For the Year 2026

Physics – 322

Syllabus for CUET

(UG)

PHYSI

PHYSICS-(322)

Unit 1: Electrostatics

- Electric charges, Conservation of charge, Coulomb's law-force between two- point charges, forces between multiple charges; superposition principle and continuous charge distribution, electric dipole.
- Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two-point charges and of electric dipole in an electrostatic field.
- Electric field, electric field lines electric field due to a point charge, electric field due to a dipole, torque on a dipole in an uniform electric field.
- Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside).
- Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor.

Unit 2: Current Electricity

- Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity, temperature dependence of resistance, Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel.
- Kirchhoff's rules, Wheatstone bridge.

Unit 3: Magnetic Effects of Current and Magnetism

- Concept of magnetic field, Oersted's experiment. Biot - Savart law and its application to the current carrying circular loop.
- Ampere's law and its applications to infinitely long straight wire. The solenoid, force on a moving charge in uniform magnetic and electric fields.

- Force on a current-carrying conductor in a uniform magnetic field, force between two parallel current-carrying conductors-definition of ampere, current loop as a magnetic

dipole and its magnetic dipole moment, torque experienced by a current loop in uniform magnetic field.

- Moving coil galvanometer- its current sensitivity and conversion to ammeter and voltmeter.

- Bar magnet, bar magnet as an equivalent solenoid, magnetic field lines, magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, torque on a magnetic dipole (bar magnet) in a uniform magnetic field.
- Magnetic properties of materials- Para-, dia- and ferro – magnetic substances with examples, Magnetization of materials, effect of temperature on magnetic properties.

Unit 4: Electromagnetic Induction and Alternating Currents

- Electromagnetic induction; Faraday's laws, induced emf and current; Lenz's Law, Self and mutual induction.
- Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LCR series circuit, phasors, resonance, power in AC circuits, power factor, wattless current.
- AC generator, Transformer.

Unit 5: Electromagnetic Waves

- Concept of displacement current.
- Electromagnetic waves, their characteristics, and their transverse nature.
- Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, and gamma rays) including elementary facts about their uses.

Unit 6: Optics

- Reflection of light, spherical mirrors, mirror formula, refraction of light, total internal reflection and optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens maker's formula, magnification, power of a lens, combination of thin lenses in contact, refraction and dispersion of light through a prism.
- Optical instruments: Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers.
- Wave front and Huygen's principle, reflection and refraction of plane waves at a plane surface using wave fronts.
- Proof of laws of reflection and refraction using Huygen's principle.

- Coherent sources and interference of light, Young's double slit experiment and expression for fringe width.
- Diffraction due to a single slit, width of central maxima.

Unit 7: Dual Nature of Matter and Radiation

- Matter waves-wave nature of particles, de-Broglie relation.
- Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light. Experimental study of photoelectric effect.

Unit 8: Atoms and Nuclei

- Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model of hydrogen atom, Expression for radius of an orbit, velocity and energy of electron in an orbit, hydrogen line spectra (qualitative treatment only).
- Composition and size of nucleus, atomic number , atomic mass number, isotopes, isobars and isotones, nuclear force, Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission, nuclear fusion.

Unit 9: Electronic Devices

- Energy bands in conductors, semiconductors and insulators (qualitative ideas only).
- Intrinsic and extrinsic semiconductors, p-type and n-type, p-n junction Semiconductor diode its I-V characteristics in forward and reverse bias.
- Application of junction diode -diode as a rectifier.