CLASS-XI

PHYSICS 2025-26

Time: 3 Hrs

Theory: 70Marks
Practical: 25 Marks
INA: 5Marks
Total: 100 Marks

SYLLABUS (THEORY)

Unit I :

Chapter-1: Units and Measurements

Units of measurement; systems of units; SI units, fundamental and derived units. significant figures.

Dimensions of physical quantities, dimensional analysis and its applications.

Unit II : Kinematics

Chapter-2: Motion in a Straight Line

Frame of reference. Motion in a straight line: Position-time graph, speed and velocity.

Average speed and instantaneous velocity, uniform accelerated motion, velocity-time and position-time graphs.

Relations for uniformly accelerated motion (graphical treatment)

Chapter-3: Motion in a Plane

Scalar and vector quantities: Position and displacement vectors, general vectors and notation, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors.

Unit vector: Resolution of a vector in a plane - rectangular components. *Scalar and vector product of vectors.* Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

Unit III : Laws of Motion

Chapter-4: Laws of Motion

Intuitive concept of force. Inertia. Newton's first law of motion; momentum and Newton's second law of motion; impulse: Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Comman forces in mechanics. Static and kinetic friction, laws of friction. rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road. vehicle on banked road).Solving problems in Mechanics.

Unit -IV: Work, Energy and Power

Chapter-5: Work, Energy and Power

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.

Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-Conservative forces, various forms of energy, motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

Unit-V: Motion of System of Particles and Rigid Body

Chapter-6: System of Particles and Rotational Motion

Centre of mass of a two-particle system, momentum conversation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod. Moment of a force, torque, angular momentum, Law of conservation of angular momentum and its applications.

Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration.

Values of moments of inertia for simple geometrical objects (no derivation).

Unit-VI: Gravitation

Chapter-7: Gravitation

Keplar's laws of planetary motion. The universal law of gravitation.
Acceleration due to gravity and its variation with altitude and depth.
Gravitational potential energy; gravitational potential. Escape velocity, Orbital velocity of a satellite. Geo-stationary satellites..

Unit-VII: Properties of Bulk Matter

Chapter-8 Mechanical Properties of Solids

Elastic behaviour, of solids, Stress-strain relationship, Hooke's law, Young's modulus, bulk moduluss, shear modulus of rigidity, Poisson s-ratio; elastic energy.

Chapter-9 Mechanical Properties of Fluids

Pressure due to a fluid column, Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure.
Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow. Critical velócity. Bernoulli's theorem and its applications.
Surface energy and surface tension, angle of contact, excess of pressure, across curved surface, application of surface tension ideas to drops, bubbles and capillary rise,

Chapter-10 Thermal Properties of Matter

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water, specific heat Capacity: Cp, Cv-colorimetry; change of state-latent heat capacity.
Heat transfer-conduction, convection radiation and thermal Conductivity, *Qualitative idea of Blackbody radiation,* Stefan’s law, Wein's displacement law, Green House effect.

Unit-VIII: Thermodynamics

Chapter-11 Thermodynamics

Thermal equilibrium and 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. Heat engines and refrigerators.

Unit-IX: Behaviour of Perfect Gas and Kinetic Theory of gases

Chapter-12 Kinetic Theory

Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases- assumptions, concept of pressure. Kinetic interpretation of temperature;

rms speed of gas molecules; degrees of freedom, law of equipartition of energy (statement only) and application to specific heat capacities of gases, concept of mean free path, Avogadro's number.

Unit-X: Oscillations and Waves

Chapter-14 Oscillations

Periodic motion – time period, frequency, displacement as a function of time. Periodic functions.

Simple harmonic motion (S.H.M) and its equation; þhase; oscillations of a loading spring-restoring force and force constant; energy in S.H.M.-kinetic and potential energies: simple pendulum-derivation of expression for its time period. Free, forced and damped oscillations (qualitative ideas only), resonance.

Chapter-15 Wave

Wave motion: Longitudinal and transverse waves, speed of wave motion. Displacement-relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.

NOTE:- TOPICS GIVEN BELOW ARE IN PRESCRIBED SYLLABUS OF P.S.E.B. BUT NOT MENTIONED IN BOOK SURSCRIBED BY PSEB. SO THESE TOPICS ARE TO BE DONE WITH STUDENTS AND PAPER WILL INCLUDD THESE TOPICS AND QUESTIONS FROM THESE TOPICS TOPICS ARE NOT CONSIDERD AS OUT OF SYLLABUS.

1. Motion in a vertical circle
2. Centre of mass of uniform rod
3. Poiwsson'-ratio; elastic energy
4. Terminal ve;ocity
5. Qualitative idea of Blackbody radiation,
6. Stefan'a law, Wein's displacement law, Green House effect.
7. Definition of temperature
8. Work done on compressing a gas
9. Avogadro's number.

STRUCTURE OF PAPER (PRACTICAL)

Time : 3 hrs. **Total : 25 Marks**

Two experiment	10
Record of Activities	2
Viva on Activities	3
Record of Experiments	2
Viva of Experiments	3
Investigatory Project	5
Total	**25**

PRACTICAL SYLLABUS

Experiments

1. Use of Vernier Callipers
   (i) To measure diameter & volume and volume of a small spherical/cylindrical body.
   (ii) To measure internal diameter and depth of a given beaker/ calorimeter and hence find its volume.

2. Use of screw gauge
   (i) to measure diameter of a given wire,
   (ii) to measure thickness of a given sheet
3. To determine the volume of a irregular lamina using screw gauge
4. To determine radius of curvature of a given spherical surface by a spherometer.
5. To determine the mass of two different objects using beam balance.
6. To find the weight of a given body using parallelogram law of vectors.
7. Using a simple pendulum, plot its L-T^2 graphs and use it to find the effective length of second's pendulum.
8. To study variation of time period of a simple pendulum of a given length by taking bobs of same size but different masses and interpret the result.
9. 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.
10. 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 (θ) by plotting graph between force and $\sin\theta$.

Activities

(For the purpose of demonstration only)

1. To make a paper scale of given least count, e.g. 0.2cm, 0.5 cm.
2. To determine mass of a given body using a metre 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 Projectile 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 a given wire by using searle's apparatus.
2. To find out the spring constant of a helical spring from its load-extension graph.
3. To study the variation in volume (V) with pressure (P) for a sample of air at constant temp. by plotting graphs between P&V and between P & 1/V.
4. To determine the surface tension of water by capillary rise method.
5. To determine the coefficient of viscosity of a given liquid by measuring the terminal volume of spherical body.
6. To study the relationship between the temperature of a hot body and time by plotting a cooling curve.
7. To determine the specific heat capacity of a given (i) solid (ii) liquid by method of mixtures.
8. To study the relation between frequency and length of a given wire under constant tension using sonometer.
9. To study the relation between the length of a given wire and tension for constant frequency using sonometer.
10. To find the speed of sound in air at room temperafure using a resonance tube by two-resonançe positions.

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 nóte 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 of water by observing capillary rise.
5. To stúdy 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 metre scale loaded.

(i) at its end (ii) in the middle.

7. To observe the decrease in pressure with increase in velocity of a fluid.

Practical Examination for Visually Impaired Students Class XI

Note: Same Evaluation Scheme and general guidelines for visually impaired students as given for class XII may be followed.

A. Items for Identification/Familiarity of the apparatus for assessment in practicals (All experiments)

Spherical ball, Cylindrical objects, vernier calipers, beaker, calorimeter, Screw gauge, wire, Beam balance, spring balance, weight box, gram and milligram weights, forceps, Parallelogram law of vectors apparatus, pulleys and pans used in the same 'weights' used, Bob and string used in a simple pendulum, meter scale, split cork, suspension arrangement, stop clock/stop watch, Helical spring, suspension arrangement used, weights, arrangement used for measuring extension, Sonometer, Wedges, pan and pulley used in it, 'weights' Tuning Fork, Meter scale, Beam balance, Weight box, gram and milligram weights, forceps, Resonance Tube, Tuning Fork, Meter scale, Flask/Beaker used for adding water.

B. List of Practicals

1. To measure diameter of a small spherical/cylindrical body using vernier calipers.
2. To measure the internal diameter and depth of a given beaker/calorimeter using vernier calipers and hence find its volume.
3. To measure diameter of given wire using screw gauge.
4. To measure thickness of a given sheet using screw gauge.
5. To determine the mass of a given object using a beam balance.
6. To find the weight of given body using the parallelogram law of vectors.

7. Using a simple pendulum plot-L-T and L-T^2 graphs. Hence find the effective length of second's pendulum using appropriate length values.

8. To find the force constant of given helical spring by plotting a graph between load and extension.

(i) To study the relation between frequency and length of a given wire under constant tension using a sonometer.

(ii) To study the relation between the length of a given wire and tension, for constant frequency, using a sonometer.

9. To find the speed of sound in air, at room temperature, using a resonance tube, by observing the two resonance positions.

Note: The above practicals may be carried out in an experiential manner rather than recording observations.