



ONLINE TEST SERIES
SYLLABUS (IIT-JAM PHYSICS)

UNIT TEST

(I) Mathematical Methods:

1. Vector algebra, Vector Calculus, Multiple integrals, Divergence theorem, Green's theorem, Stokes' theorem, Fourier series.
2. First order equations and linear second order differential equations with constant coefficients. Matrices and determinants.
3. Calculus of single and multiple variables, partial derivatives, Jacobian, imperfect and perfect differentials, Taylor expansion, Algebra of complex numbers.
4. Full Syllabus of Mathematical Physics

(II) Mechanics and General Properties of Matter:

1. Newton's laws of motion and applications, Velocity and acceleration in Cartesian, polar and cylindrical coordinate systems, uniformly rotating frame, centrifugal and Coriolis forces, Motion under a central force, Kepler's laws, Gravitational Law and field, Conservative and non-conservative forces, variable mass systems.
2. System of particles, Center of mass, equation of motion of the CM, conservation of linear and angular momentum, conservation of energy. Elastic and inelastic collisions. Rigid body motion, fixed axis rotations, rotation and translation, moments of Inertia and products of Inertia, parallel and perpendicular axes theorem. Principal moments and axes. Kinematics of moving fluids, equation of continuity, Euler's equation, Bernoulli's theorem.
3. Full Syllabus of Mechanics Physics

(III) Oscillations, Waves and Optics:

1. Differential equation for simple harmonic oscillator and its general solution. Superposition of two or more simple harmonic oscillators. Lissajous figures. Damped and forced oscillators, resonance. Wave equation, traveling and standing waves in one-dimension. Energy density and energy transmission in waves. Group velocity and phase velocity. Sound waves in media. Doppler Effect.



2. Fermat's Principle. General theory of image formation. Thick lens, thin lens and lens combinations. Interference of light, optical path retardation. Fraunhofer diffraction. Rayleigh criterion and resolving power. Diffraction gratings. Polarization: linear, circular and elliptic polarization. Double refraction and optical rotation.
3. Full Syllabus of Oscillations, Waves & Optics

(IV) Electricity and Magnetism:

1. Coulomb's law, Gauss's law. Electric field and potential. Electrostatic boundary conditions, Solution of Laplace's equation for simple cases. Conductors, capacitors, dielectrics, dielectric polarization, volume and surface charges, electrostatic energy.
2. Biot-Savart law, Ampere's law, Faraday's law of electromagnetic induction, Self and mutual inductance, Magnetic Dipole, Magnetic force on a current carrying wire, motion of a charge particle in presence of magnetic field and electric field..
3. Displacement current, Maxwell's equations and plane electromagnetic waves, Poynting's theorem, reflection and refraction at a dielectric interface, transmission and reflection coefficients (normal incidence only). Lorentz Force and motion of charged particles in electric and magnetic fields.
4. Full Syllabus of EMT

(V) Kinetic Theory, Thermodynamics:

1. Elements of Kinetic theory of gases. Velocity distribution and Equipartition of energy. Specific heat of Mono-, di- and tri-atomic gases. Ideal gas, van-der-Waals gas and equation of state. Mean free path.
2. Laws of thermodynamics. Zeroth law and concept of thermal equilibrium. First law and its consequences. Isothermal and adiabatic processes. Reversible, irreversible and quasi-static processes. Second law and entropy. Carnot cycle. Maxwell's thermodynamic relations and simple applications. Thermodynamic potentials and their applications. Phase transitions and Clausius-Clapeyron equation.
3. Ideas of ensembles, Maxwell-Boltzmann, Fermi- Dirac and Bose-Einstein distributions.
4. Full Syllabus of Kinetic Theory, Thermodynamics

(VI) Modern Physics:

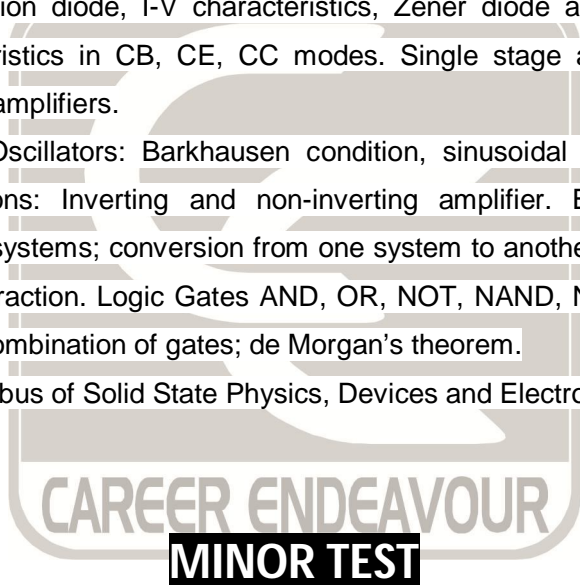
1. Blackbody radiation, photoelectric effect, Compton effect, Bohr's atomic model, X-rays. Wave-particle duality, Uncertainty principle, the superposition principle,



- calculation of expectation values, Schrödinger equation and its solution for one, two, and three-dimensional boxes.
2. Solution of Schrödinger equation for the one-dimensional harmonic oscillator. Reflection and transmission at a step potential, Structure of atomic nucleus, mass and binding energy. Radioactivity and its applications. Laws of radioactive decay.
 3. Inertial frames and Galilean invariance. Postulates of special relativity. Lorentz transformations. Length contraction, time dilation. Relativistic velocity addition theorem, mass energy equivalence. **Atomic Physics**, Pauli exclusion principle.
 4. Full Syllabus of Modern Physics

(VII) Solid State Physics, Devices and Electronics:

1. Crystal structure, Bravais lattices and basis. Miller indices. X-ray diffraction and Bragg's law; Intrinsic and extrinsic semiconductors, variation of resistivity with temperature. Fermi level.
2. p-n junction diode, I-V characteristics, Zener diode and its applications, BJT: characteristics in CB, CE, CC modes. Single stage amplifier, two stage R-C coupled amplifiers.
3. Simple Oscillators: Barkhausen condition, sinusoidal oscillators. OPAMP and applications: Inverting and non-inverting amplifier. Boolean algebra: Binary number systems; conversion from one system to another system; binary addition and subtraction. Logic Gates AND, OR, NOT, NAND, NOR exclusive OR; Truth tables; combination of gates; de Morgan's theorem.
4. Full Syllabus of Solid State Physics, Devices and Electronics



1. Minor Test 01| Thermodynamics + EMT
2. Minor Test 02| EMT + Mathematical Physics
3. Minor Test 03 | Solid-Electronics + Modern Physics
4. Minor Test 04 | Modern Physics + Mechanics
5. Minor Test 05 | Modern Physics + Waves, Optics
6. Minor Test 06 | EMT + Waves, Optics
7. Minor Test 07 | Electronics + Solid State Physics
8. Minor Test 08 | Mechanics + Mathematical Physics
9. Minor Test 09 | Mechanics + Thermodynamics
10. Minor Test 10 | Mathematical + Waves, Optics & Oscillations



FULL LENGTH TEST

1. Full Test 01 | Physics_IIT-JAM
2. Full Test 02 | Physics_IIT-JAM
3. Full Test 03 | Physics_IIT-JAM
4. Full Test 04 | Physics_IIT-JAM
5. Full Test 05 | Physics_IIT-JAM
6. Full Test 06 | Physics_IIT-JAM
7. Full Test 07 | Physics_IIT-JAM
8. Full Test 08 | Physics_IIT-JAM
9. Full Test 09 | Physics_IIT-JAM
10. Full Test 10 | Physics_IIT-JAM
11. Full Test 11 | Physics_IIT-JAM
12. Full Test 12 | Physics_IIT-JAM
13. Full Test 13 | Physics_IIT-JAM
14. Full Test 14 | Physics_IIT-JAM
15. Full Test 15 | Physics_IIT-JAM

