Punjab School Education Board

Syllabus -XI
Session 2020-21

PHYSICS
Class XI

Time : 3 hrs

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

STRUCTURE OF QUESTION PAPER (THEORY)

1. There will be one theory paper comprising of 18 questions.

2. Question No 1 will be carrying 20 objective type questions of one mark each. In objective type questions there will be 10 multiple choice questions including 2 questions of internal choice one theory type and one numerical type in choice from unit 7 (Properties of Bulk Matter) and from unit 10 (Oscillation and waves)], 3 true/false statements, 2 fill in the blanks and 5 one word answers or definitions.

3. Question number 2 to 8 will be carrying two marks each. There will be three questions of internal choice from unit-I, unit-II and unit-IV. Each one will have one theory type question and one numerical type in choice.

4. Question number 9 to 15 will be carrying three marks each. There will be two questions of internal choice from unit-III (Laws of Motion) and from unit-VIII (Thermodynamics). Each one will have one theory question and one numerical type in choice.

5. Question number 16 to 18 will be carrying 5 marks each and there will be internal choice in each of all these questions. From unit X (Oscillation and waves) internal choice questions will have one question from oscillations and choice question from waves.

6. Distribution of marks over different dimensions of the paper will be as follows.

	LEARNING OUTCOMES MARKS	PERCENTAGE OF MARKS
KNOWLEDGE	26	36%
UNDERSTANDING	30	44%
APPLICATION	14	20%
TOTAL	70	100%

7. Use of un-programmable calculator is allowed. The log tables can be used.

8. Total weightage of numberical will be 20% i.e. 14 marks. There will be two numericals of 1 marks, 3 numericals of 2 marks and 2 numericals of 3 marks.

UNIT WISE DISTRIBUTION
OF MARKS

Unit	Title	Marks
1	Physical world & Measurement	04
2	Kinematics	12
3	Laws of Motion	07
4	Work, Power and energy	07
5	Motion of system of particles& rigid body	05
6	Gravitation	05
7	Properties of Bulk Matter	10
8	Thermodynamics	07
9	Behaviour of perfect gases & Kinetic theory of gases	04
10	Oscillation & waves	09
	Total Marks	70

SCHEMATIC DISTRIBUTION OF MARKS

UNIT	Title	1 Mark Question	2 Marks Question	3 Marks Question	5 Marks Question	Total Marks
1	Physical world & Measurement	2	1 or Num	……..	….	04
2	Kinematics	2	1 or Num	1	1	12
3	Laws of Motion	2	1	1or Num	……..	07
4	Work, Power and energy	2	1 or Num	1	….	07
5	Motion of system of particles& rigid body	2	………	1	…..	05
6	Gravitation	2	…….	1	…..	05

7	Properties of Bulk Matter	2or Num	....	1	1	10
8	Thermodynamics	2	1	1 or Num	.....	07
9	Behaviour of perfect gases & Kinetic theory of gases	2	1	....	.....	04
10	Oscillation & waves	2 or num	1	......	1	09
	Total questions	1 (Sub Parts20)	7	7	3	18
	Total Marks	20	14	21	15	70

INSTRUCTIONS FOR PAPER SETTER

Note : There will be one theory paper comprising of 18 questions.

1. Question No 1 will be carrying 20 objective type questions of one marks each. There will be 2 questions of internal choice one theory type and one numerical type from unit 7 (Properties of Bulk Matter) and unit (Oscillation & waves), 10 multiple choice questions, 3 true/false statements, 2 fill in the blanks and 5 one word answers or definitions.

2. Question number 2 to 8 total 7 questions will be carrying two marks each. There will be three questions of internal choice from unit-I, unit-II and unit-IV. Each one will have one theory type question and one numerical type in choice.

3. Question number 9 to 15 total 7 questions will be carrying three marks each. There will be two questions of internal choice from unit-III (Laws of Motion) and from unit-VIII (Thermodynamics). Each one will have one theory question and one numerical type in choice.

4. Question number 16 to 18 will be carrying 5 marks each and there will be internal choice in each of all these questions. From unit X (Oscillation and waves) internal choice questions will have one question from oscillations and choice question from waves.

5. Questions paper should cover all the syllabus.

6. No question or topic should be repeated in the question paper.

7. Questions in the paper can be asked only from mentioned PSEB syllabus. Questions from

any topic which is not mentioned in the syllabus will be considered as out of syllabus .

8. All 3 sets must be of equal standard and difficulty level questions.

9. At the end of each question, paper setter must write detailed distribution of marks of each sub-question.

10. Vague, many possible answer questions, confusing answer question etc type of question should not be

asked in the paper.

One mark questions, answer should be of one word or one line only.

11. Language used should be clearly understood & specific.

12. Time and length limit of paper should be kept in mind while setting the paper.

13. Questions paper should be made according to knowledge, understanding and applications part marks distribution.

Unit I: Physical World and Measurement   **10 Periods**

Chapter–1: Physical World

Physics-scope and excitement; nature of physical laws; Physics, technology and society.

Chapter–2: Units and Measurements

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   24 Periods

Chapter–3: Motion in a Straight Line

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

Elementary concepts of differentiation and integration for describing motion, uniform and non- uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity - time and position-time graphs.

Relations for uniformly accelerated motion (graphical treatment).

Chapter–4: Motion in a Plane

Scalar and vector quantities; position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors, relative velocity, 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 14 Periods

Chapter–5: 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, Static and kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on a banked road).

Unit IV: Work, Energy and Power   12   Periods   Chapter–6:   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: motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

Unit V: Motion of System of Particles and Rigid Body

18 Periods Chapter–7: 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 a rigid body; centre of mass of a 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). Statement of parallel and perpendicular axes theorems and their applications.

Unit VI: Gravitation   12 Periods

Chapter–8: Gravitation

Kepler's laws of planetary motion, universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth.

Gravitational potential energy and gravitational potential, escape velocity, orbital velocity of a satellite, Geo-stationary satellites.

Unit VII: Properties of Bulk Matter 24 Periods Chapter–9: Mechanical

Properties of Solids

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

Chapter–10: 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 velocity, Bernoulli's theorem and its applications.

Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

Chapter–11: Thermal Properties of Matter

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; 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 Blackbody radiation, Wein's displacement Law, Stefan's law, Greenhouse effect.

Unit VIII: Thermodynamics   12 Periods

Chapter–12: 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 engine and refrigerator.

Unit IX: Behaviour of Perfect Gases and Kinetic Theory of Gases   08

Periods Chapter–13: Kinetic Theory

Equation of state of a perfect gas, work done in 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 equi-partition 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 26 Periods

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; phase; oscillations of a loaded 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: Waves

Wave motion: Transverse and longitudinal waves, speed of travelling 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   Total Periods: 60

The record, to be submitted by the students, at the time of their annual examination, has to include:

- Record of at least 15 Experiments [with a minimum of 6 from each section], to be performed by the students.

- Record of at least 5 Activities [with a minimum of 2 each from section A and section B], to be demonstrated by the teachers.

- Report of the project to be carried out by the students.

EVALUATION SCHEME
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

SECTION–A

Experiments

1. To measure diameter of a small spherical/cylindrical body and to measure internal diameter and depth of a given beaker/calorimeter using Vernier Callipers and hence find its volume.

2. To measure diameter of a given wire and thickness of a given sheet using screw gauge.

3. To determine volume of an 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 a 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 graph 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 the 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 θ.

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 an 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 a 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. To determine the surface tension of water by capillary rise method.

5. To determine the coefficient of viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.

6. To study the relationship between the temperature of a hot body and time by plotting a cooling curve.

7. To determine specific heat capacity of a given solid 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 temperature using a resonance tube by two resonance positions.

Activities (for the purpose of demonstration only)

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 of water 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 metre scale loaded at
   (i) 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.

V	States of Matter: Gases and Liquids	5
VI	Chemical Thermodynamics	6
VII	Equilibrium	4
VIII	Redox Reactions	2
IX	Hydrogen	5
X	s-Block Elements	4
XI	Some p-Block Elements	5
XII	Organic Chemistry:Some Basic Principles and Techniques	7
XIII	Hydrocarbons	7
XIV	Environmental Chemistry	4
	Total	70

CLASS 10+1 SCHEMATIC DISTRIBUTION OF MARKS

SR. NO.	UNIT	1 MARK	2 MARK	3 MARK	5 MARK	TOTAL MARK
I	Some Basic Concepts of chemistry	1N(M.C.Q)	1T	1N (internal choice)		6
II	Structure of Atom	2T (M.C.Q.,T/F)		1N		5
III	Classification of Elements and Periodicity in Properties	1(T/F)		1T		4
IV	Chemical Bonding and Molecular Structure	3 T (M.C.Q.,T/F,O.W.)		1 T		6
V	States of Matter: Gases and Liquids		1T (internal choice)	1T		5
VI	Chemical Thermodynamics	1T (O.W.)			1 (1 mark N+4 mark T)	6
VII	Equilibrium	2 (N+T) (M.C.Q.,T/F)	1N (internal choice)			4