CLASS XI

PHYSICS (THEORY)

COURSE STRUCTURE

Time: 3 hrs.   **Maximum Marks: 70**

UNIT	TOPICS	MARKS
Unit–I	**Physical World and Measurement**	23
	Chapter–2: Units and Measurements	
Unit-II	**Kinematics**	
	Chapter–3: Motion in a Straight Line	
	Chapter–4: Motion in a Plane	
Unit-III	**Laws of Motion**	
	Chapter–5: Laws of Motion	
Unit-IV	**Work, Energy and Power**	17
	Chapter–6: Work, Energy and Power	
Unit–V	**Motion of System of Particles and Rigid Body**	
	Chapter–7: System of Particles and Rotational Motion	
Unit–VI	**Gravitation**	
	Chapter–8: Gravitation	
Unit–VII	**Properties of Bulk Matter**	20
	Chapter–9: Mechanical Properties of Solids	
	Chapter–10: Mechanical Properties of Fluids	
	Chapter–11: Thermal Properties of Matter	
Unit–VIII	**Thermodynamics**	
	Chapter–12: Thermodynamics	
Unit–IX	**Behaviour of Perfect Gases and Kinetic Theory of Gases**	
	Chapter–13: Kinetic Theory	
Unit–X	**Oscillations and Waves**	10
	Chapter–14: Oscillations	
	Chapter–15: Waves	
Total		**70**

Unit I: Physical World and Measurement
Chapter–2: Units and Measurements

Need for measurement: 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–3: Motion in a Straight Line

Frame of reference, Motion in a straight line, Elementary concepts of differentiation and integration for describing motion, uniform and non- uniform motion, 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, 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–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
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: 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
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).

Unit VI: Gravitation
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.

Unit VII: Properties of Bulk Matter Chapter–
9: Mechanical Properties of Solids

Elasticity, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity (qualitative idea only), 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 simple 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.

Unit VIII: Thermodynamics
Chapter–12: Thermodynamics

Thermal equilibrium and definition of temperature zeroth law of thermodynamics, heat, work and internal energy. First law of thermodynamics,

Second law of thermodynamics: gaseous state of matter, change of conditionof gaseous state -isothermal, adiabatic, reversible, irreversible, and cyclic processes.

Unit IX: Behavior of Perfect Gases and Kinetic Theory of Gases
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
Chapter–14: Oscillations

Periodic motion - time period, frequency, displacement as a function of time, periodic functions and their application.

Simple harmonic motion (S.H.M) and its equations of motion; 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.

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.

SYLLABUS FOR HALF-YEARLY EXAMINATION
PHYSICS (THEORY)

Time: 3 hrs.   **Maximum Marks: 70**

UNIT	TOPICS	MARKS
Unit–I	**Physical World and Measurement**	
	Chapter–2: Units and Measurements	
Unit-II	**Kinematics**	**40**
	Chapter–3: Motion in a Straight Line	
	Chapter–4: Motion in a Plane	
Unit-III	**Laws of Motion**	
	Chapter–5: Laws of Motion	
Unit-IV	**Work, Energy and Power**	
	Chapter–6: Work, Energy and Power	
Unit–V	**Motion of System of Particles and Rigid Body**	**30**
	Chapter–7: System of Particles and Rotational Motion	
Unit–VI	**Gravitation**	
	Chapter–8: Gravitation	
Total		**70**

SYLLABUS FOR ANNUAL EXAMINATION
PHYSICS (THEORY)

Time: 3 hrs.   **Maximum Marks: 70**

UNIT	TOPICS	MARKS
Unit–VII	**Properties of Bulk Matter**	
	Chapter–9: Mechanical Properties of Solids	**24**
	Chapter–10: Mechanical Properties of Fluids	
	Chapter–11: Thermal Properties of Matter	
Unit–VIII	**Thermodynamics**	
	Chapter–12: Thermodynamics	
Unit–IX	**Behaviour of Perfect Gases and Kinetic Theory of Gases**	**22**
	Chapter–13: Kinetic Theory	

	Oscillations and Waves	
Unit–X	Chapter–14: Oscillations	**24**
	Chapter–15: Waves	
	Total	**70**

PRACTICALS

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

• Record of at least 6 Experiments [with 3 from each section], to be performed by the students.

EVALUATION SCHEME

Time 3 hours   Maximum Marks: 30

Topic	Marks
Two experiments one from each section	10+10
Practical record (experiment and activities)	3
Attendance	5
Viva on experiments	2
TOTAL	**30**

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 Calipers 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. Using a simple pendulum, plot its L-T^2 graph and use it to find the effective length of second's pendulum.
6. 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.

SECTION–B

Experiments

1. To determine Young's modulus of elasticity of the material of a given wire.
2. To determine the surface tension of water by capillary rise method.
3. To determine the coefficient of viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.
4. To study the relation between frequency and length of a given wire under constant tension using sonometer.
5. To study the relation between the length of a given wire and tension for constant frequency using sonometer.
6. To find the speed of sound in air at room temperature using a resonance tube by two resonance positions.

Prescribed Books:
1. Physics Part-I, Textbook for Class XI, Published by NCERT/SCERT.
2. Physics Part-II, Textbook for Class XI, Published by NCERT/SCERT.
3. Laboratory Manual of Physics, Class XI Published by NCERT.
4. The list of other related books and manuals brought out by NCERT (consider multimedia also).

Note: The content indicated in NCERT textbooks as excluded for the year 2023-2024 is not to be tested by schools.

BLUE-PRINT OF QUESTION PAPER
PHYSICS - XI
FOR THE SESSION 2023-2024
HALF-YEARLY EXAMINATION

Unit	Chapter/Contents	Unit Wise Marks	MCQ (1 mark)	VSA (1 marks)	SA (2 marks)	MA (3 Marks)	LA (4 Marks)	VLA (5 Marks)	TOTAL Marks
Unit -I	**Physical World and Measurement**	10	1	4	2x1	3x1	-	-	40
	Chapter–1: Physical World								
	Chapter–2: Units and Measurements								
Unit-II	**Kinematics**	14	2	5	2x2	3x1	-	-	
	Chapter–3: Motion in a Straight Line								
	Chapter–4: Motion in a Plane								
Unit -III	**Laws of Motion**	16	3	4	2x2	-	-	5x1	
	Chapter–5: Laws of Motion								
Unit-IV	**Work, Energy and Power**	8	2	3	0	3x1	-	-	30
	Chapter-6:Work, Energy and Power								

Unit	Chapter/Contents	Unit Wise Marks	MCQ (1 mark)	VSA (1 marks)	SA (2 marks)	MA (3 Marks)	LA (4 Marks)	VLA (5 Marks)	TOTAL Marks
Unit -V	**Motion of System of Particles and Rigid Body** Chapter–7: System of Particles and Rotational Motion	12	1	2	-	-	4x1	5x1	
Unit –VI	**Gravitation** Chapter–8: Gravitation	10	1	2	0	3x1	4x1		
Total Question / Marks			10	20	10	12	8	10	70

BLUE-PRINT OF QUESTION PAPER
PHYSICS - XI
FOR THE SESSION 2023-2024
<u>ANNUAL EXAMINATION</u>

Unit	Chapter/Contents	Unit Wise Marks)	MCQ (1 mark)	VSA (1 marks)	SA (2 marks)	MA (3 Marks)	LA (4 Marks)	VLA (5 Marks)	TOTAL
Unit–VII	**Properties of Bulk Matter** Chapter–9: Mechanical Properties of Solids Chapter–10: Mechanical Properties of Fluids Chapter–11: Thermal Properties of Matter	30	5	9	2x2	3x1	4x1	5x1	46

Unit	Chapter/Contents	Unit Wise Marks)	MCQ (1 mark)	VSA (1 marks)	SA (2 marks)	MA (3 Marks)	LA (4 Marks)	VLA (5 Marks)	TOTAL
Unit-VIII	**Thermodynamics** Chapter–12: Thermodynamics	10	2	3	2x1	3x1	-	-	
Unit–IX	**Behaviour of Perfect Gases and Kinetic Theory of Gases** Chapter–13: Kinetic Theory	6	1	2	0	3x1	-	-	
Unit–X	**Oscillations and Waves** Chapter–14: Oscillations Chapter–15: Waves	24	2	6	2x 2	3x1	4x1	5x1	24
Total Questions/Marks			10	20	10	12	8	10	70