Indian Institute of Technology Jodhpur

Department of Physics

SYLLABUS FOR THE POST OF JUNIOR TECHNICAL ASSISTANT
(Pay Level 3)
Advt. No. 25

WRITTEN TEST & TRADE TEST   *(Total Marks 100)*

Syllabus for Written Test:

(A) Electronics:

Diodes, Transistors, Differential amplifiers and Operational Amplifiers Linear Op-Amp Circuit Applications, Oscillators, Digital Principle and Digital Logic, Data Processing Circuit:

(B) Condensed Matter Physics:

Solid state physics, crystal structure, Semiconductors, Magnetism, Optical and dielectric properties of materials, Resistivity, Hall Measurement, and Magnetic measurements.

(C) Modern Physics:

Failure of classical physics, UV catastrophe, Radiation physics, black body radiation, basic quantum physics, atomic and molecular physics. Rutherford model, alpha particle scattering, Bohr atom model, Bohr's interpretation of H atom, Hydrogen spectral series, Radioactivity, Basic concepts on particle accelerators, special theory of relativity.

(D) Optics:

Reflection, Refraction, Fermat principle, focal plane, Image formation and magnification, F-number, Depth of the focus and depth of the field, aberrations, Snell's law, Polarization, collimation, optical components and their geometry effect on ray propagation. Basics of Interference

(E) Mechanics:

Motion along straight-line velocity, acceleration, velocity-time graph. Newton's laws of motion, Equations of motion, motion in two- and three-dimensions projectiles. Force, work and energy, energy conservation, work-energy theorem. System of particles Newton's law for system of particles, collisions, conservation of linear momentum, impulse, elastic and inelastic collisions in one and two dimensions. Rigid body dynamics angular velocity and angular acceleration, angular momentum, torque. Newton's laws for rotational motion, angular momenta for systems of particles, conservation of angular momentum. Requirements of equilibrium, Centre of gravity, Newton's laws of gravitation, gravitation near the surface of earth and inside the surface of earth, gravitational potential energy, central force, reduced mass, Kepler's law

(F) Electromagnetism:

Gauss's law- Gauss' law in cylindrical, planar and spherical symmetry-applications. - Electric potential: equipotential surfaces, potential due to point charge, group of point charges and due to electric dipole. Dielectrics and Capacitance: Electric Current: current density, Resistance and Resistivity, Ohm's Law, Energy and power in electric circuits, Emf, potential differences, RC circuits. Magnetic field: the definition of B, Hall Effect, magnetic force on a current carrying wire, torque on a current loop, magnetic dipole, Ampere's law, Solenoids, Electromagnetic induction: Faraday's Law of induction, Lenz's law, induced electric field, inductance, self and mutual induction, RL circuits. Maxwell's equation.

(G) Mathematical Physics:

Vector Calculus Vector differentiation, Gradient, divergence and curl, Solenoidal and irrotational vector point functions. Vector integration, Line, surface and volume integration, Gauss theorem and Stokes theorem (statements) Physical interpretation. Matrices inverse of matrices, adjoint matrices (complex conjugate transpose) orthogonal, symmetric, skew symmetric, Hermitian and skew Hermitian matrices, elementary transformations of a matrix.

(H) Thermodynamics:

Entropy - Change in entropy in reversible and irreversible processes, Entropy of ideal gas. Temperature- entropy diagram, entropy and second law of thermodynamics. Maxwell's Thermodynamics relations. Clausius - Clapeyron equation, Phase diagram, first order phase transition.

Syllabus for Trade Test:

Hands-on based on the following experiments

- (i) Screw gauge
- (ii) Vernier Callipers
- (iii) Traveling Microscope
- (iv) Multimeter
- (v) Prism Spectrometer
- (vi) Moment of Inertia based experiments

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