

PHYSICS (Theory) 2021

+2 Science 1st Year

Unit-I Physical world and Measurement (6 Periods)

SI Units, accuracy and precision of measuring instruments, errors in measurement, absolute, relative error, percentage of error, Combination of errors, significant figures. Dimensions of Physical quantities. Dimensional analysis and its applications.

Unit – II Kinematics. (18 Periods)

1. Motion in a straight line: Rest and motion, Frame of reference, motion in a Straight line, position – time graph, speed and velocity, uniform and non-uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity – time and position – time graph, Relation for uniformly accelerated motion (graphical treatment)

2. Motion in a plane: Scalars and vectors, general vectors and their notations, position and displacement vectors, equality of vectors, unit vectors, multiplication of vectors by a real number, addition and subtraction of vectors, relative velocity, resolution of a vector in a plane, rectangular components, Dot and Cross products of two vectors. Motion in a plane, cases of uniform velocity and uniform acceleration – projectile motion; uniform circular motion.

Unit-III Laws of Motion (10 Periods)

Concept of force, inertia, momentum, impulse, impulse-momentum theorem, Newton's Laws of motion, Law of Conservation of linear momentum and its application. Static and Kinetic friction, laws of friction, rolling friction. Dynamics of uniform circular motion, Centripetal force, motion of a vehicle on a level circular road and vehicle on a banked road.

Unit-IV Work, Energy and Power (10 Periods)

Work done by a Constant force and variable force, kinetic energy, work- energy theorem, power. Notion of potential energy, conservative and non-conservative forces, conservation of mechanical energy (Kinetic and Potential energies), elastic and in-elastic collisions in one dimension, coefficient of restitution.

Unit-V Motion of System of Particles and Rigid bodies: (12 Periods)

System of Particles and Rotational Motion: Centre of mass of a two-particle system, momentum conservation and centre of mass motion, centre of mass of rigid bodies, Centre of Mass of a uniform rod. Moment of a force, torque, angular momentum, conservation of angular momentum with its applications. Moment of inertia, radius of gyration, moment of inertia of simple geometrical objects (no derivation).

Unit-VI Gravitation (08 Periods)

Newton's law of gravitation, Gravitational field and Potential, gravitational potential energy, acceleration due to gravity and its variation with altitude and depth, Escape velocity, orbital velocity of a satellite.

Unit-VII Properties of Bulk Matter (18 Periods)

1. Mechanical properties of Solids: Elastic Behaviours, Stress, Strain, Hooke's Law, Stress-Strain diagram, Young's modulus, Bulk modulus, Shear modulus of rigidity, Poisson's ratio, elastic energy.

2. Mechanical properties of fluids: Surface energy and surface tension, angle of contact, excess pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise. Viscosity, Stoke's law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its application.

3. Thermal properties of matter: Concepts of heat and temperature, Thermal expansion of solids, liquids and gases, specific heat capacity: C_p , C_v . Calorimetry, change of state, latent heat capacity. Heat transfer: Conduction, Convection and radiation, thermal conductivity, qualitative ideas of black body radiation, Wien's displacement law, Stefan's law.

Unit-VIII Thermodynamics (10 Periods)

Thermal equilibrium, definition of temperature (Zeroth law of thermodynamics) heat, work and internal energy. First law of thermodynamics, isothermal and adiabatic processes, second law of thermodynamics, reversible and irreversible processes, Carnot's engine and its efficiency (no derivation).

Unit-IX Kinetic theory of gases: (04 Periods)

Equation of state of a perfect gas, work done in compressing a gas. Pressure exerted by an ideal gas (elementary idea), kinetic interpretation of temperature, mean and RMS speed of gas molecules, degrees of freedom, law of equipartition of energy (statement only) and its applications to specific heat of gases.

Unit-X Oscillation and waves (18 Periods)

1. Periodic motion: Period, Frequency, displacement as a function of time, periodic function. Simple harmonic motion and its equation, phase, oscillation of a spring, Restoring force and force constant, kinetic and potential energy in SHM, simple pendulum, derivation of expression for its time period.

2. Waves: Wave motion, transverse and longitudinal waves, speed of wave motion, displacement relation for a progressive wave, speed of longitudinal wave in an elastic medium and speed of transverse wave in a stretched string (qualitative idea only), principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes.

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