CLASS 11th - PHYSICS

1. PHYSICAL WORLD

- What is physics?
- Scope and excitement of physics
- Physics, technology and society
- Fundamental forces in nature
- Nature of physical laws

2. UNITS AND MEASUREMENTS

- Introduction
- The international system of units
- Measurement of length
- Measurement of mass
- Measurement of time
- Accuracy, precision of instruments and errors in measurement
- Significant figures
- Dimensions of physical quantities
- Dimensional formulae and dimensional equations
- Dimensional analysis and its applications

3. MOTION IN A STRAIGHT LINE

- Introduction
- Position, path length and displacement

- Average velocity and average speed
- Instantaneous velocity and speed
- Acceleration
- Kinematic equations for uniformly accelerated motion
- Relative velocity

4. MOTION IN A PLANE

- Introduction
- Scalars and vectors
- Multiplication of vectors by real numbers
- Addition and subtraction of vectors – graphical method
- Resolution of vectors
- Vector addition – analytical method
- Motion in a plane
- Motion in a plane with constant acceleration
- Relative velocity in two dimensions
- Projectile motion
- Uniform circular motion

5. LAWS OF MOTION

- Introduction
- Aristotle's fallacy
- The law of inertia
- Newton's first law of motion
- Newton's second law of motion
- Newton's third law of motion
- Conservation of momentum
- Equilibrium of a particle

- Common forces in mechanics
- Circular motion
- Solving problems in mechanics

6. WORK, ENERGY AND POWER

- Introduction
- Notions of work and kinetic energy: The work-energy theorem
- Work
- Kinetic energy
- Work done by a variable force
- The work-energy theorem for a variable force
- The concept of potential energy
- The conservation of mechanical energy
- The potential energy of a spring
- Various forms of energy: the law of conservation of energy
- Power
- Collisions

7. SYSTEM OF PARTICLES AND ROTATIONAL MOTION

- Introduction
- Centre of mass
- Motion of centre of mass
- Linear momentum of a system of particles
- Vector product of two vectors
- Angular velocity and its relation with linear velocity

- Torque and angular momentum
- Equilibrium of a rigid body
- Moment of inertia
- Theorems of perpendicular and parallel axes
- Kinematics of rotational motion about a fixed axis
- Dynamics of rotational motion about a fixed axis
- Angular momentum in case of rotations about a fixed axis
- Rolling motion

8. GRAVITATION

- Introduction
- Kepler's laws
- Universal law of gravitation
- The gravitational constant
- Acceleration due to gravity of the earth
- Acceleration due to gravity below and above the surface of earth
- Gravitational potential energy
- Escape speed
- Earth satellite
- Energy of an orbiting satellite
- Geostationary and polar satellites
- Weightlessness

9. MECHANICAL PROPERTIES OF SOLIDS

- Introduction
- Elastic behaviour of solids
- Stress and strain

- Hooke's law
- Stress-strain curve
- Elastic moduli
- Applications of elastic behavior of materials

10. MECHANICAL PROPERTIES OF FLUIDS

- Introduction
- Pressure
- Streamline flow
- Bernoulli's principle
- Viscosity
- Surface tension

11.   THERMAL PROPERTIES OF MATTER

- Introduction
- Temperature and heat
- Measurement of temperature
- Ideal-gas equation and absolute temperature
- Thermal expansion
- Specific heat capacity
- Calorimetry
- Change of state
- Heat transfer
- Newton's law of cooling

12.   THERMODYNAMICS

- Introduction
- Thermal equilibrium

- Zeroth law of thermodynamics
- Heat, internal energy and work
- First law of thermodynamics
- Specific heat capacity
- Thermodynamic state variables and equation of state
- Thermodynamic processes
- Heat engines
- Refrigerators and heat pumps
- Second law of thermodynamics
- Reversible and irreversible processes
- Carnot engine

13.   KINETIC THEORY

- Introduction
- Molecular nature of matter
- Behaviour of gases
- Kinetic theory of an ideal gas
- Law of equipartition of energy
- Specific heat capacity
- Mean free path

14.   OSCILLATIONS

- Introduction
- Periodic and oscilatory motions
- Simple harmonic motion
- Simple harmonic motion and uniform circular motion
- Velocity and acceleration in simple harmonic motion
- Force law for simple harmonic motion

- Energy in simple harmonic motion
- Some systems executing Simple Harmonic Motion
- Damped simple harmonic motion
- Forced oscillations and resonance

15. WAVES

- Introduction
- Transverse and longitudinal waves
- Displacement relation in a progressive wave
- The speed of a travelling wave
- The principle of superposition of waves
- Reflection of waves
- Beats
- Doppler effect