

UNIT I

MECHANICS AND RELATIVITY

Gravitation- Kepler's law- Gravitational constant and their determination variation of 'g' - Centre of gravity - Centre of gravity of a solid hemisphere - Hollow hemisphere - Tetrahedron and solid cone - Friction – Lubricants - Laws of friction - Cone of friction - angle of friction - Equilibrium of a body in a inclined plane - Impulse – Impact- Laws of Impact - Direct and oblique impact - Impact between two spheres - Loss of Kinetic energy – Moment of Inertia - Angular momentum and Kinetic energy of a revolving body - Moment of inertia of a sphere, shell and cylinder - Compound pendulum - Newton's laws and their limitations - postulates of special theory of relativity - Lorentz transformation equations and its applications - variation of Mass with Velocity - Mass - energy equivalence – Physical significance

UNIT II

PROPERTIES OF MATTER

Elastic moduli - Relations - Couple per unit twist - Torsional oscillations - Bending of beams - Uniform and Non uniform bending - Elastic constants and their determinations - Viscosity of liquids - Highly viscous liquids – Stoke's and Searle's method- Surface Tension - Capillary rise - Method of drops - Surface tension of mercury - Quincke's Method - Laws of osmotic pressure and experimental determination of osmotic pressure- Fick's laws of diffusion - Determination of diffusivity – Applications

UNIT III

HEAT AND THERMODYNAMICS

Specific heat capacity – Determination of specific heat capacity by Newton's law of cooling- Debye's theory- Mayer's relation - Vanderwaal's equation - Critical constants and Vanderwaal's constant - J K effect - Theory and experiment – Liquefaction of gasses – Hydrogen - Helium - Thermal conductivity - Forbe's method - Stefan's law - Experimental determination of Stefan's constant- Solar constant - Temperature of the sun

Zeroth, first law and second laws of thermodynamics - Isothermal and adiabatic change - Reversible and irreversible process - Carnot's theorem- Carnot engine - Carnot cycle - Entropy - Maxwell's thermo dynamical relations and its applications - Third law of thermodynamics

UNIT IV

Sound

Simple harmonic motion - Composition of two SHMs along a straight line and at right angles - Lissajou's figures - Laws of transverse vibrations - verification by sonometer and Melde's string - Forced vibrations and resonance - Beats - Doppler effect - Velocity of sound in solids and gases – Theory and experiment - Ultrasonics - production, properties and applications - Acoustics of buildings

UNIT V

OPTICS AND SPECTROSCOPY

Spherical aberration - Chromatic aberration and their rectifications – Coma- Eyepiece - Ramsden's and Huygen's eyepieces - Interference - Colours of thin films - Newton's rings - Theory and experiment - diffraction – Fresnel's and Fraunhofer types - Zone plate - Diffraction grating – Prism- Grating spectra - dispersive and resolving power of a grating - Double refraction - Huygen's explanation – Nicol's prism - Quarter and half wave plates - Production and detection of plane, circular and elliptically polarized light - optical activity - Determination of specific rotatory power – Polarimeter

UV and IR Spectroscopy - Principle and application - Raman effect - Explanation of Raman effect on the basis of quantum theory - Applications of Raman effect - Optical fiber - Fiber optic sensors - Fiber optic communication systems and their advantages - Lasers - Population inversion - Ruby and Helium Neon Lasers and applications

UNIT VI

WAVE MECHANICS

De Broglie concept of wave theory- Wave velocity and group velocity- De Broglie relations – Heisenberg's uncertainty principle – Basic postulates of wave mechanics- Schrodinger's Wave equation - Eigen function and Eigen values- Particle in a box – Linear harmonic oscillator (one dimension only)

UNIT VII

ELECTRICITY AND MAGNETISM

Coulomb's law - Permittivity of free space - Relative permittivity - Electric field - Intensity of field due to a point charge - Gauss theorem and its application - Electric potential - Relation between potential and intensity - Electric dipole moment - potential and

intensity due to a dipole- Capacitance - Capacity of a spherical, parallel and cylindrical capacitors - Energy of a charge capacitor - Dielectric constant - Ohm's law - Resistivity and conductivity - Internal resistance of a cell - EMF and Potential difference - Thermo Electricity - Peltier and Thomson Co Efficients - Laws of Electrolysis - Conductivity of an electrolyte Arrheinius theory of electrolytic conduction - Calculation of emf of Daneil cell as reversible cell

Magnetic field around a current carrying conductor - Biot and Savart's law - Ampere's law of magnetic force due to a current - Force between two current carrying parallel conductors- Force on an electron moving in a magnetic field - Faraday's laws of electromagnetic induction - Self and mutual inductance - Induction coils and its uses - Eddy currents - Transformers - Energy losses - Skin effect - Advantages of AC distribution over DC - Dynamos and motors -

Magnetic poles - Magnetic moments - Susceptibility - Relation between susceptibility and permeability - Hysteresis - Dia, para, ferro magnetism - Electromagnetic waves in free space.

UNIT VIII

ELECTRICAL CIRCUITS AND ELECTRONICS

Kirchoff's laws for a loop and a junction - Measurements of circuit parameters (R,L and C) - AC circuits - Complex impedance and phase diagram – LCR Circuits - Series and parallel resonant circuits - Sharpness of resonance q factor.

Semiconductors - Energy band theory of solid - Insulators - Conductors and Semiconductors - Intrinsic and extrinsic semiconductors - Electrons and holes as charge carriers - P-type and N-type semiconductors - Junction diodes - Characteristics of a diode - Diode applications - Junction transistors - characteristic of transistors - Rectifier, Amplifier and oscillator circuits - AM and FM transmission with block diagrams - Basic principles of super heterodyne receiver with block diagram - Photo conductive cell - Photo diode - Solar cell - LED and LCD - construction and working T.V Camera - Vertical and Horizontal scanning - T.V Transmission and reception with block diagrams - T.V Antenna (Yogi type) - Colour TV - Three colour theory - Radar - Uses of radar.

Logic circuits - AND, OR, NOT NAND, NOR and EX-OR gates - Truth tables - Multivibrators - Astable multivibrators - Flip flop circuits (RS and JK flip flops)

UNIT IX

MODERN PHYSICS

Canal rays - e/m of positive ions - Thomson's parabola method - Aston's mass spectrograph - Planck's quantum theory of black body radiation - Photoelectric effect - photo electric multipliers - Einstein's equation for photo electric effect - Millikan's experiment - Determination of Planck's constant.

Bohr's theory of hydrogen atom - Spectra of Hydrogen and Hydrogen like atoms - Rydberg's constant - Spatial quantization - Sommerfeld atom model – Vector atom model- Seven quantum numbers - Pauli's exclusion principle - Examples of electronic configuration – Magnetic moment due to orbital motion and electron spin - Bohr magnetron - Experimental verification - Fine structure of sodium D Line - Zeeman effect - Anomalous Zeeman effect - Theoretical explanation

UNIT X

NUCLEAR AND SOLID STATE PHYSICS

Properties of nucleus - size, charge, mass and spin - Nuclear magnetic dipole moment - Binding energy - Packing fractions - Nuclear forces - Nuclear models - Shell model and liquid drop model - Nuclear reactions – Radio activity and induced radio activity- Artificial transmutation Techniques - Application of Radio isotopes - Discovery, Production and detection of neutron - Accelerators - Betatron - Proton Synchrotron - Particle Detectors - Ionization chamber - GM counter - Elementary particle – Baryons and Leptons – Cosmic rays

Structure of crystals - Periodicity and plane in crystal - Symmetry elements and symmetry groups - Classification of crystals - Unit cell and crystal types Bonding - ionic, covalent, metallic and Vander wall's- X-rays - Bragg's law and absorption of X rays - Mosley's law - Compton effect