

PHYSICS (+1) (2024-2025)

Senior Secondary stage of school education is a stage of transition from General education to discipline - based focus on curriculum . The present updated syllabus keeps in view the rigour and depth of disciplinary approach as well as the comprehension level of learners . Due care has also been taken that the syllabus is not heavy and is at the same time , comparable to the international standards . Salient features of the syllabus include :

- Emphasis on basic conceptual understanding of the content.
- Emphasis , on use of SI units , symbols , nomenclature of physical quantities and formulations as per international standards .
- Providing logical sequencing of the units of the subject matter and proper placement of concepts with their linkage for better learning .
- Reducing the curriculum load by eliminating overlapping of concepts / content within the discipline and other disciplines .
- Promoting process - skills , problems - solving abilities and applications of Physics concepts .

Besides , the syllabus also attempts to

- Strengthen the concepts developed at the secondary stage to provide firm foundation for further learning in the subject .
- Expose the learners to different processes used in Physics - related industrial and technological applications
- Develop process - skills and experimental observational , manipulative , decision making and investigatory skills in the learners
- Promote problem solving abilities and creative thinking in learners .
- Develop conceptual competence in the learners and make them realize and appreciate the interface of Physics with other disciplines .

COURSE STRUCTURE (THEORY)

ONE PAPER

THREE HOURS

M . M . 60

Class - XI

Weightage

Unit - I	UNITS AND MEASUREMENTS
Unit - II	MOTION IN A STRAIGHT LINE
Unit - III	MOTION IN A PLANE
Unit - IV	LAWS OF MOTION
Unit - V	WORK, ENERGY AND POWER
Unit - VI	SYSTEM OF PARTICLES AND ROTATIONAL MOTION
Unit - VII	GRAVITATION
Unit - VIII	MECHANICAL PROPERTIES OF SOLIDS
Unit - IX	MECHANICAL PROPERTIES OF FLUIDS
Unit - X	THERMAL PROPERTIES OF MATTER
Unit - XI	THERMODYNAMICS
Unit - XII	KINETIC THEORY
Unit - XIII	OSCILLATIONS
Unit - XIV	WAVES

Unit - I: UNITS AND MEASUREMENTS

Introduction, System of units, Significant figures, Dimensions of Physical Quantities, Dimensional analysis and its applications.

Unit - II : MOTION IN A STRAIGHT LINE

Introduction, Instantaneous velocity and speed, Acceleration, Kinematic Equations for uniformly accelerated motion.

Unit - III : MOTION IN A PLANE

Introduction, Scalars and vectors, (position and displacement vectors, equality of vectors) Multiplication of a vector by real number, addition and subtraction of vectors, Resolution of vectors, Vector Addition-Analytical Method, Motion in Plane, motion in plane with constant acceleration, Projectile motion, uniform circular motion, centripetal acceleration.

Unit – IV : LAWS OF MOTION

Introduction, Aristotle's Fallacy, The laws of inertia, Newton's First Law of Motion, Newton's Second Law of Motion, Momentum; Impulse, Newton's Third Law of Motion, Conservation of Momentum and its applications, Equilibrium of Particle, common Forces in Mechanics, Friction, Static Centripetal Force, Circular Motion (Motion of a car on level road and Banked Road), Solving Problem in Mechanics.

Unit – V: WORK, ENERGY AND POWER

Introduction, Scalar Product, work done by constant and variable force, kinetic energy, work-Energy Theorem, The concept of potential energy, the conservation of Mechanical energy, P.E of a spring, conservation Forces: Non-conservative Forces, Power, collisions (Elastic and Inelastic collisions), collision in one dimension collision in two dimension.

Unit – VI: SYSTEM OF PARTICLES AND ROTATIONAL MOTION

Introduction, centre of Mass, Motion of centre of Mass, linear Momentum of system of particles, vector product of two vectors, angular velocity and its relation with linear velocity, angular acceleration Torque and angular momentum, conservation of angular momentum with examples, equilibrium of rigid body, centre of gravity, moment of inertia, radius of gyration, kinematics of rotational motion about a fixed axis, angular momentum in case of rotation, about fixed axis, conservation of angular momentum.

Unit – VII: GRAVITATION

Introduction, Kepler's laws, universal law of gravitation, gravitational constant, acceleration due to gravity acceleration due to gravity below and above the surface of earth, gravitational potential energy, escape speed, orbital velocity of Earth's satellites, energy of orbiting.

Unit – VIII: MECHANICAL PROPERTIES OF SOLIDS

Introduction, Stress and strain, Hooke's Law, Stress-Strain curve, Elastic moduli (Young's Modulus, Shear Modulus, Bulk Modulus), Poisson's Ratio, Elastic P.E in a stretched wire, applications of Elastic behavior of Materials.

Unit – IX: MECHANICAL PROPERTIES OF FLUIDS

Introduction, Pressure due to liquid column, Pascal's law and its application, (Hydraulic lift and hydraulic brakes), streamline flow, equation of continuity, Bernoulli's principle (speed of efflux, Dynamics lift), Viscosity, Stokes' Terminal velocity surface tension, surface energy and surface tension (relation), Angle of contact, excess pressure in drops and bubbles, capillary rise, .

Unit – X: THERMAL PROPERTIES OF MATTER

Introduction, Temperature and heat, measurement of temperature, ideal gas equation and absolute temperature, Thermal expansion (linear, area and volume), Relation between coefficients of linear, area and volume expansion, specific heat capacity and molar specific heat capacity, calorimetry, change of state, latent heat, heat transfer (conduction, convection and radiation) Blackbody radiation (Wien's Displacement and Stefan Boltzmann Law), Newton's law of cooling

Unit – XI: THERMODYNAMICS

Introduction, Thermal equilibrium, zeroth's law of thermodynamics, heat; internal energy and work, First law of thermodynamics, specific heat capacity, Thermodynamics state variables and equation of state, thermodynamics Processes (Quasi-static, isothermal adiabatic, isochoric process, isobaric and cyclic process)

Unit – XII: KINETIC THEORY

Introduction, molecular nature of matter, behavior of gases, kinetic theory of ideal gas, pressure of an ideal gas, kinetic interpretation of temperature, law of equipartition of energy, specific heat capacity (mono atomic, diatomic and poly atomic gases).

Unit – XIII: OSCILLATIONS

Introduction, Periodic and oscillatory motion; period and frequency; displacement, simple harmonic motion, simple harmonic motion and circular motion, velocity and acceleration in simple harmonic motion, force laws of simple harmonic motion, energy in simple harmonic motion, oscillation due to spring; simple pendulum

Unit – XIV: WAVES

Introduction, transverse and longitudinal waves, Displacement relation in progressive waves; amplitude and phase; wavelength and angular wave number; period, angular frequency and frequency, speed of travelling waves (transverse wave and longitudinal wave) principle of superposition of waves, reflection of waves, standing waves normal modes in strings and organ pipes, beats.

PRACTICALS

Note : Every student will perform 10 experiments (5 from each section) and 8 activities (4 from each section) during the academic year.

Two demonstration experiments must be performed by the teacher with participation of students. The students will maintain a record of these demonstration experiments.

EVALUATION SCHEME FOR PRACTICAL EXAMINATION

- One experiment from any one section
- Two activities (one from each section)
- Practical Record (experiments & activities)
- Record of demonstration experiments & Viva Based on these experiments
- Viva on experiments & activities

SECTION - A

Experiments

1. Use of Vernier Callipers
 - (i) To measure diameter of a small spherical / cylindrical body .
 - (ii) To measure dimensions of a given regular body of known mass and hence find its density .
 - (iii) To measure internal diameter and depth of a given beakers calorimetre and hence find its volume .
2. Use of screw gauge
 - (1) To measure diameter of a given wire ,
 - (ii) To measure thickness of a given sheet
 - (iii) To measure volume of an irregular lamina .
3. To determine radius of curvature of a given spherical surface by a spherometer .
4. To find the weight of given body using parallelogram law of vectors.
5. Using a simple pendulum, plot L-T and L-T² graphs. Hence find the effective length of second's Pendulum using appropriate graph.
6. To study the relationship between force of limiting friction and normal reaction and to find co-efficient of friction between a block and a horizontal surface.
7. To find the downward force, along an inclined plane, acting on a roller due to gravitational pull of the earth and study its relationship with the angle of inclination by the plotting graph between force and $\sin\theta$.

Activities

1. To make a paper scale of given least count , e . g . 0 . 2cm . 0.5cm
2. To determine mass of a given body using a meter scale by principle of moments .
3. To plot a graph for a given set of data , with proper choice of scales and error bars .
4. To measure the force of limiting friction for rolling of a roller on a horizontal plane .
5. To study the variation in range of a jet of water with angle of projection .
6. To study the conservation of energy of a ball rolling down on inclined plane (using a double inclined plane) . . .
7. To study dissipation of energy of a simple pendulum by plotting a graph between square of amplitude and time . .

SECTION - B

Experiments

1. To determine Young ' s modulus of elasticity of the material of a given wire .
2. To find the force constant of a helical spring by plotting graph between load and extension .
3. To study the variation in volume with pressure for a sample of air at constant temperature by plotting graphs between P and v , and between P and $1/V$.
4. determine the surface tension of water by capillary rise method .
5. To determine the coefficient of viscosity of measuring terminal velocity of a given spherical body.
6. To study the relationship between the time by plotting a cooling curve .

- 7 . (i) To study the relation between frequency and length of given wire under constant tension using sonometer .
(ii) To study the relation between the length of given wire and tension for constant frequency using sonometer .
- 8 . To find the speed of sound in air at room temperature tube by two - resonance positions.
- 9 . To determine specific heat of a given (i) solid (ii) liquid by method of mixtures

Activities

- 1 . To observe change of state and plot a cooling curve for molten wax
- 2 . To observe and explain the effect of heating on a bi - metallic strip .
- 3 . To note the change in level of liquid in a container on heating and interpret the observations .
- 4 . To study the effect of detergent on surface tension by observing capillary rise .
- 5 . To study the factors affecting the rate of loss of heat of a liquid .
- 6 . To study the effect of load on depression of a suitably clamped meter scale loaded (i) at its end (ii) in the middle . ,

PRESCRIBED BOOKS

Physics

Published by HPBOSE Dharamshala