<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-101N</td>
<td>Applied Physics-I</td>
<td>4 L 1 T 0 P</td>
<td>75 Theory 25 Sessional 100 Total</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

To introduce the basics of Physics to the students for applications in Engineering field.

<table>
<thead>
<tr>
<th>Course Outcomes (CO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
</tr>
<tr>
<td>CO-2</td>
</tr>
<tr>
<td>CO-3</td>
</tr>
<tr>
<td>CO-4</td>
</tr>
</tbody>
</table>

**Unit - I**

**Interference:** Principle of Superposition, Conditions for interference, Division of wavefront: Fresnel’s Biprism and Applications, Division of amplitude: Wedge-shaped film, Newton’s rings, Michelson Interferometer and Applications.

**Diffraction:** Types of diffraction, Fraunhofer diffraction at a single slit, Plane transmission diffraction grating: theory, secondary maxima and minima, width of principal maxima, absent spectra, overlapping of spectral lines, determination of wavelength; Dispersive power and resolving power of diffraction grating.

**Unit – II**

**Polarization:** Polarization of transverse waves, Plane of polarization, Polarization by reflection, Double refraction, Nicol Prism, Quarter and half wave plate, Specific Rotation, Laurent ’s half shade polarimeter, Biquartz polarimeter.


**Unit – III**

**Optical Fiber:** Introduction, Principle of propagation of light waves in optical fibers: total internal reflection, acceptance angle, numerical aperture, V- number; Modes of propagation, Types of optical fibers: single mode fiber, multimode fibers; Fiber optics communication system, Advantages of optical fiber communication, Applications of optical fibers.

**Ultrasonics:** Ultrasonic waves, Properties of ultrasonic waves, Production of ultrasonic waves: Magnetostriction and Piezoelectric methods, Detection of ultrasonic waves, Measurement of velocity of ultrasonic waves, Applications of ultrasonic waves.
Unit - IV

Special theory of Relativity: Concept of ether, Michelson-Morley experiment, Postulates of Special theory of relativity, Frame of reference, Galilean Transformations, Lorentz transformations, Consequences of Lorentz Transformations: Length contraction, Time dilation; Velocity transformations, Variation of mass with velocity, Einstein’s mass-energy relation, Einstein’s energy-momentum relation.

Nuclear Radiation and Detection: Classification of nuclear radiations, Interaction of charged particle (light and heavy) and gamma radiations with matter (basic concepts); Gas-filled detector: Ionization Chamber, Proportional Counter, Geiger Muller Counter; Scintillation Detector, Semiconductor Detector.

Text Books


Reference Books


Note: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-103N</td>
<td>Applied Chemistry</td>
<td>L 3 T 1 P 0</td>
<td>Theory 75</td>
<td>Sessional 25</td>
</tr>
</tbody>
</table>

**Purpose**

To introduce some of the concepts of applied chemistry to students.

**Course Outcomes (CO)**

- **CO-1**: Basic concepts of thermodynamics and phase rule chemistry.
- **CO-2**: General methods of water purification and introduction of green chemistry.
- **CO-3**: Importance of lubricants and drawbacks of corrosion.
- **CO-4**: Introduction of different engineering materials.

**Unit - I**

**Thermodynamics**: First, second, third and zeroth law of thermodynamics, concept of entropy (for reversible and irreversible process, of ideal gases, of phase transition), free energy, work function, chemical potential, Gibb’s Helmholtz equation, Clausius-Clapeyron equation and related numerical problems. Phase rule, terminology and derivation of Gibbs phase rule, phase diagrams of water system, sulphur system, (Pb-Ag) system, (Zn-Mg) system and (Na-K) system.

**Unit - II**

**Water and its treatment**: Hardness of water and its determination by EDTA, alkalinity and its determination, related numerical problems, Scale and sludge formation (composition, properties and methods of prevention), Water softening by ion exchange process, desalination (reverse osmosis, electrodialysis)

**Green Chemistry**: Definition and concept, Twelve principles of green chemistry, Alternate solvents-ionic liquids, super critical fluid (SCF) system, derivatized and immobilized solvent materials.

**Unit - III**

**Corrosion**: Dry and Wet corrosion, electrochemical theory of corrosion, Pitting, water-line, differential aeration and stress corrosion, factors affecting corrosion, preventive measures (proper design and material selection, cathodic and anodic protection).

**Lubricants**: Mechanism of thin and thick layer lubrication, classification of lubricants and important properties of lubricants (viscosity index, flash and fire point, saponification number, pour point, iodine number,) Greases as lubricants: consistency and drop point test

**Unit-IV**

**Engineering materials**: Ceramics (brief introduction of clays, silica, feldspar, porcelain and Vitreous Enamels), cement (introduction, raw materials, manufacture of portland cement, analysis of cement) Nanoscale materials(introduction, properties of nanomaterials, brief discussion of nanocrystals and clusters, fullerenes, carbon nanotubes, dendrimers, nano wires, nanocomposites)
Text Book

Reference Books

Note: *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-101N</td>
<td>Manufacturing Technology and Processes</td>
<td>L: 4 T: 0 P: 0</td>
<td>Theory: 75 Sessional: 25 Total: 100</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

*To make the students aware of different manufacturing processes like metal casting, forming, metal cutting and joining processes.*

**Course Outcomes (CO)**

| CO-1 | Define and classify the manufacturing processes, accidents, safety methods, comprehend about the engineering materials, properties and application areas. |
| CO-2 | Comprehend the procedure of casting of liquid materials such as molten metal’s. Define and classify the plant layout. |
| CO-3 | Comprehend the procedure of manufacturing process of forming materials into shapes. |
| CO-4 | Explain the procedure of how the materials are joined together and the processes used to achieve this. |

**Unit - I**

**Introduction:** Introduction to Manufacturing Processes and their Classification. Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, First Aid.


**Unit – II**

**Foundry:** Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern Allowances, Risers, Runners, Gates, Moulding Sand and its composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting (Cupola) and Pouring, Fettling, Casting Defects and Remedies.

**Unit – III**

**Cold Working (Sheet Metal Work):** Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining, Advantages and Limitations.


**Plant Layout:** Objectives of Layout, Types of Plant Layout and their Advantages.

**Unit – IV**

**Introduction to Machine Tools:** Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Milling, Drilling, Introduction to Metal Cutting. Nomenclature
of a Single Points Cutting Tool and Tool Wear. Mechanics of Chips Formations, Type of Chips, Use of Coolants in machining.


Text Books


Reference Books


Note: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-105N</td>
<td>Applied Mathematics-I</td>
<td>L 4 T 1 P 0</td>
<td>Theory 75</td>
<td>Sessional 25 Total 100</td>
</tr>
</tbody>
</table>

**Purpose**

To acquaint the students with the basic use of matrices, differential calculus and integral calculus.

**Course Outcomes (CO)**

- **CO-1**: How to find the inverse of the higher order matrices using Gauss Jordan method, using the rank how to get the solution of system of linear equations, and application of Eigen values and Eigen vectors.
- **CO-2**: Find higher order derivatives, to find the approximate values of the function using series method and, tracing of plane curves.
- **CO-3**: Extension of some concept of differential calculus for more than one variable
- **CO-4**: Application of integral calculus to find the area, volume, surface, volume of solid of revolution and, easy way to solve the multiple integrals by changing the variables.

**Unit - I**

**Linear Algebra**: Rank of a matrix, elementary transformations, elementary matrices, Gauss Jordan method to find inverse using elementary transformations, normal form of a matrix, linear dependence and independence of vectors, consistency of linear system of equations, linear and orthogonal transformations, eigenvalues and eigenvectors, properties of eigenvalues, Cayley - Hamilton theorem and its applications, diagonalization of matrices, quadratic forms.

**Unit - II**

**Differential Calculus I**: Successive differentiation, Leibnitz theorem and applications, Taylor’s and Maclaurin’s series (single variable), Expansion of functions, Asymptotes (Cartesian and Polar Co-ord.), Curve Tracing (for standard curves, Cartesian and Polar)

**Unit - III**

**Differential Calculus II**: Concept of limit and continuity of a function of two and three variables, Partial derivatives, variable treated as constant, Euler’s theorem on Homogeneous functions, total derivative, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor’s and Maclaurin’s series (two variables). Maxima and minima of a function of two variables, Lagrange’s method of undetermined multipliers

**Unit - IV**

**Integral Calculus**: Application of single integration to find the volume and surface areas of solid of revolution, Double integrals, Change of order of integration, Areas enclosed by plane curves, Triple integrals, Volume of solids, Change of variables.
Text Books

1. E. Kreyszig, Advanced Engineering Mathematics, Wiley India.

Reference Books


Note: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS-101N</td>
<td>Technical Communication</td>
<td>3 L 1 T 0 P</td>
<td>75 Theory 25 Sessional 100 Total</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

To enhance the students’ communication skills by giving adequate exposure in reading, writing, listening and speaking skills and the related sub-skills

**Course Outcomes (CO)**

<table>
<thead>
<tr>
<th>CO-1</th>
<th>Know the process of technical communication and its components.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-2</td>
<td>Improve the language skills i.e. Listening Skills, Speaking Skills, Reading Skills and Writing Skills (LSRW).</td>
</tr>
<tr>
<td>CO-3</td>
<td>Construct basic and intermediate skills in English language.</td>
</tr>
<tr>
<td>CO-4</td>
<td>Enhance comprehension skills, presentation skills, group discussion skills etc. Create literature sensibility and learn life skills through it.</td>
</tr>
</tbody>
</table>

Develop confidence for communicating in English and create interest for the life-long learning of English language

**Unit-I**

**Introduction:** Meaning; Types; Role of Communication; Barriers to Communication

**Unit-II**

**Communicative Skills:**

i) Listening: Traits of a good listener; Barriers
ii) Speaking: Achieving confidence, clarity and fluency; Paralinguistic features
iii) Reading Skills: Vocabulary; Scanning; Skimming; the SQ3R Reading Technique
iv) Writing: Characteristics; Language; Techniques for effective writing

**Unit-III**

**Professional Speaking:**

i) Group Discussion   ii) Oral Presentation   iii) Job Interview

**Unit-IV**

**Technical Writing:**

i) Technical letters   ii) Job Application and Resume   iii) Technical articles

**Text Books**

Reference Books

2. Farhathullah, T. M. *Communication Skills for Technical Students*
3. *Advanced Learner’s Dictionary*, Oxford University Press

**Note:** *Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.*
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT-101N</td>
<td>Fundamentals of Biotechnology</td>
<td>3 L 1 T 0 P</td>
<td>75 Theory 25 Sessional 100 Total</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

*To familiarize the students with the basics of Biotechnology*

**Course Outcomes (CO)**

| CO-1      | Introduction to essentials of life and macromolecules essential for growth and development |
| CO-2      | Defining the basic concepts of cell division, genes and Immune system |
| CO-3      | Introduction of basic tools and techniques in Genetic Engineering and Transgenics |
| CO-4      | Explain the role of Biotechnology in Agriculture, Medicine, Environment, Industry and Forensic Science |

**UNIT - I**

*Introduction to living world*: Concept and definition of Biology; Characteristic features of living organisms; Cell ultra-structure and functions of cell organelles like nucleus, mitochondria, chloroplast, ribosomes and endoplasmic reticulum; Difference between prokaryotic and eukaryotic cell; Difference between animal and plant cell.

*Introduction to Biomolecules*: Definition, general classification and important functions of carbohydrates, lipids, proteins, nucleic acids (DNA & RNA: Structure and forms), vitamins, hormones and enzymes.

**UNIT-II**

*Genetics*: Cell division- Mitosis and its utility to living systems. Meiosis and its genetic significance; *Gene*: Concept, location, definition and structure; Introduction to replication, transcription, translation, Mutations, Genetic disorders; *Human traits*: Genetics of blood groups, diabetes type I & II.

*Role of immune system in health and disease*: Brief introduction to morphology and pathogenicity of bacteria, fungi, virus, protozoa beneficial and harmful for human beings.

**UNIT-III**

*Concepts of Genetic Engineering*: Definition; Tools used in recombinant DNA Technology: Plasmids as nature’s interlopers, restriction enzymes as nature’s pinking-shears, Vectors as gene transfer vehicles.

*Transgenesis*: Production and significance of transgenic plants and animals; Basic concept of genetically modified organisms.

**UNIT-IV**

*Applications of Biotechnology*: Definition of biotechnology; Applications of Biotechnology in Agriculture, Medicine, Environment, Industry and Forensic Science.
**Role of biology in allied fields:** Role of biology in Information Technology (Bioinformatics), Nanotechnology (Nanobiotechnology), Micro-electromechanical systems (Bio-MEMS) and Sensors (Biosensors). Ethical issues related to Biotechnology.

**Text Book**

**Reference Books**
4. Snusted & Simmons, *Genetics*.

**Note:** Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-105N</td>
<td>Engg. Drawing and Graphics</td>
<td>1 0 3</td>
<td>75 25 100</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

To draw and interpret various projections of 1D, 2D and 3D objects.
To understand the basics of AUTOCAD and perform exercises.

**Course Outcomes (CO)**

<table>
<thead>
<tr>
<th>CO-1</th>
<th>To familiarize with the projections of points and straight lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-2</td>
<td>To draw with the projection of planes and solids</td>
</tr>
<tr>
<td>CO-3</td>
<td>To familiarize with the sectioning of solids and development of surfaces</td>
</tr>
<tr>
<td>CO-4</td>
<td>To know the AUTOCAD basics and exercise the problems</td>
</tr>
</tbody>
</table>

**Unit-I**

**Introduction, Projection of Points:** Introduction to Engineering Equipments, Elements of Engineering Drawing, Types of Lines, Various types of projections, First and third angle systems of orthographic projections. Projections of points in different quadrants.

**Projection of Straight Lines:**

**Projections of straight lines:** parallel to one or both reference planes, contained by one or both planes, perpendicular to one of the planes, inclined to one plane but parallel to the other plane, inclined to both the planes, true length of a line and its inclinations with reference planes, traces of a line.

**Unit-II**

**Projection of planes:** Introduction, types of planes, Projection of planes by change of position method only, projection of plane perpendicular to a plane, with axis parallel to both planes, with axis parallel to one plane and inclined to the other plane.

**Projection of Solids:** Types of solids, Projections of Polyhedra Solids and Solids of Revolution – in simple positions with axis perpendicular to a plane, with axis parallel to both planes, with axis parallel to one plane and inclined to the other.

**Unit-III**

**Section of Solids:** Introduction - section planes - apparent section - true section - sectional view - need for sectional view - cutting plane - cutting plane line.

Sectional view of simple solids such as Prism, Cylinders, Pyramids and Cones in simple positions Section plane perpendicular to one plane and parallel to the other, section plane perpendicular to one plane and inclined to the other.

**Development of Surfaces:** Development of surface of various simple solids in simple positions such as cubes, cylinders, prisms, pyramids etc.

**Unit-IV**

**Orthographic views (First Angle Projection Only):** Three orthographic views of solids, Orthographic Views of Nuts & Bolts.
AUTOCAD basics: Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems. Basic Commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline
Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror Display Commands: Zoom, Pan, Redraw, and Regenerate Simple dimensioning and text, simple exercises.

Text Book


Reference Books


*Note*: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE-101N</td>
<td>Basics of Electronics Engg.</td>
<td>L 3 T 1 P 0</td>
<td>Theory 75</td>
<td>Sessional 25</td>
</tr>
</tbody>
</table>

**Purpose**
To familiarize the students with the basics of Electronics Engineering.

**Course Outcomes (CO)**

<table>
<thead>
<tr>
<th>CO-1</th>
<th>Explain the fundamentals and applications of basic semiconductors and diodes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-3</td>
<td>Discuss Operational Amplifier (OP-Amp): Block Diagram, Configurations, Parameters and Applications.</td>
</tr>
<tr>
<td>CO-4</td>
<td>Discuss the Special Semiconductor Devices: Field Effect Transistors (FET), Types of FETs, Characteristics, Operation and Applications of SCR, UJT and TRIAC.</td>
</tr>
</tbody>
</table>

**Unit - I**

**Semiconductor Diodes:** Active Components (Current & Voltage Sources) and Passive Electronic components (Resistors, Capacitors & Inductors), concept of P-N diode, Diode Equivalent Circuits, Load Line Analysis, Diode as a Switch, Breakdown Mechanisms, Zener Diode: Operation and Applications, Rectifiers: Half Wave and Full Wave Rectifiers, Photo Diode and Applications, LED.

**Unit – II**

**Bipolar Junction Transistor:** Different Types of Transistors, basic operation of a transistor, Amplifying Action of BJT, Input and Output Characteristics of Common Base (CB), Common Collector (CC) and Common Emitter (CE) Configurations, Operating Point, Transistor as a switch and amplifier, Biasing: Fixed Bias, Self Bias, Voltage Divider Bias, Concept of Feedback in amplifiers, Advantages of negative feedback, Oscillators: Barkhausen criterion for oscillations.

**Unit – III**


**Unit – IV**

**Special Semiconductor Devices:** Operation and I-V Characteristics of enhancement and depletion MOSFET, concept of n-MOSFET, p-MOSFET and C-MOSFET, DIAC: Characteristics, Operation and Applications, UJT: Characteristics, Operation and

Text Books


Reference Books

1. *Basic Electronics Engineering*, Wiley Precise Textbook Series, Wiley India.

Note: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
Course No. | Course Title | Teaching Schedule | Allotment of Marks | Duration of Exam (Hrs.)
---|---|---|---|---
EE-101N | Electrical Technology Fundamentals | 4 L 1 T 0 P | 75 Theory 25 Sessional 100 Total | 3 |

**Purpose**

To familiarize the students with the basics of Electrical Technology

**Course Outcomes (CO)**

| CO-1 | Deals with steady state circuit analysis subject to DC |
| CO-2 | Deals with AC fundamentals & steady state circuit response subject to AC and circuit parameters solution techniques |
| CO-3 | Deals with introductory Balanced Three Phase System analysis in first part and second part deals with qualitative analysis of magnetic circuits & Single Phase Transformer. |
| CO-4 | Explains the general constructional features and working of various types of Electrical Machines (qualitative analysis only) |

**Unit - I**


**Network Theorems**: Superposition, Thevenin’s and Norton’s theorems all in the context of dc voltage and current sources acting in a resistive network, maximum power transfer theorem, Relevant D.C. circuit analytical problems for quantitative analysis.

**Unit - II**

AC Fundamentals: Mathematical representation of various wave functions. Sinusoidal periodic signal, instantaneous & peak values, polar & rectangular form representation of impedances & phasor quantities. Addition & subtraction of two or more phasor sinusoidal quantities using component resolution method. RMS & average values of various waveforms including clipped, clamped, half wave rectified & full wave rectified sinusoidal periodic waveforms etc. Generation of alternating emf (dynamo). Relevant analytical problems for quantitative analysis.

**A.C. Circuits**: Behavior of various components fed by A.C. source. (steady state response of pure R, pure L, pure C, RL, RC, RLC series with waveforms of instantaneous voltage, current & power on simultaneous real axis scale and corresponding phasor diagrams), P.F. active, reactive & apparent power. Frequency response of Series & Parallel RLC circuit including resonance, Q factor, cut-off frequency & bandwidth. Relevant A.C. circuit analytical problems solutions using ‘j-omega’ operator method.
Unit - III

Balanced Three Phase Systems: Necessity & advantage of three phase system, mode of generation of 3 phase supply. Phase and line voltages & currents, power. Measurement of 3-phase power by two wattmeter method for various types of star & delta connected balanced resistive, inductive & capacitive loads including phasor diagrams at various power factors. Phase sequence significance. Relevant problems for quantitative analysis.

Electromagnetism & Magnetic circuits (Qualitative analysis only): Laws of EMI, statically & dynamically induced emf, self & mutual induction, dot notation, RH Screw rule, Fleming’s RH & LH rules. MMF, Relation between magnetic flux, m.m.f. and reluctance, magnetic fringing. Hysteresis & Eddy current losses & their minimization


Unit - IV

ELECTRICAL MACHINES (Qualitative analysis only)
Prime mover, Stator-Rotor, Field–Armature, necessity of a starter.

D.C. Machines: Principle, general construction & working. Split ring /Commutator working in DC generator & motor, generated emf equation, Torque Equation. Types of DC Machines, speed control of DC Shunt motor.

A.C. Machines: 3-phase Induction motor: Concept of rotating magnetic field, principle, types, general construction and working. Concept of slip & its significance.
Synchronous Generator (alternator): Principle, general construction & working.
Synchronous motor: Principle, general construction & working.
General comparison amongst squirrel cage I.M., phase wound rotor type I.M. & DC motor.
General comparison between alternator & DC generator.

Text Books

1. Vijay Kumar Garg, Basic Electrical Engg: A complete Solution, Wiley India Ltd.

Reference Books

1. S.K. Sahdev, Basic Electrical Engg., Pearson Education

Note: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE-101N</td>
<td>Introduction to Computer Programming</td>
<td>3 1 0</td>
<td>75 25 100</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**
To familiarize the students with the basics of Computer System and C Programming

**Course Outcomes (CO)**

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Describe the overview of Computer System and Levels of Programming Languages.</td>
</tr>
<tr>
<td>CO-2</td>
<td>Learn the basic concepts of C Language.</td>
</tr>
<tr>
<td>CO-3</td>
<td>Description and applications of arrays and functions.</td>
</tr>
<tr>
<td>CO-4</td>
<td>Description and applications of pointers and user defined data types.</td>
</tr>
</tbody>
</table>

**Unit – I**

**Overview of Computers:** Block diagram and its description, Number systems, Arithmetic of number systems, Computer Hardware: Printers, Keyboard and Mouse, Storage Devices.

**Introduction to programming language:** Different levels of PL: High Level language, Assembly language, Machine language; Introduction to Compiler, Interpreter, Debugger, Linker, Loader, Assembler.

**Problem Analysis:** Problem solving techniques, Algorithms and Flowchart representation.

**Unit – II**

**Overview of C:** Elements of C, Data types; Storage classes in C; Operators: Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators, precedence & associativity of operators.

**Input/output:** Unformatted & formatted I/O function in C.

**Control statements:** if statement, switch statement; Repetition: for, while, and do-while loop; break, continue, goto statements.

**Unit – III**

**Arrays:** Definition, types, initialization, processing an array, String handling.

**Functions:** Definition, prototype, parameters passing techniques, recursion, built-in functions, passing arrays to functions, returning arrays from functions.

**Unit – IV**

**Pointers:** Declaration, operations on pointers, pointers and arrays, dynamic memory allocation, pointers and functions, pointers and strings.

**Structure & Union:** Definition, processing, Structure and pointers, passing structures to functions, use of union.

**Data files:** Opening and closing a file, I/O operations on files.
Text Books


Reference Books

2. Brian W. Kernighan Dennis Ritchie, *C Programming Language*, Pearson

Note: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-107N</td>
<td>Applied Physics Lab-I</td>
<td>0 0 2</td>
<td>30 20 50</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

*Give the knowledge of basic practicals of Physics in Engineering.*

<table>
<thead>
<tr>
<th>Course Outcomes (CO)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To make the students familiar with the experiments related with optics.</td>
</tr>
<tr>
<td>CO-2</td>
<td>To give the knowledge of handling of the experiments related with resistance using different methods.</td>
</tr>
</tbody>
</table>

**List of Experiments**

1. To find the wavelength of monochromatic light by Newton’s ring experiment.
2. To find the wavelength of various colours of white light with the help of plane transmission diffraction grating.
3. To verify Newton’s formula and hence to find the focal length of the given convex lens.
4. To find the specific rotation of sugar solution by using a Polarimeter.
5. To find the frequency of A.C. mains by using Sonometer and horse shoe magnet.
6. To find low resistance by Carrey-Foster bridge.
7. To find the resistance of a galvanometer by post office box.
8. To find the value of high resistance by substitution method.
9. To convert a galvanometer into an ammeter of desired range and verify the same.
10. To find high resistance by leakage method.
11. To compare the capacitances of two capacitors by de-sauty’s bridge and hence to find the dielectric constant of a medium.
12. To find the wavelength of sodium light by Michelson’s interferometer.
13. To find the resolving power of telescope.
14. To find the wavelength of sodium light using Fresnel bi-prism.

*Note: Student will be required to perform at least 10 experiments out of the given list.*

**Recommended Books**

1. C.L. Arora, *B. Sc. Practical Physics*, S. Chand & Company Ltd.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-109N</td>
<td>Applied Chemistry Lab-I</td>
<td>L 0 T 0 P 2</td>
<td>Practical 30</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

To train the students for handling of chemicals and glassware

**Course Outcomes (CO)**

<table>
<thead>
<tr>
<th>CO-1</th>
<th>Testing of certain properties of water samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-2</td>
<td>Determination of some of the properties of lubricants</td>
</tr>
<tr>
<td>CO-3</td>
<td>To determine some important properties of liquids</td>
</tr>
<tr>
<td>CO-4</td>
<td>To make familiar with the use of flame photometer, spectrophotometer</td>
</tr>
</tbody>
</table>

**List of Experiments**

1. Determination of temporary and permanent hardness by EDTA method or Determination of Ca$^{2+}$ and Mg$^{2+}$ hardness of water using EDTA method.
2. To determine the alkalinity of given water sample.
3. Determination of Dissolved Oxygen (DO) in given water sample.
4. To determine the flash point and fire point of an oil by Pensky-Marten flash point apparatus.
5. Determination of viscosity of lubricant by Red Wood Viscometer (No. 1 and No. 2).
6. To determine the strength of HCl solution by titrating it with NaOH solution conductometrically.
7. To determine the amount of sodium and potassium ions in a given water sample by flame photometer.
8. To determine the total iron content (Fe$^{2+}$ and Fe$^{3+}$) in an iron ore by internal/self/external indicator method.
9. To determine the concentration of KMnO$_4$ solution spectrophotometrically.
10. To determine the coefficient of viscosity of a liquid by Ostwald viscometer.
11. To determine the refractive indices of given organic liquid using Abbe’s refractometer.
12. To determine the strength of strong acid by titrating it with strong base using pH meter.
13. To determine the surface tension of a given liquid by means of stalagmometer by drop number method.

**Note:** Student will be required to perform at least 10 experiments out of the given list.

**Recommended Books**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-107N</td>
<td>Engg. Workshop</td>
<td>0 0 3</td>
<td>30 20 50</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

To aware the students with hands on experience on different trades of engineering like fitting, carpentry, smithy, welding, machine shop and sheet metal.

**Course Outcomes (CO)**

<table>
<thead>
<tr>
<th>CO-1</th>
<th>Prepare models of various basic prototypes in the carpentry trade such as Lap joint, T joint, Dove tail joint, Mortise &amp; Tenon joint, Cross-Lap joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-2</td>
<td>Prepare models of various basic prototypes in the trade of Welding such as Lap joint, Lap &amp; T joint, Edge joint, Butt joint and Corner joint.</td>
</tr>
<tr>
<td>CO-3</td>
<td>Comprehend various machine tools and prepare specified models involving various operations in the trade of Machining on lathe, drilling, shaper machines</td>
</tr>
<tr>
<td>CO-4</td>
<td>Identify fitting, marking, carpentry, measuring and machine tools.</td>
</tr>
</tbody>
</table>

**List of Experiments**

1. To study different types of measuring tools used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools (lathe, shape, milling, drilling machines)
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable for butt welding and lap welding.
7. To perform pipe welding.
8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
9. To prepare simple engineering components/ shapes by forging.
10. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
11. To prepare horizontal surface/ vertical surface/ curved surface/ slots or V-grooves on a shaper/ planner.
12. To prepare a job involving side and face milling on a milling machine

**Note:** (i) At least 10 experiments are to performed by students in a semester; (ii) At least 7 experiments should be performed from the above list; remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE-103N</td>
<td>Electrical Technology Lab</td>
<td>0 0 2</td>
<td>Practical 30</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sessional 20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total 50</td>
<td></td>
</tr>
</tbody>
</table>

**Purpose**  
To familiarize the students with the Electrical Technology Practicals

**Course Outcomes (CO)**

| CO-1      | Understand basic concepts of Network theorems |
| CO-2      | Deals with steady state frequency response of RLC circuit parameters solution techniques |
| CO-3      | Deals with introductory Single Phase Transformer practicals |
| CO-4      | Explains the constructional features and practicals of various types of Electrical Machines |

**List of Experiments**

1. To verify KVL and KCL.
2. To verify Superposition theorem on a linear circuit with at least one voltage & one current source.
3. To verify Thevenin’s Theorem on a linear circuit with at least one voltage & one current source.
4. To verify Norton's Theorem on a linear circuit with at least one voltage & one current source.
5. To study frequency response of a series R-L-C circuit on CRO and determine resonant frequency & Q-factor for various Values of R, L, and C.
6. To study frequency response of a parallel R-L-C circuit on CRO and determine resonant frequency & Q-Factor for various values of R, L, and C.
8. To perform direct load test on a single phase transformer and plot efficiency v/s load characteristic.
9. To perform speed control of DC shunt motor.
10. To perform starting & reversal of direction of a three phase induction motor.
11. Measurement of power in a 3 phase balanced system by two watt meter method.
12. To calibrate a single phase energy meter.
13. To study connections & working of fluorescent tube light.

*Note: Student will be required to perform at least 9 experiments out of the given list.*
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE-103N</td>
<td>Computer Programming Lab</td>
<td>0 0 2</td>
<td>30 20 50</td>
<td>3</td>
</tr>
</tbody>
</table>

Purpose

*To Introduce students with C Programming*

Course Outcomes (CO)

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the basic concepts of C Programming</td>
</tr>
<tr>
<td>CO-2</td>
<td>Implementation of arrays and functions.</td>
</tr>
<tr>
<td>CO-3</td>
<td>Implementation of pointers and user defined data types.</td>
</tr>
<tr>
<td>CO-4</td>
<td>Write individual and group reports: present objectives, describe test procedures and results.</td>
</tr>
</tbody>
</table>

List of Programs

1. Write a program to find the sum of individual digits of a positive integer.
2. Write a program to generate the first n terms of the Fibonacci sequence.
3. Write a program to generate all the prime numbers between 1 and n, where n is the input value given by the user.
4. Write a program to calculate the following Sum:
   \[ \text{Sum} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} \ldots \]
5. Write a program to find the roots of a quadratic equation.
6. a) Write a function to generate Pascal’s triangle.
   b) Write a function to construct a pyramid of numbers.
7. Write a C functions to find both the largest and smallest number of an array of integers.
8. Write a program for addition of Two Matrices
9. Write a program for calculating transpose of a matrix.
10. Write a program for Matrix multiplication by checking compatibility
11. Write programs that use both recursive and non-recursive functions for the following
    a. To find the factorial of a given integer.
    b. To find the GCD (greatest common divisor) of two given integers.
12. Write a function that uses functions to perform the count the lines, words and characters in a given text.
13. Write a program to explores the use of structures, union and other user defined variables
14. Write a program to print the element of array using pointers
15. Write a program to implement call by reference
16. Write a program to print the elements of a structure using pointers
17. Write a program to read a string and write it in reverse order
18. Write a program to concatenate two strings
19. Write a program to check that the input string is a palindrome or not.
20. Write a program which copies one file to another.
21. Write a program to reverse the first n characters in a file.

*Note:* Student will be required to perform at least 10 programs out of the given list.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE-103N</td>
<td>Basic Electronics Lab-I</td>
<td>0 0 2</td>
<td>30 20 50</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**

To familiarize the students with the basics of Electronics Engineering, PCB design and fabrication processes.

**Course Outcomes (CO)**

| CO-1 | Study and Identification of various basics electronics components.. |
| CO-2 | Study and perform the experimental verification of diodes, BJT, JFET, MOSFET, OP-Amps. |
| CO-3 | To provide the knowledge in assembling and testing of the PCB based electronic circuits. |

**List of Experiments**

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT and DIP), Bread Boards, Diodes, BJTs, JFETs, MOSFETs, Power Transistors, SCRs and LEDs.
2. Study the operation of Digital Multi Meter, Function / Signal Generator, Regulated Power Supply (RPS), Cathode Ray Oscilloscopes; Amplitude, Phase and Frequency of Sinusoidal Signals on CRO.
3. To study & perform the Experimental Verification of V-I characteristics of PN-diode in forward and reverse bias & study of various parameters of diode like threshold voltage and breakdown voltage etc.
4. To study & perform the Experimental Verification of Half-Wave & Full-Wave Rectifier and calculate its ripple factor, efficiency and PIV.
5. To study & perform the Experimental Verification of Zener Diode as a Voltage Regulator and calculate its parameters.
6. To study & perform the Experimental Verification of the input and output characteristics of BJT in common-emitter configuration & calculate all its parameters.
7. To study & perform the Experimental Verification of Op-Amp as Inverting, Non-Inverting, Differential amplifier & calculate its Voltage gain.
8. To study & perform the Experimental Verification of Summing and Difference amplifier & calculate its Voltage gain.
9. To study & perform the Experimental Verification of the I-V characteristics of JFET and MOSFET & calculate all its parameters.
10. Simulation of simple electronic circuits and analyzing its input and output waveforms using any of EDA tools.

**Note:** Experiments are to be performed using bread-board and components only.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-102N</td>
<td>Applied Physics - II</td>
<td>4 L 1 T 0 P</td>
<td>75 Theory</td>
<td>100 Total</td>
</tr>
</tbody>
</table>

### Purpose

To introduce the fundamentals of solid state physics and its applications to the students.

### Course Outcomes (CO)

- **CO-1**
  
  To make the students aware of basic terminology of crystal structure.

- **CO-2**
  
  Introduce the elementary quantum mechanics, which will be useful in understanding the concepts of solid state physics.

- **CO-3**
  
  Discussion of classical free electron theory, quantum theory and Band theory of solids.

- **CO-4**
  
  Basics and applications of superconductivity and nanomaterials.

### Unit - I

**Crystal Structure:** Crystalline and Amorphous solids, Crystal Structure: lattice translation vector, symmetry operations, space lattice, basis; Unit cell and Primitive cell, Fundamental types of lattices: two-dimensional and three dimensional Bravais lattices; Characteristics of Unit cells: Simple Cubic (SC), Body Centred Cubic (BCC), Face Centred Cubic (FCC), Hexagonal Close Packed (HCP) structure; Simple crystal structures: Sodium Chloride, Cesium Chloride, Diamond, Cubic Zinc Sulfide; Miller Indices, Bonding in Solids, Point defects in crystals: Schottky and Frenkel defects.

### Unit – II

**Quantum Theory:** Need and origin of Quantum concept, Wave-particle duality, Phase velocity and group velocity, Uncertainty Principle and Applications; Schrodinger’s wave equation: time-dependent and time –independent; Physical Significance of wave function $\psi$.

### Unit – III

**Free Electron Theory:** Classical free electron theory: electrical conductivity in metals, thermal conductivity in metals, Wiedemann-Franz law, success and drawbacks of free electron theory; Quantum free electron theory: wave function, eigen values; Fermi-Dirac distribution function, Density of states, Fermi energy and its importance, Thermionic Emission (qualitative).

**Band theory of Solids:** Bloch theorem, Kronig-Penney Model (qualitative), $E$ versus $k$ diagram, Brillouin Zones, Concept of effective mass of electron, Energy levels and energy bands, Distinction between metals, insulators and semiconductors, Hall effect and its Applications.
Unit IV


Nanomaterials: Introduction, Synthesis of nanomaterials: Top-down and Bottom-up approach, Sol-Gel and Ball Milling methods, Properties of Nanomaterials, Applications of Nanomaterials.

Text Books


Reference Books


Note: Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-104N</td>
<td>Applied Mathematics -II</td>
<td>4 1 0</td>
<td>75 25 100</td>
<td>3</td>
</tr>
</tbody>
</table>

**Purpose**  
To acquaint the students with the basic use of theory of equations, Laplace transform and its applications, Ordinary differential equation and its applications, and vector calculus.

**Course Outcomes (CO)**

- **CO-1**  
  How to find the roots and relation between them for the higher order polynomials, to solve the integrals by the beta and Gamma functions, and by the Leibnitz’s rule for differentiation under the integral sign.

- **CO-2**  
  Introduction about the concept of Laplace transform and how it is useful in solving the definite integrals and initial value problems.

- **CO-3**  
  Methods to solve the ODE and some of its applications.

- **CO-4**  
  How to perform the derivative and integral of the vectors, its application to find the line, surface and volume integrals.

---

**Unit - I**

**Theory of Equations:** Introduction, formation of equations, Relation between roots and coefficients, Reciprocal Equations, Transformation of equations  
Integral Calculus: Beta and Gamma functions, Evaluation of integrals by Leibnitz’s rule (Differentiation under the Integral sign)

**Unit - II**

**Laplace Transforms and its applications:** Laplace transforms: Basic concepts, Existence conditions, transform of elementary functions, Properties of Laplace transforms, transform of derivatives and integrals, multiplication and division property, Evaluation of integrals by Laplace transforms, Inverse transforms, The Convolution theorem, Unit step function, second shifting theorem, Dirac’s Delta function, Application to linear differential equations and simultaneous linear differential equations with constant coefficients.

**Unit – III**

**Ordinary Differential Equations and its applications:** Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order and first degree to simple electric circuits, Newton’s law of cooling, heat flow and orthogonal trajectories.  
Linear differential equations of second and higher order, complete solution, complementary function and particular integral, method of variation of parameters and method of
undetermined coefficients to find the particular integral, Cauchy’s and Legendre’s linear equations, simultaneous linear equations with constant coefficients.

**Unit - IV**

**Vector Calculus:** Differentiation of Vectors, Scalar and vector point functions, Gradient of a scalar field and directional derivative, divergence and Curl of a vector field and their physical interpretations, line integrals, surface integral, volume integral, Green’s theorem in the plane, Stoke’s Theorem, Gauss Divergence Theorem (without proof) and their applications.

**References Books**


**Note:** Examiner will set eight questions by selecting two from each unit. Students will be required to attempt five questions selecting at least one question from each unit.
<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Teaching Schedule</th>
<th>Allotment of Marks</th>
<th>Duration of Exam (Hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-106N</td>
<td>Applied Physics Lab-II</td>
<td>0 0 2</td>
<td>30 20</td>
<td>50</td>
</tr>
</tbody>
</table>

**Purpose**

To give the practical knowledge of handling the sophisticated instruments.

**Course Outcomes (CO)**

CO: To make the students familiar with the experiments related with solid state physics.

**List of Experiments**

1. To find the frequency of ultrasonic waves by piezoelectric methods.
2. To find the value of e/m for electrons by Helical method.
3. To find the ionisation potential of Argon/Mercury using a thyatron tube.
4. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee’s apparatus.
5. To study the characteristics of (Cu-Fe, Cu-Constantan) thermocouple.
6. To find the value of Planck’s constant by using photoelectric cell.
7. To find the value of coefficient of self inductance by using a Rayleigh bridge.
8. To find the value of Hall Coefficient of semiconductor.
9. To study the V-I characteristics of a p-n diode.
10. To find the band gap of intrinsic semiconductor using four probe method.
11. To calculate the hysteresis loss by tracing a B-H curve.
12. To verify Richardson thermionic equation.
13. To find the flashing and quenching potential of Argon and to find the capacitance of unknown capacitor.
14. To find the temperature coefficient of resistance by using Pt resistance thermometer by post office box.

**Note:** Student will be required to perform at least 10 experiments out of the given list.

**Recommended Books**

1. C.L. Arora, B. Sc. Practical Physics, S. Chand & Company Ltd.
2. B.L. Worshopn and H. T Flint, Advanced Practical Physics, KPH.