of stack – Infix to Postfix – Evaluation
of expression – Function calls.

UNIT IV   NONLINEAR DATA STRUCTURES           9
Dijskstra’s shortest path - Prim’s and Kruskal’s Algorithms - Network flow problems.

UNIT V    SORTING AND SEARCHING                9
Sorting - Insertion sort - Shell sort - Heap sort - Merge sort - Quick sort. Searching – Linear search –
Binary search – Fibonacci search.

TOTAL: 45 PERIODS

TEXT BOOKS
   2007.

REFERENCES
1. Bjarne Stroustrup, “Programming: Principles and Practice Using C++”, Addison Wesley,
   2008.
13EI37  ELECTRONIC DEVICES AND CIRCUITS LABORATORY  L T P C  0 0 3 2

COURSE OUTCOMES
Upon completion of the course, students will be able to
- Analyze the characteristics of two terminal and three terminal semiconductor devices.
- Use the modern virtual instrumentation kits to study the characteristics of devices and its applications.
- Design, test and implement the amplifiers and oscillators using BJT and FET.

EXPERIMENTS
1. Characteristics of Semiconductor diode and Zener diode
2. Characteristics of Transistor in Common Emitter, Common Collector, and Common Base Configuration
3. Characteristics of FET
4. Characteristics of SCR and UJT
5. Photodiode, photo transistor Characteristics and study of light activated relay circuit
6. Single phase half wave and full wave rectifiers with inductive and capacitive filters using Educational laboratory virtual instrumentation suite
7. Amplifier design using BJT
8. Differential amplifier using FET
9. Realization of Passive filters
10. Design of sinusoidal wave generator using BJT
11. Study of simulation experiments

TOTAL: 45 PERIODS
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.
13EI41 NUMERICAL METHODS AND PROBABILITY L T P C
3 1 0 4

COURSE OUTCOMES
On the successful completion of the course, the students should be able to
• Solve the linear and non-linear algebraic equations using Numerical methods
• Find the solution of differential equations using Numerical methods
• Interpolate and approximate polynomials
• Apply the sampling Distributions to Engineering problem
• Understand the concept of Correlations and regressions

UNIT I SOLUTION OF ALGEBRAIC EQUATIONS 12

UNIT II INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION 12
Lagrange’s and Newton’s divided difference interpolation – Newton’s forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials- Numerical integration using Trapezoidal and Simpson’s 1/3 rules.

UNIT III NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12

UNIT IV PROBABILITY 12
Mean – Median – Mode - Standard Deviation – Probability - Conditional probability (Definitions only). One dimensional Random variable - Moments – Moment generating function and its properties - Discrete and Continuous distributions- Binomial, Poisson and Normal distributions.

UNIT V TWO DIMENSIONAL RANDOM VARIABLES 12
Two dimensional Random variables – Covariance - Correlations and Regressions.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EI42  INDUSTRIAL INSTRUMENTATION – I  L T P C
3 0 0 3

COURSE OUTCOMES
Upon completion of the course, students will be able to
• Explain the working of pressure measurements.
• Define the need of temperature transducer in industries.
• Apply thermocouple for different temperature applications.
• Define the basic principle of speed and torque measurements.
• Describe the features of density measurements.

UNIT I  MEASUREMENT OF FORCE, TORQUE AND SPEED  9
Electric balance - Different types of load cells - Hydraulic, Pneumatic, strain gauge- Magnetoelastic and Piezoelectric load cells, Different methods of torque measurement; Strain gauge, Relative angular twist, Speed measurement-Capacitive tacho, Drag cup type tacho-D.C and A.C tacho generators, Stroboscope.

UNIT II  MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY  9
Accelerometers - LVDT, Piezoelectric, Strain gauge and Variable reluctance type accelerometers - Mechanical type vibration instruments, Seismic instruments as accelerometer, Vibration sensor, Calibration of vibration pickups, Units of density and specific gravity, Baume scale and API scale, Pressure type densitometers - Float type densitometers, Ultrasonic densitometer, gas densitometer

UNIT III  PRESSURE MEASUREMENT  9
Units of pressure, Manometers, different types, Elastic type pressure gauges, Bourdon tube, bellows and diaphragms, Electrical methods - Elastic elements with LVDT and strain gauges, Capacitive type pressure gauge, Piezo resistive pressure sensor, Resonator pressure sensor, Measurement of vacuum-McLeod gauge, Thermal conductivity gauge, Ionization gauges, Cold cathode type and hot cathode type, calibration of pressure gauges, Dead weight tester.

UNIT IV  TEMPERATURE MEASUREMENT  9
Definitions and standards - Primary and secondary fixed points - Calibration of thermometers, Different types of filled in system thermometers - Sources of errors in, filled in systems and their compensation, Bimetallic thermometers, RTD - characteristics and signal conditioning-3 lead and 4 lead RTDs - Thermistors.

UNIT V  THERMOCOUPLE AND RADIATION PYROMETER  9
Thermocouples - Laws of thermocouple, Fabrication of industrial thermocouples, Signal conditioning for thermocouple, isothermal block reference junctions, Commercial circuits for cold junction compensation, Response of thermocouple, Special techniques for measuring high temperature using thermocouple, Radiation fundamentals, Radiation methods of temperature measurement, Total radiation pyrometers, Optical pyrometers, Two colour radiation pyrometers - Fiber optic sensor for temperature measurement.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

13EI43 ELECTRICAL AND ELECTRONIC MEASUREMENTS L T P C
3 1 0 4

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

- Understand the operation of electrical instruments, various measurement techniques and the concept of identification and minimization of errors in particular measurement situations.
- Describe the measurement techniques of Power, Energy and Flux density.
- Explain the prospective ideas about Potentiometer & Instrument transformers and to extend the views in resistance measuring methods, inductance and capacitance measurement.
- Know the electronic measurement techniques of voltage, frequency etc.

UNIT I MEASUREMENT OF VOLTAGE AND CURRENT 12

UNIT II MEASUREMENT OF POWER, ENERGY AND FLUX DENSITY 12

UNIT III POTENTIOMETERS AND INSTRUMENT TRANSFORMERS 12
DC potentiometer: Basic circuit, standardization, Laboratory type (Crompton’s) – AC potentiometers: Drysdale (polar) type, Gall-Tinsley (coordinate) type – Applications of DC and AC potentiometers – Leeds Northrup self balancing potentiometer – Instrument Transformers: C.T and P.T – construction, theory, operation and characteristics.

UNIT IV MEASUREMENT OF R,L,C 12

UNIT V ELECTRONIC MEASUREMENTS 12

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EI44    CONTROL SYSTEMS     L T P C
3 1 0 4

COURSE OUTCOMES
Upon completion of the course, students will be able to
- Analyze the performance of linear feedback control systems.
- Describe the transient and steady state response of linear systems.
- Investigate the stability analysis of linear control systems.
- Describe the concepts of frequency domain analysis in control engineering.
- Analyze the various types of compensator design in control systems.

UNIT I   MODELING OF PHYSICAL AND ELECTRICAL SYSTEM     12
Concepts of typical Control system - Open loop and closed loop control system - Applications - Transfer function - Mathematical modeling of electrical systems, mechanical systems - Electrical analogy of mechanical translational and mechanical rotational system - Transfer function model of D.C. Servo motor and A.C. servomotor - Block diagram reduction technique - Signal flow graph representation using Mason’s gain formula.

UNIT II   TIME RESPONSE ANALYSIS     12
Time response and its classification - Standard test signals - Time response of First order and Second order system - Time domain specifications - delay time, rise time, peak time, settling time, peak overshoot. Steady state error and error constants - position, velocity and acceleration error constants - Generalized error series - P, PI, PID modes of feedback control.

UNIT III   STABILITY OF CONTROL SYSTEM     12
Characteristics equation - Routh Hurwitz criterion of stability - Absolute and Relative stability - Concepts of Root Locus - Design procedure and construction of root locus technique.

UNIT IV   FREQUENCY DOMAIN ANALYSIS     12
Frequency domain specifications - Bode plot - Polar plot - Determination of gain margin and phase margin from Magnitude and phase angle plot - Nyquist stability criterion - Correlation between frequency domain and time domain specifications.

UNIT V   COMPENSATOR DESIGN     12
Performance criteria - Lag, Lead, Lag Lead networks - Compensation design using Bode Plot and root locus - Introduction to state variable representation of continuous time system.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon completion of the course, students will be able to

- Explain the principle of operation of a DC Machine
- Compare the different types of transformer and derive its EMF equation
- Explain the principle of operation of synchronous machine with its starting methods
- Derive the transformer equivalent circuit of an Induction motor
- Analyze the different types of single phase machines

UNIT I   D.C. MACHINES
Construction of D.C. Machines - Principle and theory of operation of D.C generator - EMF equation –
Armature reaction - Principle of operation of D.C Motor - Torque equation - Types of D.C. Motors –
Starters - Speed control of D.C Motors.

UNIT II  TRANSFORMERS
Principle - Theory of ideal transformer - EMF equation - Construction details of shell and core type
transformers – OC and SC tests - Equivalent circuit - Regulation and efficiency of a transformer -
Introduction to three - phase transformer connections.

UNIT III  SYNCHRONOUS MACHINES
Principle of alternators:- Construction details - salient and non-salient pole- Equation of induced
EMF- EMF method- Synchronous motor - Starting methods, V curves and inverted V -Hunting.

UNIT IV  INDUCTION MACHINES
Induction motor - Construction and principle of operation, Classification of induction motor, Torque
equation - Equivalent Circuit- Starting methods and Speed control of induction motors.

UNIT V   SPECIAL MACHINES
Types of single phase motor – Double revolving field theory – Capacitor start capacitor run
reluctance motor – Permanent magnet Brushless D.C motor.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
   Delhi, 2007.
2. Del Toro, V., “Electrical Engineering Fundamentals”, Prentice Hall of India, New Delhi,
   1995.
   1999.
**13EI46  DIGITAL SYSTEM DESIGN**

**L T P C**

3 1 0 4

**COURSE OUTCOMES**
Upon completion of the course, students will be able to

- Build the basics of digital systems design with a focus on FPGA design.
- Design the combinational and sequential hardware system.
- Describe the Testing in digital circuits and testability

**UNIT I  DIGITAL LOGIC FAMILIES**
TTL, CMOS, NMOS, Dynamic MOS, ECL, I^2L, Operating conditions, Parameters, Interpreting data sheets. Power supply grounding considerations for digital ICs, TTL – to – CMOS Interface, CMOS – to – TTL interface.

**UNIT II  DIGITAL MEMORIES**
The role of Memory in a system – memory types and terminology – ROM – types of ROM – RAM – SRAM – DRAM – Expanding word size and capacity – Applications.

**UNIT III  SYSTEM DESIGN USING PLDs AND CPLDs**
Structure of Standard PLDs and Complex PLDs (CPLDs) – Design of combinational and sequential circuits using PLDs and CPLDs – Design of state machines using Algorithmic State Machines (ASM) chart as a design tool.

**UNIT IV  INTRODUCTION TO FIELD PROGRAMMABLE DEVICES**
Field programmable combination devices, Field programmable logic sequences, Types of FPGA – Xilinx XC2000 & XC3000 series – Logic Cell Array (LCA) – Configurable Logic Blocks (CLB) – Input/Output Blocks (IOB) – Programmable Interconnection Points (PIP).

**UNIT V  TESTING IN DIGITAL CIRCUITS AND DESIGN FOR TESTABILITY**

L: 45 T: 15, TOTAL: 60 PERIODS

**TEXT BOOKS**

**REFERENCES**
13EI47       TRANSDUCERS AND MEASUREMENTS LABORATORY    L T P C
                             0 0 3  2

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

- Observe the principles of operation of sensors and transducers.
- Demonstrate and analyze the practical concepts about different sensors and transducers which are useful for measuring process parameters through experimentation.
- Design the measurement system and criticize the output for the measurement of resistance, capacitance and inductance.

LIST OF EXPERIMENTS
2. Characteristics of Strain gauge and Load cell.
3. Characteristics of LVDT, Hall effect transducer and Photoelectric tachometer.
4. Characteristic of LDR
5. Characteristics of RTD, thermistor and thermocouple
6. Step response characteristics of RTD, thermocouple and thermistor.
13. Study of smart transducers.

TOTAL: 45 PERIODS
COURSE OUTCOMES
Upon completion of the course, students will be able to

• Describe the performance of DC shunt generators under load/no load conditions
• Compare the characteristics of different types of DC motors and induction motors under loaded conditions
• Analyze the performance of transformers on no load/load conditions
• Analyze the linear systems and controllers using Software Package.
• Determine the transfer functions of DC generator and DC motor.

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of separately excited and self excited D.C. generator.
2. Load test on D.C. shunt motor.
3. Swinburne’s test and speed control of D.C. shunt motor.
4. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
5. Regulation of three phase alternator by EMF and MMF methods.
7. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
10. Stability Analysis of Linear system.
11. Study the effect of P, PI, PID controllers.

TOTAL: 45 PERIODS
13EI49 COMMUNICATION SKILLS AND TECHNICAL SEMINAR L T P C 0 0 3 2

COURSE OUTCOMES
Upon completion of the course, 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
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. Does ragging 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.

REFERENCES

TOTAL: 45 PERIODS