

Syllabus for First year Intermediate from Academic Year 2025-26

Physics (1st Year)

1. UNITS AND MEASUREMENTS

- 1.1 Introduction
- 1.2 The International system of units
- 1.3 Significant figures
- 1.4 Dimensions of Physical Quantities
- 1.5 Dimensional formulae and dimensional equations
- 1.6 Dimensional analysis and its applications

2. MOTION IN A STRAIGHT LINE

- 2.1 Introduction
- 2.2 Instantaneous velocity and speed
- 2.3 Acceleration
- 2.4 Kinematic equations for uniformly accelerated motion

3. MOTION IN A PLANE

- 3.1 Introduction
- 3.2 Scalars and vectors
- 3.3 Multiplication of vectors by real members
- 3.4 Addition and subtraction of vectors - graphical Method
- 3.5 Resolution of vectors
- 3.6 Vector addition - Analytical method
- 3.7 Motion in a plane
- 3.8 Motion in a plane with constant acceleration
- 3.9 Projectile motion
- 3.10 Uniform circular motion

4. LAWS OF MOTION

- 4.1 Introduction
- 4.2 Aristotle's fallacy
- 4.3 The law of inertia
- 4.4 Newton's first law of motion
- 4.5 Newton's second law of motion
- 4.6 Newton's third law of motion
- 4.7 Conservation of momentum
- 4.8 Equilibrium of a particle
- 4.9 Common forces in mechanics, friction
- 4.10 Circular motion
- 4.11 Solving problems in mechanics.

5. WORK, ENERGY AND POWER

- 5.1 Introduction
- 5.2 Notions of work and kinetic energy: The work-energy theorem.
- 5.3 Work
- 5.4 Kinetic Energy
- 5.5 Work done by a variable force
- 5.6 The work – energy theorem for a variable force
- 5.7 The concept of Potential energy

- 5.8 The conservation of mechanical energy
- 5.9 The Potential energy of a spring
- 5.10 Power
- 5.11 Collisions

6. SYSTEM OF PARTICLES AND ROTATIONAL MOTION

- 6.1 Introduction
- 6.2 Centre of mass
- 6.3 Motion of Centre of mass
- 6.4 Linear momentum of a system of particles
- 6.5 Vector product of two vectors
- 6.6 Angular velocity and its relation with linear velocity
- 6.7 Torque and angular momentum
- 6.8 Equilibrium of a rigid body and centre of gravity
- 6.9 Moment of inertia
- 6.10 Kinematics of rotational motion about a fixed axis
- 6.11 Dynamics of rotational motion about a fixed axis.
- 6.12 Angular momentum in case of rotations about a fixed axis.

7. GRAVITATION

- 7.1 Introduction
- 7.2 Kepler's laws
- 7.3 Universal law of gravitation
- 7.4 The gravitational constant
- 7.5 Acceleration due to gravity of the earth
- 7.6 Acceleration due to gravity below and above the surface of earth.
- 7.7 Gravitational potential energy
- 7.8 Escape speed
- 7.9 Earth Satellites
- 7.10 Energy of an orbiting satellite

8. MECHANICAL PROPERTIES OF SOLIDS

- 8.1 Introduction
- 8.2 Stress and strain
- 8.3 Hooke's law
- 8.4 Stress – strain curve
- 8.5 Elastic moduli
- 8.6 Applications of elastic behavior of materials

9. MECHANICAL PROPERTIES OF FLUIDS

- 9.1 Introduction
- 9.2 Pressure
- 9.3 Stream line flow
- 9.4 Bernoulli's principle
- 9.5 Viscosity
- 9.6 Surface tension

10. THERMAL PROPERTIES OF MATTER

- 10.1 Introduction
- 10.2 Temperature and Heat
- 10.3 Measurement of temperature

- 10.4 Ideal – gas equation and absolute temperature
- 10.5 Thermal expansion
- 10.6 Specific Heat capacity
- 10.7 Calorimetry
- 10.8 Change of state
- 10.9 Heat transfer
- 10.10 Newton’s law of cooling.

11. THERMODYNAMICS

- 11.1 Introduction
- 11.2 Thermal equilibrium
- 11.3 Zeroth law of thermodynamics
- 11.4 Heat, internal energy and work
- 11.5 First law of thermodynamics
- 11.6 Specific heat capacity
- 11.7 Thermodynamic state variables and equation of state
- 11.8 Thermodynamic processes
- 11.9 Second law of thermodynamics
- 11.10 Reversible and irreversible processes
- 11.11 Carnot engine

12. KINETIC THEORY

- 12.1 Introduction
- 12.2 Molecular nature of matter
- 12.3 Behavior of gases
- 12.4 Kinetic theory of an ideal gas
- 12.5 Laws of equipartition of energy
- 12.6 Specific heat capacity
- 12.7 Mean free path

13. OSCILLATIONS

- 13.1 Introduction
- 13.2 Periodic and oscillatory motions
- 13.3 Simple Harmonic motion
- 13.4 Simple Harmonic motion and uniform circular motion
- 13.5 Velocity and acceleration in simple harmonic motion
- 13.6 Force law for simple harmonic motion
- 13.7 Energy in simple harmonic motion
- 13.8 The Simple Pendulum

14. WAVES

- 14.1 Introduction
- 14.2 Transverse and longitudinal waves
- 14.3 Displacement relation in a progressive wave
- 14.4 The speed of a travelling wave
- 14.5 The principle of superposition of waves
- 14.6 Reflection of waves
- 14.7 Beats

Syllabus for Second Year Intermediate from Academic Year 2026-27

Physics (2nd Year)

1. Electric Charges and Fields

- 1.1 Introduction
- 1.2 Electric Charge
- 1.3 Conductors and Insulators
- 1.4 Basic Properties of Electric Charges
- 1.5 Coulomb's Law
- 1.6 Forces between Multiple Charges
- 1.7 Electric Field
- 1.8 Electric Field lines
- 1.9 Electric Flux
- 1.10 Electric Dipole
- 1.11 DiPole in a Uniform External Field
- 1.12 Continuous Charge Distribution
- 1.13 Gauss's Law
- 1.14 Applications of Gauss's Law

2. Electrostatic Potential and Capacitance

- 2.1 Introduction
- 2.2 Electrostatic Potential
- 2.3 Potential Due to a Point charge
- 2.4 Potential Due to an Electric Dipole
- 2.5 Potential Due to a System of Charges
- 2.6 Equipotential Surfaces
- 2.7 Potential Energy of a System of Charges
- 2.8 Potential Energy in an External Field
- 2.9 Electrostatics of Conductors
- 2.10 Dielectrics and Polarisation
- 2.11 Capacitors and Capacitance
- 2.12 The Parallel Plate Capacitor
- 2.13 Effect of Dielectric on Capacitance
- 2.14 Combination of Capacitors
- 2.15 Energy Stored in a Capacitor

3. Current Electricity

- 3.1 Introduction
- 3.2 Electric Current
- 3.3 Electric Current in Conductors
- 3.4 Ohm's Law
- 3.5 Drift of Electrons and the Origin of Resistivity
- 3.6 Limitations of Ohm's Law
- 3.7 Resistivity of Various Materials
- 3.8 Temperature Dependence of Resistivity
- 3.9 Electrical Energy, Power
- 3.10 Cells, EMF, Internal Resistance
- 3.11 Cells in Series and in Parallel
- 3.12 Kirchhoff's Rules
- 3.13 Wheatstone Bridge

4. Moving Charges and Magnetism

- 4.1 Introduction
- 4.2 Magnetic Force
- 4.3 Motion in a Magnetic Field
- 4.4 Magnetic Field due to a Current Element, Biot-savart Law
- 4.5 Magnetic Field on the Axis of a Circular Current Loop
- 4.6 Ampere's circuital Law
- 4.7 The Solenoid
- 4.8 Force Between Two Parallel Currents, the Ampere
- 4.9 Torque on Current Loop, Magnetic Dipole
- 4.10 The Moving Coil Galvanometer

5. Magnetism and Matter

- 5.1 Introduction
- 5.2 The Bar Magnet
- 5.3 Magnetism and Gauss's Law
- 5.4 Magnetisation and Magnetic Intensity
- 5.5 Magnetic Properties of Materials

6. Electromagnetic Induction

- 6.1 Introduction
- 6.2 The Experiments of Faraday and Henry
- 6.3 Magnetic Flux
- 6.4 Faraday's Law of Induction
- 6.5 Lenz's Law and Conservation of Energy
- 6.6 Motional Electromotive Force
- 6.7 Inductance 6.8 AC Generator

7. Alternating Current

- 7.1 Introduction
- 7.2 AC Voltage Applied to a Resistor
- 7.3 Representation of AC current and Voltage by Rotating Vectors-Phasors
- 7.4 AC Voltage Applied to an Inductor
- 7.5 AC Voltage Applied to a Capacitor
- 7.6 AC Voltage Applied to a Series LCR Circuit
- 7.7 Power in AC Circuit: The Power Factor
- 7.8 Transformers

8. Electromagnetic Waves

- 8.1 Introduction
- 8.2 Displacement Current
- 8.3 Electromagnetic Waves
- 8.4 Electromagnetic Spectrum

9. Ray Optics and Optical Instruments

- 9.1 Introduction
- 9.2 Reflection of Light by Spherical Mirrors
- 9.3 Refraction
- 9.4 Total Internal Reflection
- 9.5 Refraction at Spherical Surfaces and by Lenses
- 9.6 Refraction through a Prism

9.7 Optical Instruments

10. Wave Optics

10.1 Introduction

10.2 Huygens Principle

10.3 Refraction and Reflection of Plane Waves using Huygens Principle

10.4 Coherent and Incoherent Addition of Waves

10.5 Interference of Light Waves and Young's Experiment

10.6 Diffraction

10.7 Polarisation

11. Dual Nature of Radiation and Matter

11.1 Introduction

11.2 Electron Emission

11.3 Photoelectric Effect

11.4 Experimental Study of Photoelectric Effect

11.5 Photoelectric Effect and Wave Theory of Light

11.6 Einstein's Photoelectric Equation: Energy Quantum of Radiation

11.7 Particle Nature of Light: The Photon

11.8 Wave Nature of Matter

12. Atoms

12.1 Introduction

12.2 Alpha-particle Scattering and Rutherford's Nuclear Model of Atom

12.3 Atomic Spectra

12.4 Bohr Model of the Hydrogen Atom

12.5 The Line Spectra of the Hydrogen Atom

12.6 De Broglie's Explanation of Bohr's Second Postulate of Quantisation

13. Nuclei

13.1 Introduction

13.2 Atomic masses and composition of Nucleus

13.3 Size of the Nucleus

13.4 Mass - energy, and Nuclear binding energy

13.5 Nuclear force

13.6 Radioactivity

13.7 Nuclear energy

14. Semiconductor Electronics: Materials, Devices and Simple Circuits

14.1 Introduction

14.2 Classification of Metals, Conductors and Semiconductors

14.3 Intrinsic Semiconductor

14.4 Extrinsic Semiconductor

14.5 p-n Junction

14.6 Semiconductor Diode

14.7 Application of Junction Diode as a Rectifier