

TECHNICAL ASSISTANT (Physics)

Written Test Pattern and Syllabus (Indicative)

17.12.2025

The written test consists of two parts 1) Part-A and 2) Part-B

The level of test is Under Graduate in Physics.

Part-A Test

The objective test will be for **60** marks and duration of the test will be for **01** hour.

The medium of language will be English only. The indicative syllabus for above test is given below.

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1. Class XII Science (Physics, Chemistry, Mathematics)
 2. Numerical Ability
 3. Logical Reasoning
 4. General Knowledge & Current Affairs
 5. Computer Fundamentals
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Part-B Test

The objective test will be for **40** marks and duration of the test will be for **01** hour.

The medium of language will be English only. The indicative syllabus for above test is given below.

Electromagnetic Theory: Solution of electrostatic and magneto-static problems including boundary value problems; dielectrics and conductors; Biot-Savart's and Ampere's laws; Faraday's law; Maxwell's equations; scalar and vector potentials; Coulomb and Lorentz gauges; Electromagnetic waves and their reflection, refraction, interference, diffraction and polarization. Poynting vector, Poynting theorem, energy and momentum of electromagnetic waves; radiation from a moving charge.

Atomic and Molecular Physics: Photoelectric effect, idea of discrete energy levels and electron spin; Franck – Hertz and Stern – Gerlach experiments, Significance of four quantum numbers and concept of atomic orbitals; electric dipole transitions and selection rules; X-ray spectra; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Franck-Condon principle; Raman effect; NMR and ESR; lasers.

Solid State Physics: Elements of crystallography; diffraction methods for structure determination; bonding in solids; elastic properties of solids; defects in crystals; lattice vibrations and thermal properties of solids; free electron theory; band theory of solids; metals, semiconductors and insulators; transport properties; optical, dielectric and magnetic properties of solids; elements of superconductivity.

Nuclear Physics: Nuclear radii and charge distributions, nuclear binding energy, Electric and magnetic moments; nuclear models, liquid drop model – semi empirical mass formula, Fermi gas model of nucleus, nuclear shell model; nuclear force and two nucleon problem; Alpha decay, Beta-decay, electromagnetic transitions in nuclei; Rutherford scattering, nuclear reactions, conservation laws; fission and fusion; particle accelerators and detectors.

Electronics: Network analysis; semiconductor devices; Bipolar Junction Transistors, Field Effect Transistors, amplifier and oscillator circuits; operational amplifier, negative feedback circuits ,active filters and oscillators; rectifier circuits, regulated power supplies; basic digital logic circuits, sequential circuits, flip-flops, counters, registers, A/D and D/A conversion.

Optics: Ray Optics: focal length of lenses, magnifying and resolving power of telescopes. Wave optics: Interference, young's double slit experiment, interference in thin films, Newton rings diameter. Diffraction: single slit and N-slit diffraction, diffraction grating. Polarization: Production of polarization. Principles of fiber optics, acceptance angle, acceptance cone, numerical aperture, applications if fiber optics.

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