Himachal Pradesh Board of School Education, Dharamshala

PHYSICS
10+1

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**

Unit - 1	Physical World & Measurement	**03**
Unit - II	Kinematics	**09**
Unit - III	Laws of Motion	**09**
Unit - IV	Work , Energy & Power	**05**
Unit - V	Motion of System of particles & Rigid Bodies	**04**
Unit - VI	Gravitation	**04**
Unit - VII	Properties of Bulk Matter	**09**
Unit - VIII	Thermodynamics	**04**
Unit - ix-	Behavior of Perfect Gas & Kinetic Theory of gases	**04**
Unit - x	Oscillations & Waves	**09**
		Total - 60

UNIT - I : PHYSICAL WORLD AND MEASUREMENT

Physics - scope and excitement ; nature of physical laws , Physics , technology and society . .
Need for measurement : Units of measurement : systems of units : SI units . fundamental and derived units . Length . mass and time measurements accuracy and precision of measuring instruments , errors in measurement , significant figures . .
Dimensions of physical quantities , dimensional analysis and its applications .

UNIT - II : KINEMATICS

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 , position - time graphs , relations for uniformly accelerated motion (graphical treatment)

Elementary concepts of differentiation and integration for describing motion.
 Scalar and vector quantities : Position and displacement vectors, general vectors and notation , equality of vector by a real number . addition and subtraction of vector Relative velocity. Unit vector . Resolution of a vector in a plane-rectangular components. Motion in a plane. Cases of uniform velocity and uniform acceleration projectile motion. Uniform circular motion.

UNIT - III : LAWS OF MOTION

Intuitive concept of force , Inertia , Newton ' s first momentum and Newton ' s second law of me law of motion . Law of conservation of linear momentum and its applications.
Equilibrium of concurrent forces . Static and kinetic friction, Laws of friction, rolling friction.
Dynamics of uniform circular motion : Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road).

UNIT - IV : WORK , ENERGY AND POWER

Scalar product of vectors . 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 . elastic and inelastic collisions in one and two dimensions.

UNIT - V : MOTION OF SYSTEM OF PARTICLES AND RIGID BODY

Centre of mass of a two - particle system . momentum conservation and centre of mass motion .
Centre of mass of a rigid body : centre of mass or uniform rod.
Vector product of vectors : moment of a force , torque , angular momentum , conservation of angular momentum with some examples.
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) . Statement of parallel and perpendicular axes theorems their applications .

UNIT - VI : 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

Elastic behavior , Stress - strain relationship . Hooke ' s law , Youngs modulus , bulk modulus , shear . modulus of rigidity.
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 . Reynold ' s number , streamline and turbulent flow - Bernoulli ' s theorem and its applications.
Surface energy and surface tension angle of contact . application surface tension ideas to drops , bubbles and capillary rise .
Heat , temperature , thermal expansion / specific heat - calorimetry , change of state - latent heat .
Heat transfer - conduction , convection and radiation thermal conductivity Newton ' s law of cooling . (Periods 12) |

Unit VIII : Thermodynamics

Thermal equilibrium and definition of temperature (zeroth law or thermodynamics) .
Heat , work and internal energy . First law or thermodynamics .
Second law of thermodynamics : reversible and irreversible processes . Heat engines and refrigerators . .

Unit IX : Behaviour of Perfect Gas and Kinetic Theory

Equation of state of a perfect gas , work done on compressing a gas .
Kinetic theory of gases - assumptions , concept of pressure . Kinetic energy and temperature , rms speed of gas molecules , degrees of freedom , law of equipartition of energy (statement only) and application to specific heats of gases ; concept of mean free path , Avogadro ' s number . . |

Unit x : Oscillations and Waves

Periodic motion - period , frequency , displacement as a function of time .
Periodic functions. Simple harmonic motion (S.H.M) and its equation;
Phase; oscillations of a spring - restoring force and force constant , energy in S . H . M - Kinetic and potential energies , simple pendulum - derivation expression for its time period free , forced and damped (qualitative ideas only) , resonance .
Wave motion Longitudinal and transverse waves , speed of wave 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 .

PRACTICALS   M . M . 20

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 agiven regular body of known mass and hence find its density .
   (iii) To measure internal diameter and depth of a given beakers calorimentre 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-T^2 graphs. Hence find the effective length of second's Pendulum using appropriate graph.
6 . To study the relationship between force of limiting frication and normal reaction and to find co-efficient of frication between a block and a horizontal surface.
7 . To find the downward force, along an inclined plane, actiong 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 .

Activites

1. To make a paper scale of given least count , e . g . 0 . 2cm . 0.5cm
2. Todetermine mass of a given body using a metre scale by princiate moments .
3 To plot agraph 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 plottinggraph 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 \ / 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 te 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 way

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 . ,

Subject -Physics
class XI
Time : 3 Hrs   **Design of Question Paper**   M. M. – 60
Blue Print

S.N.	Name of the Unit	1 Mark MCQ Questions	2 marks Questions	3 marks Questions	4 marks Questions	Total Marks
1	Physical world and Measurement	-	-	1	-	3
2	Kinematics	1	2	-	1 (Internal Choice)	9
3	Laws of Motion	1	2	-	1 (Internal choice)	9
4	Work, Energy and Power	2	-	1 (Internal Choice)	-	5
5	Motion of system of particles and rigid bodies	1	-	1	-	4
6	Gravitation	1	-	1 (Internal Choice)	-	4
7	Properties of bulk matter	2	2 (1 Internal Choice)	1	-	9
8	Thermodynamics	1	-	1	-	4
9	Behaviour of Perfect gas and Kinetic theory of gases	1	-	1	-	4
10	Oscillation and waves	2	-	1	1	9
	Break up total 34 Questions	**12**	**6**	**8**	**3**	**29**
Total Marks		**1x12=12**	**2x6=12**	**3x8=24**	**4x3=12**	**60**

Blue Print of MCQ

Sr. No	Type of question	Number of questions
1	Concept based /direct	2
2	Numerical based	2
3	Match the columns	2
4	Case study /comprehension	2
5	Assertion and reasoning	2
6	Diagram graph interpretation	1
7	Miscellaneous understanding and knowledge based	1
	Total number of questions	**12**

Each MCQ carries one mark only
No internal choice be given in the MCQ section

PRESCRIBED BOOKS

Physics   Published by HPBOSE Dharamshala