

# SYLLABUS

## JEE Main

### Centre of Mass

Centre of mass of a two particle system, Centre of mass of a rigid body.

### Rotational Motion

Basic concepts of rotational motion; Moment of a force, Torque, Angular momentum, conservation of angular momentum and its applications; Moment of inertia, Radius of gyration. Values of moments of inertia for simple geometrical objects, Parallel and perpendicular axes theorems and their applications. Rigid body rotation, Equations of rotational motion.

### Gravitation

The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Kepler's laws of planetary motion. Gravitational potential energy; Gravitational potential, Escape velocity. Orbital, velocity of a satellite, Geostationary satellites.

### Properties of Solids and Liquids

Elastic behaviour, Stress-strain relationship, Hooke's Law, Young's modulus, Bulk modulus, modulus of rigidity. Pressure due to a fluid column; Pascal's law and its applications. Viscosity, Stokes' law, Terminal velocity, Streamline and turbulent flow, Reynolds number. Bernoulli's principle and its applications. Surface energy and surface tension, Angle of contact, Application of surface tension – drops, bubbles and capillary rise.

### Oscillations

Periodic motion – period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (SHM) and its equation; Phase; Oscillations of a spring -restoring force and force constant; energy in SHM – Kinetic and potential energies; Simple pendulum – derivation of expression for its time period; Free, forced and damped oscillations, resonance.

# JEE Advanced

## General

Determination of  $g$  using simple pendulum. Young's modulus by Searle's method.

## Centre of Mass and Collision

System of particles, Centre of mass and its motion, Impulse, Elastic and inelastic collisions.

## Gravitation

Law of gravitation, Gravitational potential and field, Acceleration due to gravity, Motion of planets and satellites in circular orbits, Escape velocity.

## Rotational Motion

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.

## Oscillations

Linear and angular simple harmonic motions.

## Properties of Solids and Liquids

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.