

Non-Teaching Staff Recruitment

(Advertisement No. IITT/STAFFREC/02/2023 dated 23-08-2023)

Syllabus	Junior Technician - Physics
----------	-----------------------------

Modern Physics and Quantum Mechanics: Black body radiation, Photoelectric and Compton Effect, Bohr's atomic model, Wave-particle duality, Superposition principle, Schrödinger equation, Eigenvalue problems, Commutators, Heisenberg uncertainty principle, Angular momentum algebra, Hydrogen atom, Stern-Gerlach experiment, Zeeman, Paschen-Back & Stark effects.

Electronics: Semiconductors, p-n junction diode, Zener diode, Bipolar junction transistor, Field effect transistor, Amplifiers, Oscillators, Operational amplifier, Boolean algebra, Logic Gates, de Morgan's theorem.

Electromagnetic Theory: Coulomb's law, Gauss's law, Laplace & Poisson equation, Conductors, Capacitors, and Dielectrics. Biot-Savart law, Ampere's law, Faraday's law. Alternating current, Displacement current, Maxwell's equations, electromagnetic waves.

Mechanics: Newton's laws of motion, Cartesian and polar coordinate system, non-inertial frames, Central force, Kepler's laws, Conservative and non-conservative forces.

Waves, Oscillations, and Optics: Simple harmonic, damped, and forced oscillators. Wave equation, Group and phase velocity, Sound, Doppler Effect. Fermat's Principle, Interference, Diffraction, Polarization of light.

Mathematical Physics: Vector algebra, Vector Calculus, Differential equations, Matrices and determinants, Eigen values and Eigen vectors.

Kinetic theory, Thermodynamics, and Statistical mechanics: Kinetic theory of gases, Specific heat of gases, Laws of thermodynamics.

Condensed Matter Physics: Bravais lattice, Reciprocal lattice, Miller Indices, Bragg's Law, Bonding in solid. Drude, Free-electron, Kronig-Penney, Tight-binding and near free-electron models. Specific heat of solid. Band theory of solids. Superconductivity: type-I and type-II superconductors.

Experiments in Physics (Bachelor and Master degree level):

Experiments in Mechanics, Properties of Materials, Heat, Electromagnetism and Optics. Error analysis. Circuit diagrams. A few examples of experiments are Compound pendulum, Velocity of sound and bulk modulus using Ultrasonic Interferometer, Band gap of a Semiconductor by four-probe method, Wavelength of light by interference and diffraction based techniques, Mapping of equipotential lines, Basic understanding of Digital Oscilloscope, Hall effect, Determination of Planck's constant, etc

General awareness logical reasoning and numerical ability

Selection Criteria:

1) Level-I : Objective Based Test

2) Level-II : Descriptive Test

3) Level-III : Skill/Trade Test (Qualifying Nature: minimum 50% Score is required to qualify)

Note: All the above tests will be based on the above-mentioned syllabus. Equal weightage will be given to Level-I and Level-II tests to prepare a merit list.