Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Theory	Sessional	Total	
AS-101N	Applied Physics-I	4	1	0	75	25	100	3
Purpose	*To introduce the basics of Physics to the students for applications in Engineering field.*							
Course Outcomes (CO)								
CO-1	Introduce the fundamentals of interference and diffraction and their applications.							
CO-2	To make the students aware of the importance of polarization and Laser in technology.							
CO-3	Applications of Optical Fiber and Ultrasonics in various fields.							
CO-4	Discussion of theory of relativity and detection of nuclear radiations.							

Unit - I

Interference: Principle of Superposition, Conditions for interference, Division of wave-front: 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.

Laser: Introduction, Stimulated Absorption, Spontaneous and Stimulated Emission; Einstein's Coefficients and its derivation, Population Inversion, Direct and Indirect pumping, Pumping schemes, Main components of Laser, He-Ne Laser, Semiconductor Laser, Characteristics of Laser, Applications of Laser.

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

1. P.K. Diwan, *Applied Physics for Engineers*, Wiley India Pvt. Ltd.
2. S.P. Taneja, *Modern Physics for Engineers*, R. Chand & Co.

Reference Books

1. N. Subrahmanyam, B. Lal, M.N. Avadhanulu, *A Textbook of Optics*, S. Chand & Company Ltd.
2. Arthur Beiser, *Concepts of Modern Physics*, Tata McGraw-Hill Publishing Company Limited.
3. R. Resnick, *Introduction to Special Relativity*, John Wiley & Sons. (Asia) Pte. Ltd.
4. V.K. Mittal, R.C. Verma, S.C. Gupta, *Introduction to Nuclear and Particle Physics*, PHI Learning Private Limited.
5. S.S. Kapoor, V.S. Ramamurthy, *Nuclear Radiation Detectors*, New Age International (P) Limited.

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.)
		L	T	P	Theory	Sessional	Total	
AS-103N	Applied Chemistry	3	1	0	75	25	100	3
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 propertiers 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

1. Rajesh Agnihotri, *Engineering Chemistry*, Wiley India Pvt. Ltd.

Reference Books

1. J.C. Kuriacone, J. Rajaram, *Chemistry in Engineering and Technology*, McGraw Hill Education (India) Private Ltd. Volume I and II.
2. S.S. Dua, *A Text Book of Engineering Chemistry*, S.Chand and Company Ltd.
3. Atkin, *Physical Chemistry*, Oxford Publication.
4. Puri, Sharma, Pathania, *Principals of Physical Chemistry*, Vishal Publications.

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.)
		L	T	P	Theory	Sessional	Total	
ME-101N	Manufacturing Technology and Processes	4	0	0	75	25	100	3
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.
Engineering Materials: General Properties and Applications of Engineering Materials, Mild Steel, Medium Carbon Steel, High Carbon Steel, High Speed Steel and Cast Iron.

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.
Hot Working Processes: Introduction to Hot Working, Principles of Hot Working Processes, Forging, Rolling, Extrusion, Wire Drawing.
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.
Welding: Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding; Spot and Seam Welding, Arc Welding: Metal Arc, TIG & MIG Welding, Welding Defects and Remedies, Soldering & Brazing.

Text Books

1. Hazra & Chaudhary, *Workshop Technology Vol. I &II* , Asian Book Comp., New Delhi.
2. R.A. Lindberg, *Process and Materials of Manufacture*, Prentice Hall of India, New Delhi.

Reference Books

1. J.S. Campbell, *Principles of Manufacturing Materials and Processes*, McGraw- Hill.
2. Amitabha Ghosh & Ashok Kumar Malik, *Manufacturing Science*, East-West Press.
3. Ostwald, Munoz , *Manufacturing Process and Systems*, John Wiley.
4. Chapman, WAJ, Edward Arnold , *Workshop Technology*, Vol. 1, 2 & 3.

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.)
		L	T	P	Theory	Sessional	Total	
AS-105N	Applied Mathematics-I	4	1	0	75	25	100	3
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 Jordon 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

1. G. B. Thomas, R. L. Finney, *Calculus and Analytic Geometry*, Pearson Education.
2. B. V. Ramana, *Engineering Mathematics*, Tata McGraw Hill
3. Michael D. Greenberg, *Advanced Engineering Mathematics*, Pearson Education, Prentice Hall.

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.)
		L	T	P	Theory	Sessional	Total	
HS-101N	Technical Communication	3	1	0	75	25	100	3
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)								
CO-1	Know the process of technical communication and its components.							
CO-2	Improve the language skills i.e. Listening Skills, Speaking Skills, Reading Skills and Writing Skills (LSRW).							
CO-3	Construct basic and intermediate skills in English language.							
CO-4	Enhance comprehension skills, presentation skills, group discussion skills etc.							
	Create literature sensibility and learn life skills through it.							
	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

1. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, Oxford University Press
2. M. Ashraf Rizvi, *Effective Technical Communication*, McGraw Hill

Reference Books

1. Wallace and Masters, *Personality Development for Life and Work,* Thomson Learning
2. Farhathullah,T. M. *Communication Skills for Technical Students*
3. *Advanced Learner's Dictionary,* Oxford University Press
4. Sanjay Kumar, *Communication Skills*, 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.*

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Theory	Sessional	Total	
BT-101N	Fundamentals of Biotechnology	3	1	0	75	25	100	3
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

1. Deswal & Deswal, *Introduction to Biotechnology*, Dhanpat Rai Publications

Reference Books

1. Bruce *et al., Molecular Biology of cell*, (4th ed.) Alberts, Garland Science Publishing, New York.
2. Pelczar Jr., M.J.; Chan, E.C.S. and Krieg, N.R., *Microbiology*, Tata McGraw Hill, New Delhi.
3. David L. Nelson and M.M. Cox, *Lehninger: Principles of Biochemistry* (3rd edition), Maxmillan/ Worth publishers.
4. Snusted & Simmons, *Genetics.*
5. Glick, B. R. and Pasternak, J.J., *Molecular Biotechnology: Principles Application of Recombinant DNA.* ASM press WashingtonDC.
6. Goldsby, R A,. Kindt, T.J, Osborne, B.A., *Kuby's Immunology*, W. H. Freeman and company, New York.
7. Watson, James D. and Gilman, M, *Recombinant DNA* (2nd Edition), W.H Freeman and Company, New York.
8. Malacinski, G. M., *Essentials of Molecular Biology* (4th ed.), Jones & Bartlet Publishers, Boston

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.)
		L	T	P	Theory	Sessional	Total	
ME-105N	Engg. Drawing and Graphics	1	0	3	75	25	100	3
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)								
CO-1	To familiarize with the projections of points and straight lines							
CO-2	To draw with the projection of planes and solids							
CO-3	To familiarize with the sectioning of solids and development of surfaces							
CO-4	To know the AUTOCAD basics and exercise the problems							

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

1. T. Jeyapoovan, *Engineering Graphics using AUTOCAD 2000*, Vikas Publishing House.
2. Basudeb Bhattacharyya, *Machine Drawing*, Oxford University Press, New Delhi

Reference Books

1. Amar Pathak, *Engineering Drawing*, Dreamtech Press, New Delhi.
2. N.D. Bhatt and V.M.Panchal, *Engineering Drawing: Plane and Solid Geometry*, Charotar Publishing House.
3. Thomas E.French, Charles J.Vierck, Robert J.Foster, *Engineering drawing and graphic technology*, McGraw Hill International Editions.
4. P.S. Gill, *Engineering Graphics and Drafting*: Millennium Edition, S.K. Katariaand Sons.
5. *A Primer on Computer aided Engineering Drawing-2006*, published by VTU, Belgaum.

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.)
		L	T	P	Theory	Sessional	Total	
ECE-101N	Basics of Electronics Engg.	3	1	0	75	25	100	3
Purpose	*To familiarize the students with the basics of Electronics Engineering.*							
Course Outcomes (CO)								
CO-1	Explain the fundamentals and applications of basic semiconductors and diodes.							
CO-2	Explain Bipolar Junction Transistors (BJT): Biasing techniques, BJT Amplifier, Feedback, Oscillators.							
CO-3	Discuss Operational Amplifier (OP-Amp): Block Diagram, Configurations, Parameters and Applications.							
CO-4	Discuss the Special Semiconductor Devices: Field Effect Transistors (FET), Types of FETs, Characteristics, Operation and Applications of SCR, UJT and TRIAC.							

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

Operational Amplifier: Operational Amplifier: Basic Block Diagram, Equivalent Circuit, Characteristics of Ideal Op-Amp, Concept of Virtual Short, Ideal Op-Amp vs Practical Op-Amp, Configurations of Op-Amp: Inverting, Non-Inverting, Differential, Parameters of Op-Amp: Bandwidth, Slew Rate, Gain, CMRR, PSRR, Input offset voltage, Output offset voltage, Op-Amp Applications: Summing and Difference Amplifiers, Integrator and Differentiator.

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

Applications, SCR: Characteristics, Operation and Applications, TRIAC: Characteristics, Operation and Applications.

Text Books

1. Boylestad & Nashelsky, *Electronics Devices & Circuits*, Pearson Education.

Reference Books

1. *Basic Electronics Engineering*, Wiley Precise Textbook Series, Wiley India.
2. N. N. Bhargava S. C. Gupta D. C. Kulshreshtha, *Basic Electronics and Linear Circuits*, Tata McGraw-Hill Education
3. Millman & Halkias, *Integrated Electronics*, Mc-Graw Hill.
4. David A. Bell, *Electronic Devices and Circuits*, Oxford University Press.
5. Donald L. Schilling & Charles Belove, *Electronics Circuits*, Mc-Graw Hill.
6. Thomas L. Floyd, *Electronic Devices*, Pearson Education
7. Malvino, *Electronics Principles*, Mc-Graw Hill.

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.)
		L	T	P	Theory	Sessional	Total	
EE-101N	Electrical Technology Fundamentals	4	1	0	75	25	100	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

D.C. circuits excited by independent voltage/current source (steady state): Ohm's Law, junction & node, circuit elements classification: Linear & nonlinear, active & passive, lumped & distributed, unilateral & bilateral with examples. KVL, KCL, Loop analysis of resistive circuit in the context of dc voltages & currents, Node-voltage analysis of resistive circuit in the context of dc voltages & currents.Star-Delta transformation for set of pure resistors. Relevant D.C. circuit analytical problems for quantitative analysis.

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

Single Phase Transformer (Qualitative analysis only): Principle, construction & emf equation. Phasor diagram for ideal case and at no load. Winding resistance & leakage reactance. Actual transformer at resistive, inductive & capacitive loads with phasor diagrams. Losses & Efficiency, condition of maximum efficiency, regulation. OC & SC test, direct load test, equivalent circuit, concept of auto transformer.

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.
2. Rajendra Prasad, *Electrical Engg. Fundamentals*, PHI Pub.

Reference Books

1. S.K. Sahdev, *Basic Electrical Engg.*, Pearson Education
2. PV Prasad, *Basic Electrical Engg,* Sivangaraju, Cengage Learning Pub.
3. Bobrow, *Electrical Engg. Fundamentals*, Oxford Univ. Press
4. Kulshreshtha, *Basic Electrical Engg.*, McGraw Hill Pub.

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.)
		L	T	P	Theory	Sessional	Total	
CSE-101N	Introduction to Computer Programming	3	1	0	75	25	100	3
Purpose	*To familiarize the students with the basics of Computer System and C Programming*							
Course Outcomes (CO)								
CO-1	Describe the overview of Computer System and Levels of Programming Languages.							
CO-2	Learn the basic concepts of C Language.							
CO-3	Description and applications of arrays and functions.							
CO-4	Description and applications of pointers and user defined data types.							

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

1. Pradip Dey and Manas Ghose, *Computer Fundamental and Programming in C*, Oxford Pub.
2. Vikas Gupta, *Computer Concepts and C Programming*, Dreamtech.

Reference Books

1. Forouzan Behrouz, *Computer Science: A Structured Programming Approach Using C*, Cengage Learning.
2. Brian W. Kernighan Dennis Ritchie, *C Programming Language*, Pearson
3. Yashwant Kanetker, *Let us C*, BPB Publications.
4. A K Sharma, *Fundamentals of Computers & Programming*, Dhanpat Rai Publications
5. Kashi Nath Dey, Samir Bandyopadhyay, *C Programming Essentials*, Pearson.
6. Rajaraman V., *Computer Basic and C Programming*, Prentice Hall of India Learning.

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.)
		L	T	P	Practical	Sessional	Total	
AS-107N	Applied Physics Lab-I	0	0	2	30	20	50	3
Purpose	*Give the knowledge of basic practicals of Physics in Engineering.*							
Course Outcomes (CO)								
CO-1	To make the students familiar with the experiments related with optics.							
CO-2	To give the knowledge of handling of the experiments related with resistance using different methods.							

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.
2. B.L. Worshnop and H, T, Flint, *Advanced Practical Physics,* (KPH).

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Practical	Sessional	Total	
AS-109N	Applied Chemistry Lab-I	0	0	2	30	20	50	3
Purpose	*To train the students for handling of chemicals and glassware*							
Course Outcomes (CO)								
CO-1	Testing of certain properties of water samples							
CO-2	Determination of some of the properties of lubricants							
CO-3	To determine some important properties of liquids							
CO-4	To make familiar with the use of flame photometer, spectrophotometer							

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 condutometrically.
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

1. S.S. Dara, *A Text Book on Experimental and Calculation :Engineering Chemistry*, S. Chand & Company (Ltd.)
2. Shashi Chawla, *Essential of Experimental Engineering Chemistry*, Dhanpat Rai Publishing Company.
3. O.P. Virmani, A.K. Narula, *Theory & Practice Applied Chemistry*, New Age.

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Practical	Sessional	Total	
ME-107N	Engg. Workshop	0	0	3	30	20	50	3
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)								
CO-1	Prepare models of various basic prototypes in the carpentry trade such as Lap joint, T joint, Dove tail joint, Mortise & Tenon joint, Cross-Lap joint							
CO-2	Prepare models of various basic prototypes in the trade of Welding such as Lap joint, Lap & T joint, Edge joint, Butt joint and Corner joint.							
CO-3	Comprehend various machine tools and prepare specified models involving various operations in the trade of Machining on lathe, drilling, shaper machines							
CO-4	Identify fitting, marking, carpentry, measuring and machine tools.							

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.*

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Practical	Sessional	Total	
EE-103N	Electrical Technology Lab	0	0	2	30	20	50	3
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.
7. To perform O.C. and S.C. tests on a single phase transformer.
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.*

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Practical	Sessional	Total	
CSE-103N	Computer Programming Lab	0	0	2	30	20	50	3
Purpose	*To Introduce students with C Programming*							
Course Outcomes (CO)								
CO-1	Understand the basic concepts of C Programming							
CO-2	Implementation of arrays and functions.							
CO-3	Implementation of pointers and user defined data types.							
CO-4	Write individual and group reports: present objectives, describe test procedures and results.							

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:
   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.*

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Practical	Sessional	Total	
ECE-103N	Basic Electronics Lab-I	0	0	2	30	20	50	3
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.*

Course No.	Course Title	Teaching Schedule			Allotment of Marks			Duration of Exam (Hrs.)
		L	T	P	Theory	Sessional	Total	
AS-102N	Applied Physics - II	4	1	0	75	25	100	3
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 ψ.

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

Superconductivity: Introduction, General features of Superconductors, Meissner effect, Types of superconductors, Elements of BCS theory, London equations, Applications of superconductivity.

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

1. P.K. Diwan, *Applied Physics for Engineers*, Wiley India Pvt. Ltd.
2. S.P. Taneja, Modern Physics for Engineers, R. Chand & Co.

Reference Books

1. C. Kittel, *Introduction to Solid State Physics*, John Wiley & Sons.
2. Arthur Beiser, *Concepts of Modern Physics*, Tata McGraw-Hill Publishing Company Limited.
3. S.O. Pillai, *Solid State Physics, New Age International (P) Limited.*
4. J.L. Powell, B. Crasemann, *Quantum Mechanics*, Narosa Publishing House.
5. C.P. Poole, F.J. Owens, *Introduction to Nanotechnology*, John Wiley & Sons (Asia) Pte. Ltd.

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.)
		L	T	P	Theory	Sessional	Total	
AS-104N	Applied Mathematics -II	4	1	0	75	25	100	3
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

1. E. Kreyszig, *Advanced Engineering Mathematics*, Wiley India.
2. G. B. Thomas, R. L. Finney, *Calculus and Analytic Geometry,* Pearson Education.
3. B. V. Ramana, *Engineering Mathematics*, Tata McGraw Hill
4. Michael D. Greenberg, *Advanced Engineering Mathematics*, Pearson Education, Prentice Hall.

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.)
		L	T	P	Practical	Sessional	Total	
AS-106N	Applied Physics Lab-II	0	0	2	30	20	50	3
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 thyratron 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 Richerdson 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. Worshnop and H. T Flint, *Advanced Practical Physics*, KPH.