

## PhD-July 2026-Admissions

### Syllabus for Written Test (Physics)

**Electromagnetic Theory:** Scalar and vector potentials; Flux, divergence of a vector, Gauss's theorem, Curl-rotational and irrotational vector fields, Stoke's theorem; Electrostatic potential and field due to discrete and continuous charge distributions, Dielectrics, capacitors, and conductors; Lorentz force law, Bio-Savart's law and Ampere's law in magneto statics, Divergence and curl of B; Maxwell's equations; Propagation of electromagnetic waves in dielectric media.

**Quantum Mechanics:** Postulates of quantum mechanics; Uncertainty principle; Schrodinger equation; One-dimensional potentials: Step potential, finite rectangular well, tunnelling from a potential barrier, particle in a box, harmonic oscillator.

**Solid State Physics:** Elements of crystallography; Diffraction methods for structure determination; Bonding in solids; Free electron theory; Band theory of solids; Metals, semiconductors and insulators; Conductivity, mobility and effective mass; Optical properties of solids; Kronig-Penney model; Magnetic properties of solids; Dia-, para-, ferro-magnetism; Superconductivity.

**Electronics:** Semiconductors in equilibrium: Electron and hole statistics in intrinsic and extrinsic semiconductors; Direct and indirect band gap transitions, p-n junctions, Current-Voltage (I-V) characteristics of p-n junction diode, Bipolar junction transistors; Current-Voltage (I-V) characteristics; Operational amplifiers, active filters; Basics of digital logic circuits/gates.