Chennai Mathematical Institute
BSc (Honours) Physics

Topics covered in entrance examination

- Mechanics: Measurements, accuracy, precision, errors, significant figures, dimensional analysis; position, displacement, path length, average speed and velocity, instantaneous speed and velocity, relative velocity, acceleration; planar motion, projectiles, uniform circular motion; Newton's laws, equilibrium, work, energy, power, potential en ergy, conservation of momentum, energy, collisions; centre of mass, linear momentum of a system of particles, angular velocity, torque, angular momentum, rigid body, moment of inertia, motion around a fixed axes, rolling motion; Kepler's laws, acceleration due to gravity on, below, and above the earth's surface, gravitational potential energy, escape speed, moon, geostationary and polar satellites; stress, strain, Hooke's law, elastic moduli; fluids, pressure, Bernoulli's principle, viscosity, surface tension.
- Thermal physics: heat and temperature, ideal-gas equation, absolute temperature, thermal expansion, specific heat capacity, calorimetry, heat transfer, law of cooling, thermal equilibrium, zeroeth law, internal energy, work, first law of thermodynamics, thermodynamic state variables, equation of state, heat engines, refrigerator and heat pumps, second law, reversible, irreversible processes, Carnot engine, molecular nature of matter, gases, kinetic theory, equipartition, mean free path.
- Oscillations and Waves: Periodic, oscillatory, simple harmonic and uniform circular motions, damped and forced oscillations, resonance, transverse, longitudinal, progressive and travelling waves, superposition, reflection, beats, Doppler effect.
- Electricity and Magnetism: Coulomb's law, electric field lines, flux, Gauss's law, potential, capacitance, conductors, dielectrics and polarisation, Ohm's law, drift velocity, resistivity, energy, power; capacitors, resistors, cells in series and parallel, emf, internal resistance, Kirchhoff 's laws, Wheatstone bridge, meter bridge, potentiometer; magnets, magnetisation and magnetic intensity, magnetic properties of matter, magnetic flux, Faraday-Lenz law, motional EMF, eddies, inductance, LCR circuit, transformers, displacement current, electromagnetic waves and spectrum.
- Optics and Modern Physics: Ray optics, reflection, refraction, total internal reflection, lenses, prisms, dispersion, optical instruments; wave optics, plane waves, reflection, refraction using Huyghen's principle, coherent, incoherent addition, interference, diffraction, polarisation; thermionic emission, field emission, photoelectric effect, wave nature of matter, Davisson and Germer experiment, Rutherford's model, atomic spectra, Bohr model, de Broglie's hypothesis, atomic masses; nuclear composition, size of the nucleus, mass-energy and nuclear binding energy, nuclear force, radioactivity, nuclear energy, intrinsic and extrinsic semiconductors,bandwidths.

Suggested reading material

1. Class XI and XII Physics Textbooks of the National Council of Educational Research and Training, New Delhi.
2. *Advanced Level Physics* by Michael Nelkon and Philip Parker, CBS Publishers and Distributors, India.
3. *Fundamentals of Physics* by D. Halliday, R. Resnick and J.Walker, Wiley Publishers.
4. *3000 Solved Problems in Physics* (Schaum's Solved Problems Series) by Alvin Halpern; McGraw Hill Publishers.
5. *Problems in General Physics* by I. E. Irodov, CBS Publishers and Distributors, India.