Physics Syllabus–

The following section will have the syllabus for JEE Advanced for physics distributed between the predetermined units.

General

- Units and dimensions, dimensional analysis; least count, significant figures.
- Methods of measurement and error analysis for physical quantities pertaining to the following experiments: Experiments based on using Vernier callipers and screw gauge (micrometer), Determination of g using simple pendulum, Young's modulus by Searle's method, Specific heat of a liquid using calorimeter, focal length of a concave mirror and a convex lens using u-v method, Speed of sound using resonance column, Verification of Ohm's law using voltmeter and ammeter, and specific resistance of the material of a wire using meter bridge and post office box.

Mechanics

- Kinematics in one and two dimensions (Cartesian coordinates only), projectiles.
- Uniform circular motion.
- Relative velocity.Newton's laws of motion.
- Inertial and uniformly accelerated frames of reference.
- Static and dynamic friction; Kinetic and potential energy; Work and power.
- Conservation of linear momentum and mechanical energy.
- Systems of particles; Centre of mass and its motion; Impulse; Elastic and inelastic collisions.
- Law of gravitation; Gravitational potential and field; Acceleration due to gravity.
- Motion of planets and satellites in circular orbits; Escape velocity.
- Rigid body, moment of inertia, parallel and perpendicular axes theorems, moment of inertia of uniform bodies with simple geometrical shapes; Angular momentum.
- Torque; Conservation of angular momentum; Dynamics of rigid bodies with fixed axis of rotation.
- Rolling without slipping of rings, cylinders and spheres.
- Equilibrium of rigid bodies.
- Collision of point masses with rigid bodies.
- Linear and angular simple harmonic motions, Hooke's law, Young's modulus.
- Pressure in a fluid; Pascal's law; Buoyancy; Surface energy and surface tension, capillary rise.
- Viscosity (Poiseuille's equation excluded), Stoke's law; Terminal velocity, Streamline flow, equation of continuity, Bernoulli's theorem and its applications.
- Wave motion (plane waves only), longitudinal and transverse waves, superposition of waves; Progressive and stationary waves.

- Vibration of strings and air columns.
- Resonance; Beats; Speed of sound in gases; Doppler effect (in sound).

Thermal physics

- Thermal expansion of solids, liquids and gases.
- Calorimetry, latent heat.
- Heat conduction in one dimension.
- Elementary concepts of convection and radiation.
- Newton's law of cooling; Ideal gas laws.
- Specific heats (C_v and C_p for monoatomic and diatomic gases).
- Isothermal and adiabatic processes, bulk modulus of gases.
- Equivalence of heat and work.
- First law of thermodynamics and its applications (only for ideal gases).
- Blackbody radiation: absorptive and emissive powers.
- Kirchhoff's law.
- Wien's displacement law, Stefan's law.

Electricity and magnetism

- Coulomb's law.
- Electric field and potential.
- Electrical potential energy of a system of point charges and of electrical dipoles in a uniform electrostatic field.
- Electric field lines.
- Flux of electric field.
- Gauss's law and its application in simple cases, such as, to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell.
- Capacitance; Parallel plate capacitor with and without dielectrics.
- Capacitors in series and parallel.
- Energy stored in a capacitor.
- Electric current.
- Ohm's law.
- Series and parallel arrangements of resistances and cells.
- Kirchhoff's laws and simple applications; Heating effect of current.
- Biot–Savart's law and Ampere's law.
- Magnetic field near a current-carrying straight wire, along the axis of a circular coil and inside a long straight solenoid.
- Force on a moving charge and on a current-carrying wire in a uniform magnetic field.
- Magnetic moment of a current loop.
- Effect of a uniform magnetic field on a current loop.
- Moving coil galvanometer, voltmeter, ammeter and their conversions.

- Electromagnetic induction: Faraday's law, Lenz's law; Self and mutual inductance.
- RC, LR and LC circuits with d.c. and a.c. sources.

Optics

- Rectilinear propagation of light.
- Reflection and refraction at plane and spherical surfaces.
- Total internal reflection.
- Deviation and dispersion of light by a prism.
- Thin lenses.
- Combinations of mirrors and thin lenses.
- Magnification.
- Wave nature of light: Huygen's principle, interference limited to Young's double-slit experiment.

Modern physics

- Atomic nucleus; α, β and γ radiations.
- Law of radioactive decay.
- Decay constant.
- Half-life and mean life.
- Binding energy and its calculation.
- Fission and fusion processes.
- Energy calculation in these processes.
- Photoelectric effect.
- Bohr's theory of hydrogen-like atoms.
- Characteristic and continuous X-rays.
- Moseley's law; de Broglie wavelength of matter waves.