

INTERMEDIATE FIRST YEAR
REVISED SYLLABUS: PHYSICS (Only S.I.Units are to be adopted)
(With Effect from 2003-2004)

I. UNITS AND DIMENSIONS: (5 Periods)

Necessity of Measurements for quantitative Study – Choosing Units. Fundamental Units in the S.I. System and their definitions. Supplementary and derived Units – Multiples and sub-multiples and rules for writing units in S.I.System.

Dimension of physical quantities – Applications of dimensional Analysis with examples – Limitations of dimensional analysis.

II. ELEMENTS OF VECTORS: (8 Periods)

Classification of physical quantities as vectors and scalars Geometrical representation of vectors – Addition & Subtraction of Vectors

Laws of addition of Vectors – Equal and Null Vectors

Unit Vectors – Unit Vectors in Cartesian co-ordinate system – Position vector and its magnitude

Parallelogram law of vectors – Derivation of expression for the resultant vector.

Triangle law and polygon law of vectors – Concept of relative velocity – Application to relative motion of a boat in a river.

Multiplication of a vector with a scalar – Scalar product with examples of work and energy – Vector product with Examples of torque and angular momentum – Vector and Scalar product and Unit Vectors.

III. KINEMATICS: (7 Periods)

Concept of acceleration due to Gravity – Equations of motion of freely falling body – vertically projected body from ground and tower – Projectiles with Examples – Oblique projection from ground and horizontal projection from the top of tower – Path of projectile. Maximum height, time of flight and range.

IV. DYNAMICS: (10 Periods)

Concept of resultant force – Apparent weight in lift – Impulse – Law of conservation of linear momentum (statement only) – Work – Power – Energy –

Definition and Units – Derivation of expression for P.E & K.E – Work – Energy theorem – Law of conservation of energy – Examples – Vertically projected and freely falling bodies.

V. COLLISIONS: (5 Periods)

Collision of two bodies in one dimension – Elastic and in-elastic collisions – One body at rest, two bodies moving in the same and opposite directions – Co-efficient of restitution.

VI. CENTRE OF MASS: (3 Periods)

Definition with examples – Difference between Centre Mass and Centre of Gravity – Co-ordinates of Centre of Mass – Velocity, acceleration – Characteristics of centre of mass - Examples in the case of two dimensional motion – Laws of motion of velocity, acceleration – Characteristics of Centre of Mass – Explosion.

VII. FRICTION: (4 Periods)

Causes of Friction – Static, Kinetic and rolling frictions – Angle of friction – Laws of friction – Lubricants – Pushing and pulling of lawn Roller – Derivation of expression for acceleration of a body on a smooth and rough inclined planes.

VIII. ROTARY MOTION (10 Periods)

Concepts of torque and couple – Relation between angular momentum and torque – Moment of inertia – Parallel and perpendicular axes theorems – Derivation of Expressions for M.I. of a thin rod, uniform disc, and rectangular lamina. Expressions for M.I. of sphere, circular ring and cylinder (statement of expressions only) – Law of Conservation of angular momentum with examples – Motion in vertical circle.

IX. GRAVITATION: (7 Periods)

Basic forces in nature – Nature of Gravitation – Propagation speed of Gravitational fields – Limitations of Newton's third law – Force at a distance – Black holes.

Idea of inertial and non-inertial frames – Inertial and Gravitational masses – Principle of equivalence – Escape velocity and orbital velocity with derivation and relation between them – Geo stationary satellites and their uses.

X. SIMPLE HARMONIC MOTION: (8 Periods)

Definitions and examples – Derivation of expressions for displacement, velocity, acceleration period and frequency – Derivation of expressions for the period of a simple pendulum and loaded spring – force constant.

Derivation of expression for the K.E & P.E of a body in S.H.M. – Example of law of conservation of energy in the case of simple pendulum.

XI. ELASTICITY: (6 Periods)

Elasticity & Plasticity – Stress – Strain, Hooke's law, moduli of elasticity (Y, n, K) – Poisson's ratio – Behaviour of wire under gradually increasing load – Elastic fatigue, Strain Energy – Experimental determination of Y-Searle's apparatus.

XII. SURFACE TENSION (5 Periods)

Surface Tension Definition and Examples – Molecular Phenomenon – Angle of contact – Capillarity with Examples in nature – Experimental Determination of S.T. by capillary rise method with necessary theory – Variation of S.T with temperature – Expression for excess pressure inside a drop and a bubble.

XIII. VISCOSITY (6 Periods)

Explanation – Statement of Poiseuille's expression – Variation of coefficient of viscosity with temperature – Streamline flow - Stokes formula - terminal velocity – Principle of buoyancy – Pressure in a fluid – Bernoulli's theorem (Derivation included) – application to aerodynamic lift and motion of spinning ball.

XIV. THERMAL EXPANSION OF MATERIALS (20 Periods)

Vibrations of atoms in a solid – Potential Energy Curve – anharmonicity of vibrations – Explanation of thermal expansions – Difference in α values (of solids) of different materials.

The coefficients of real and apparent expansion of liquids and the derivation of the relationship between them – Variation of density with temperature. Determination of coefficient of apparent expansion of liquid by specific gravity bottle method.

Volume and pressure coefficients of gases – Derivation of their relationship – Experimental determination of the two co-efficients by Regnault's and Jolley's bulb apparatus – Absolute Zero – Kelvin Scale of Temperature – Boyle's law and

Charle's law – Derivation of ideal gas equation – significance of universal gas constant.

XV. THERMO DYNAMICS: (9 Periods)

Definition of calorie, thermal capacity, specific heat and latent heat – Experimental determination of specific heat and latent heat – Law of mixtures – Joule's law and mechanical equivalent of heat (J). Three phases of matter & triple point of water.

Definitions of specific heats of gasses (C_p & C_v) - Isothermal and adiabatic processes – Derivations of relationships between P,V & T – External work done by an ideal gas during expansion – Internal energy – Statements and explanation of Zeroeth, first and second laws of Thermodynamics – Derivation of $C_p - C_v = R$ (without using Maxwell's Equations).

XVI. TRANSMISSION OF HEAT: (7 Periods)

Conduction of Heat – Coefficient of thermal conductivity – Convection of Heat - Nature and properties of Thermal Radiation – Prevost's Theory of heat exchanges – Emissive and absorptive power of bodies – Black body radiation - Kirchoff's law and its application – Stefan's law – Newton's law of cooling.,

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