

Department of Physics

Technical Assistant

Stage-I (Screening Test)

Stage-I (Screening Test): A screening test shall be conducted in the first phase in form of multiple choice written test. Written test shall be of **90 minutes'** duration comprising of **75 questions**. Each **correct answer will be awarded One [1] mark** and for each **wrong answer One-fourth [1/4] mark shall be deducted**. Screening test shall consist of questions on **General English**(Tenses, Active and Passive, Direct and Indirect speech, Punctuation, Correction of sentences, One word substitutes, Modals, Articles, Clauses, Synonyms, Antonyms, Idioms and Phrases); **Numerical Aptitude Arithmetic**(Simplification of Fractions, Simple and Compound Interest, Profit and Loss, Percentage, Averages, Number System, Time and Work, Problems on Trains, Calendar, Area, Problems on Numbers, Square root, Cube root, Time and Distance and Other basic Arithmetic related matters);**Reasoning and Data Interpretation** (Number Series Compilation, Missing Number finding, Pattern series, Direction Sense Test, Series Compilations, Classification, Missing Character finding, odd man out, Blood relations, Analogy, Coding and Decoding, Letter and Symbol Series, Verbal reasoning, Statement and Conclusions, Letter and Symbol Series, Logical Problems, Arithmetic reasoning, Logical Sequence of words, Pie Chart and Bar Chart).

Eligible candidates **Ten Times** of the positions in each category will be screened for the Stage-II subject to the fulfillment of all educational qualification etc. as per the Recruitment Rules-2019.

Stage-II (Skill test)

Stage-II (Skill Test): The skill test will be of qualifying nature.

Laboratory Experiments etc. as per nature of the post shall be conducted in the respective laboratories/field. Minimum qualifying marks in the skill test will be [UR:30%; EWS:27%; OBC:27%; SC;20%; ST:20%; PwD:15%].

The candidates, who will qualify the skill test, will be called for the final written test. The Candidates appearing in the written test must ensure their eligibility for the particular category of post. The documents in support of their eligibility shall be verified before the Final test. If any candidate will not have requisite qualification etc. as per the post for which he is appearing will not be allowed to sit in the final test (Stage-III).

Stage-III (Final test)

Stage-III (Final Test): Final written test shall be of 2 hours duration comprising of 100 multiple choice questions.

Each **correct answer will be awarded One [1] mark** and for each **wrong answer One-fourth [1/4] mark shall be deducted**. Only those who are screened in after the Screening test [Stage –I] and qualify the Skill Test [Stage-II] will be allowed to appear in the Final Test [Stage III]. The minimum passing marks in Final test will be [UR:30%; EWS:27%; OBC:27%; SC;20%; ST:20%; PwD:15%].

The final merit list shall be drawn on the basis of the stage-III written test.

SYLLABUS FOR SKILL TEST AND FINAL WRITTEN TEST IS AS PER ANNEXURE-IV.

Department of Physics
Syllabus for Skill Test (Technical Assistant)

The candidate is expected to perform and have working knowledge of the experiments related to the following topics:

Error Analysis and Measurements

Units, Errors, Least count, use of vernier calliper, screw gauge, spherometer, travelling microscope.

ELECTROSTATICS

Electric flux – Electrostatic induction – capacitor and capacitance – Dielectric and electric polarisation – parallel plate capacitor with and without dielectric medium – applications of capacitor – energy stored in a capacitor.

CURRENT ELECTRICITY & EFFECTS OF ELECTRIC CURRENT

Carbon resistors – Colour code for carbon resistors – Combination of resistors – series and parallel – Temperature dependence of resistance – Internal resistance of a cell – Potential difference and emf of a cell. Kirchoff's law – illustration by simple circuits. Magnetic effect of electric current – Concept of magnetic field. Oersted's experiment – Biot-Savart law – Magnetic field due to an infinitely long current carrying straight wire and circular coil – Tangent galvanometer – Construction and working – Bar magnet as an equivalent solenoid – magnetic field lines.

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

Self induction – Mutual induction – Eddy current – Applications – Transformer – Long distance transmission. Alternating current – measurement of AC – AC circuit with resistance – AC circuit with inductor – AC circuit with capacitor – LCR series circuit – Resonance and Q – factor: power in AC circuits.

ELECTROMAGNETIC WAVES

Electromagnetic spectrum, Radio, Microwaves, Infra red, visible, ultra violet – X rays, gamma rays. Raman Effect – Raman spectrum.

ATOMIC PHYSICS

X-rays – production, properties, detection, absorption, diffraction of X-rays – Laue's experiment – Bragg's law, Bragg's X-ray spectrometer – X-ray spectra – continuous and characteristic X-ray spectrum – Mosley's law and atomic number. Photoelectric Effect- photoelectric cell, photovoltaic cell, Frank- Hertz Experiment.

Masers and Lasers – spontaneous and stimulated emission – normal population and population inversion – Ruby laser, He-Ne laser – properties and applications of laser lithography.

NUCLEAR PHYSICS

Nuclear properties –Stability of nuclei – Bain bridge mass spectrometer. Radioactivity – alpha, beta and gamma radiations and their properties, α -decay and β -decay and γ -decay – Radioactive decay law – half life – mean life, Geiger Muller Counter, Scintillation Counter.

SEMICONDUCTOR DEVICES AND THEIR APPLICATIONS

Formation of P-N Junction – Barrier potential and depletion layer – P-N Junction diode – Forward and reverse bias characteristics – diode as a rectifier – zener diode. Zener diode as a voltage regulator – LED. Junction transistors – characteristics, Hall Effect, Four probe experiment. Measuring Instruments – Cathode Ray oscilloscope – Principle – Functional units – uses. Multimeter – construction and uses.

Thermal Conductivity

Lee's Disc method for thermal conductivity of bad conductor.

Optics

Focal length of lenses, resolving power of telescope, use of sextant, spectrometer, refractive index and dispersive power of prism, Newton rings experiment, diffraction grating, Michelson interferometer, Polarimeter, Nicol Prism.

Department of Physics

Syllabus for Final written test (Technical Assistant)

Electromagnetic Theory: Solution of electrostatic and magnetostatic 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 of fiber optics.