

**PHYSICS**  
**THEORY**  
**COURSE STRUCTURE**  
**CLASS - XI**

*One Paper*

*Times : 3 Hours*

*70 Marks*

<b>Unit</b>	<b>Contents</b>	<b>Marks</b>
I	Physical World and Measurement	03
II	Kinematics	10
III	Laws of Motion	10
IV	Work, Energy and Power	06
V	Motion of System of Particles and Rigid Body	06
VI	Gravitation	05
VII	Properties of Bulk Matter	10
VIII	Thermodynamics	05
IX	Behaviour of Perfect Gas and Kinetic Theory	05
X	Oscillations and Waves	10
<b>Total:</b>		<b>70</b>

**Unit I: Physical World and Measurement**

**(10 periods)**

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**

**(Periods 30)**

Motion in a straight line: Speed and velocity. Instantaneous velocity. Uniformly accelerated motion, velocity-time and position-time graphs.

Relations for uniformly accelerated motion (graphical treatment). 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**

**(Periods 16)**

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 level circular road, vehicle on banked road).

#### **Unit IV: Work, Energy and Power**

**(Periods 16)**

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**

**(Periods 18)**

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 uniform rod. Moment of a force, torque, angular momentum, law of conservation of angular momentum and its application. 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**

**(Periods 14)**

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**

**(Periods 28)**

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

Heat, temperature, thermal expansion; thermal expansion of solid, 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, Wien's displacement law, Stefan's law.

**Unit VIII: Thermodynamics****(Periods 12)**

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.

**Unit IX: Behaviour of Perfect Gas and Kinetic Theory****(Periods 8)**

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 equi-partition of energy (statement only) and application to specific heats capacities of gases; concept of mean free path, Avogadro's number.

**Unit X: Oscillations and Waves****(Periods 28)**

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.

Wave motion. Longitudinal and transverse 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.

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**PHYSICS**  
**PRACTICAL**  
**CLASS - XI**

**Note : A.** Every student will perform 12 experiments (6 from each section). The activities mentioned are for the purpose of demonstration by teachers only. These are not to be evaluated during the academic year. For evaluation in examination, students would be required to perform two experiments - one from each section. The report of one Activity should be submitted at the time for Examination.

**B. Evaluation Scheme of Practical Examination :**

Two experiments one each of the two sections : 8+8=16 Marks

Theory 2+2=4

Observation/Data (procedure) 4+4=8

Conclusion 1+1=2

Accuracy of result 1+1=2

Total 16

Record of one Activity work and Viva  
base on the Activity :

5 Marks

Practical record of experiments :

5 Marks

Viva and experiments :

2+2=4 Marks

Total 30 Marks

**SECTION-A**

**EXPERIMENTS:**

**( Any 6 experiments out of the following to be performed by the students)**

1. To measure diameter of a small spherical/cylindrical body using Vernier Callipers.
2. To measure internal diameter and depth of a given beaker/calorimeter using Vernier Callipers and hence find its volume.
3. To measure diameter of a given wire using screw gauge.
4. To measure thickness of a given sheet using screw gauge.
5. To measure volume of an irregular lamina using screw gauge.
6. To determine radius of curvature of a given spherical surface by a spherometer.
7. To find the weight of a given body using parallelogram law of vectors.
8. Using a simple pendulum, plot L-T and L-T<sup>2</sup> graphs. Hence find the effective length of a second's pendulum using appropriate graph.

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 by plotting a graph between force and  $\sin\theta$ .

**ACTIVITIES OF SECTION - A (FOR THE PURPOSE OF DEMONSTRATION ONLY)**

1. To make a paper scale of given least count, e.g. 0.2 cm., 0.5 cm.
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 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:

( Any 6 experiments out of the following to be performed by the students)

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

### ACTIVITIES OF SECTION - B (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 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 TEXT BOOKS:**

1. Physics Part-I  
Textbook for Class-XI.  
Published by : NCERT, New Delhi.
2. Physics Part-II  
Textbook for Class-XI  
Published by : NCERT, New Delhi.

### **REFERENCE BOOKS:**

1. Fundamental Physics  
By: Dr. Gomber and K.L. Gogia  
Published by : Pradeep Publications,  
Jalandhar - 144008
2. New Millennium Physics for Class XI & XII  
By: S.K. Sharma  
Published by: S. Dinesh Sales Corporation, Jalandhar.
3. Modern's abc Physics  
By: Satish K. Gupta  
Published by: Modern Publishers, Jalandhar
4. Comprehensive Practical Physics for Class XI (New Edition)  
By : J.N. Jaiswal  
Published by : Laxmi Publications (P) Ltd., New Delhi - 110 002.
5. A Textbook of Practical Physics for Class XI  
By: O. Kuber Singh  
Published by: Writers Book Store, Paona Bazar, Imphal



# DESIGN OF QUESTION PAPER

Subject : **PHYSICS**  
Paper : Theory  
Class : XI  
Full Mark : 70  
Time : 3 Hours

1.	<b>WEIGHTAGE TO OBJECTIVES:</b>				
	Objectives		Marks	Percentage	
	Knowledge (K)		10	15	
	Understanding (U)		35	50	
	Application (A)		21	30	
	Skill (S)		4	5	
	Total:		70	100	
2.	<b>WEIGHTAGE TO FORM OF QUESTIONS:</b>				
	Form of Questions	No. of Question	Time (in minutes)	Marks	
	Essay/Long Answer (E/LA)	3	60	15	
	Short Answer (SA-I)	6	37	18	
	Short Answer (SA-II)	10	40	20	
	Very Short Answer (VSA)	7	21	7	
	MCQ	10	22	10	
	Total:		36	180	70
3.	<b>WEIGHTAGE TO CONTENT:</b>				
	<b>UNIT/CONTENTS:</b>		Marks	Percentage	
	I	Physical World and Measurement	03	05	
	II	Kinematics	10	14	
	III	Laws of Motion	10	14	
	IV	Work, Energy and Power	06	09	
	V	Motion of System of Particles and Rigid Body	06	09	
	VI	Gravitation	05	07	
	VII	Properties of Bulk Matter	10	14	
	VIII	Thermodynamics	05	07	
	IX	Behaviour of Perfect Gas and Kinetic Theory	05	07	
	X	Oscillations and Waves	10	14	
	Total:		70	100	
4.	<b>SCHEME OF SECTIONS:</b> Nil				
5.	<b>SCHEME OF OPTIONS:</b> 1. Internal option will be given in Essay Type Question. 2. Internal option will be given in three questions of SA-I including one case study based question.				
6.	<b>DIFFICULTY LEVEL:</b> Difficult : 35% of the total marks Average : 50% of the total marks Easy : 15% of the total marks				

Abbreviation: K(Knowledge), U(Understanding), A(Application), Skill(S),  
E/LA(Essay /Long Answer Type), SA(Short Answer Type), VSA(Very  
Short Answer Type), MCQ(Multiple Choice Question)

**NOTE-** Two questions out of ten questions of MCQ will be assertion & reason type question.



## DESIGN OF QUESTION PAPER

**Subject : PHYSICS**

**Paper : Practical**

**Class : XI**

**Full Marks : 30**

**Time : 3 Hours**

Sl. No.	Forms of exercise	Nature of Exercise	Skill/Objective to be tested					Marks Allotted	Estimated Time in Minute
			O.S.	M.S.	D.S.	R.S.	R.U		
1.	Short	Theory (Principle/ working formula/ illustration diagrams	0	0	1/0	3/4	0	4	40
2.	Short	Setting of instruments and using it.	0	2	0	0	2	4	20
3.	Major Experiment	Experimental procedure, tabulation, etc.	2	2	0	0	0	4	100
4.	Short	Reading of measurement	2	0	0	2	0	4	20
5.	Short	Viva-Voce	0	0	0	0	4	4	X
6.	Sessional Record	Practical Note Book	1	1	1	1	1	5	X
7.	Sessional Record	Record of one activity	1	1	1	1	1	5	X
<b>Total</b>			<b>6</b>	<b>6</b>	<b>3/2</b>	<b>7/8</b>	<b>8</b>	<b>30</b>	<b>180</b>

O.S.= Observational Skill, M.S.=Manipulative Skill, D.S. = Drawing Skill, R.S.= Reporting Skill, R.U.= Related Understandings.

\* No fixed time is allotted for viva-voce. It is to be conducted during the course of the experiment.

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# PHYSICS

## THEORY CLASS - XII

*One Paper*

*Time : 3 Hours*

*70 Marks*

Unit	Contents	Marks
I	Electrostatics	09
II	Current Electricity	07
III	Magnetic effect of current & Magnetism	09
IV	Electromagnetic Induction and Alternating current	08
V	Electromagnetic Waves	03
VI	Optics	15
VII	Dual Nature of Matter and Radiation	05
VIII	Atoms and Nuclei	07
IX	Electronic Devices	07
<b>Total</b>		<b>70</b>

### Unit I: Electrostatics

**(Periods 25)**

Electric Charges; Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution.

Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in uniform electric field.

Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside).

Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field.

Conductors and Insulators (without concept of earthing), Free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy store in a capacitor (no derivation, formula only).

### Unit II: Current Electricity

**(Periods 22)**

Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity.

Temperature dependence of resistance.

Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel.

Kirchhoff's laws and simple applications. Wheatstone bridge.

### **Unit III: Magnetic Effects of Current and Magnetism**

**(Periods 25)**

Concept of magnetic field, Oersted's experiment.

Biot - Savart law and its application to current carrying circular loop.

Ampere's circuital law and its applications to infinitely long straight wire, straight solenoids (only qualitative treatment)

Force on a moving charge in uniform magnetic and electric fields.

Force on a current-carrying conductor in a uniform magnetic field, force between two parallel current-carrying conductors-definition of ampere. Torque experienced by a current loop in uniform magnetic field; Current loop as a magnetic dipole and its magnetic dipole moment, moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter.

Bar magnet, bar magnet as an equivalent solenoid (Qualitative treatment only), Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, torque on a magnetic dipole (bar magnet) in a uniform magnetic field (Qualitative treatment only), magnetic field lines.

Para, dia and ferromagnetic substances with examples. Magnetisation of materials, effect of temperature on magnetic properties.

### **Unit IV: Electromagnetic Induction and Alternating Currents**

**(Periods 20)**

Electromagnetic induction; Faraday's law, induced EMF and current; Lenz's Law, self and mutual induction.

Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LCR series circuit (Phasor-diagram solution only), resonance (without sharpness of resonance); power in AC circuits, power factor, wattless current.

AC generator and transformer.

### **Unit V: Electromagnetic waves**

**(Periods 4)**

Basic idea of displacement current.

Electromagnetic waves and their characteristics, their transverse nature (qualitative ideas only).

Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.

**Unit VI: Optics****(Periods 30)**

Reflection of light, spherical mirrors, mirror formula, refraction of light, total internal reflection and optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens maker's formula, magnification, power of a lens, combination of thin lenses in contact, refraction of light through a prism.

Optical instruments: Microscopes, astronomical telescopes (reflecting and refracting) and their magnifying powers.

Wave optics: wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens' principle. Interference, Young's double slit experiment and expression for fringe width only (no derivation final expression only), coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maxima ( qualitative treatment only).

**Unit VII: Dual Nature of Matter and Radiation****(Periods 8)**

Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations;

Einstein's photoelectric equation-particle nature of light.

Experimental study of photoelectric effect

Matter waves-wave nature of particles, de-Broglie relation.

**Unit VIII: Atoms & Nuclei****(Periods 18)**

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model and the expression for radius of  $n^{\text{th}}$  possible orbit (without derivation), velocity and energy of electron in this orbit, hydrogen line spectra (Qualitative treatment only)

Composition and size of nucleus, nuclear force.

Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.

**Unit IX: Electronic Devices****(Periods 18)**

Energy bands in conductors, semiconductors and insulators (qualitative ideas only), intrinsic and extrinsic semiconductors, p and n type, p-n junction.

Semiconductor diode – I-V characteristics in forward and reverse bias, application of junction diode-diode as a rectifier;

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# PHYSICS

## PRACTICAL

### CLASS - XII

**Note : A.** Every student will perform at least 12 experiments (6 from each section). The activities mentioned here should only be for the purpose of demonstration. One project of five marks is to be carried out by the students.

The report of the project work should be submitted at the time of Practical Examination

**B.** Evaluation Scheme of Practical Examination :

Two experiments one from each of the two sections :

8+8=16 Marks

Theory	2+2=4
Observation/Data (procedure)	4+4=8
Conclusion	1+1=2
Accuracy of result	1+1=2

**Total**                      **16**

Record of one Investigatory project:

5 Marks

Viva base on the project :

2 Marks

Practical record of experiments :

5 Marks

Viva on experiments :

2 Marks

**Total = 30 Marks**

## **Section-A**

### **EXPERIMENTS:**

**(Any 6 experiments out of the following to be performed by the students)**

1. To find resistance of a given wire using meter bridge and hence determine the specific resistance of its material.
2. To determine resistance per cm of a given wire by plotting a graph of potential difference versus current.
3. To verify the laws of series combination of resistances using a meter bridge.
4. To verify the laws of parallel combination of resistances using a meter bridge.
5. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.
6. To convert a given galvanometer (of known resistance and figure of merit) into an ammeter and voltmeter of desired range and to verify the same.
7. To find the frequency of the a.c. mains with a sonometer.

### **ACTIVITIES OF SECTION - A (FOR THE PURPOSE OF DEMONSTRATION ONLY)**

1. To measure the resistance and impedance of an inductor with or without iron core.
2. To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multimeter.
3. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.
4. To measure the components of a given electrical circuit.
5. To study the variation in potential drop with length of a wire for a steady current
6. To draw the diagram of a given open circuit comprising at least a battery, resistor/ rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram.

## Section-B

### EXPERIMENTS:

(Any 6 experiments out of the following to be performed by the students)

1. To find the value of  $v$  for different values of  $u$  in case of a concave mirror and to find the focal length.
2. To find the focal length of a convex mirror, using a convex lens.
3. To find the focal length of a convex lens by plotting graphs between  $u$  and  $v$  or between  $1/u$  and  $1/v$ .
4. To find the focal length of a concave lens, using a convex lens.
5. To determine angle of minimum deviations for a given prisms by plotting a graph between the angle of incidence and the angle of deviation.
6. To determine refractive index of a glass slab using a travelling microscope.
7. To find refractive index of a liquid by using  
(i) Concave mirror, (ii) Convex lens and plane mirror.
8. To draw the I-V characteristic curve of a p-n junction in forward bias and reverse bias.

### ACTIVITIES OF SECTION - B (FOR THE PURPOSE OF DEMONSTRATION ONLY)

1. To identify a diode, an LED a transistor, and IC, a resistor and a capacitor from mixed collection of such items.
2. Use of multimeter to (i) identify base of transistor, (ii) distinguish between npn and pnp type transistors, (iii) see the unidirectional flow of current in case of a diode and an LED, (iv) check whether a given electronic component (e.g. diode, transistor or IC) is in working order.
3. To study effect of intensity of light (by varying distance of the source) on an L.D.R.
4. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.
5. To observe polarization of light using two Polaroid.
6. To observe diffraction of light due to a thin slit.

7. To study the nature and size of the image formed by (i) convex lens (ii) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror).
8. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.

### **SUGGESTED INVESTIGATORY PROJECTS FOR CLASS XII**

1. To investigate whether the energy of a simple pendulum is conserved.
2. To determine the radius of gyration about the centre of mass of a meter scale used as a bar pendulum.
3. To investigate changes in the velocity of a body under the action of a constant force and determine its acceleration.
4. To compare effectiveness of different materials as insulators of heat.
5. To study various factors on which the internal resistance/emf of a cell depends.
6. To construct a time-switch and study dependence of its time constant on various factors.
7. To study infra-red radiation emitted by different sources using photo-transistor.
8. To compare effectiveness of different materials as absorbers of sound.
9. To design an automatic traffic signal system using suitable combinations of logic-gates.
10. To study luminosity of various electric lamps of different powers and make.
11. To compare the Young's modulus of elasticity of different specimens of rubber and also draw their elastic hysteresis curve.
12. To study the refractive indices of the materials of transparent substances of different densities.
13. To determine the wavelength of laser beam by diffraction.
14. Any other innovative works related to the syllabus.



### **PRESCRIBED TEXTBOOKS:**

1. Physics Part-I  
Textbook for Class-XII.  
Published by : NCERT, New Delhi.
2. Physics Part-II  
Textbook for Class-XII  
Published by : NCERT, New Delhi.

### **REFERENCE BOOKS:**

1. Fundamental Physics  
By: Dr. Gomber and K.L. Gogia  
Published by : Pradeep Publications,  
Jalandhar - 144008
2. New Millennium Physics for Class XI & XII  
By: S.K. Sharma  
Published by: S. Dinesh Sales Corporation, Jalandhar.
3. Modern's abc Physics  
By: Satish K. Gupta  
Published by: Modern Publishers, Jalandhar
4. Comprehensive Practical Physics for Class XII (New Edition)  
By : J.N. Jaiswal  
Published by : Laxmi Publications (P) Ltd., New Delhi - 110 002.
5. A Textbook of Practical Physics for Class XII  
By: O. Kuber Singh  
Published by: Writers Book Store, Paona Bazar, Imphal

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**FOR THE ACADEMIC SESSION 2024-25****DESIGN OF  
QUESTION PAPER**

Subject : **PHYSICS**  
 Paper : Theory  
 Class : XII  
 Full Mark : 70  
 Time : 3 Hours

1.	<b>WEIGHTAGE TO OBJECTIVES:</b>				
	Objectives		<b>Marks</b>	<b>Percentage</b>	
	Knowledge (K)		14	20	
	Understanding (U)		32	46	
	Application (A)		21	30	
	Skill (S)		3	4	
		<b>Total:</b>	<b>70</b>	<b>100</b>	
2.	<b>WEIGHTAGE TO FORM OF QUESTIONS:</b>				
	<b>Form of Questions</b>	<b>No. of Question</b>	<b>Time (in minutes)</b>	<b>Marks</b>	<b>Percentage</b>
	Essay/Long Answer (E/LA)	3	60	15	21
	Short Answer (SA-I)	6	36	18	26
	Short Answer (SA-II)	10	40	20	29
	Very Short Answer (VSA)	10	30	10	14
	MCQ	7	14	7	10
		<b>Total:</b>	<b>36</b>	<b>180</b>	<b>70</b>
3.	<b>WEIGHTAGE TO CONTENT:</b>				
	<b>UNIT/CONTENTS:</b>			<b>Marks</b>	<b>Percentage</b>
	I	Electrostatics		09	12
	II	Current Electricity		07	10
	III	Magnetic effect of current & Magnetism		09	12
	IV	Electromagnetic Induction and Alternating current		08	11
	V	Electromagnetic Waves		03	5
	VI	Optics		15	23
	VII	Dual Nature of Matter		05	7
	VIII	Atoms and Nuclei		07	10
	IX	Electronic Devices		07	10
			<b>Total:</b>	<b>70</b>	<b>100</b>
4.	SCHEME OF SECTIONS: Nil				
5.	SCHEME OF OPTIONS: <b>Internal option may be given in Essay Type Question &amp; SA-I.</b>				
6.	DIFFICULTY LEVEL:				
	Difficult	: 30%			
	Average	: 50%			
	Easy	: 20%			

Abbreviation: K(Knowledge), U(Understanding), C(Comprehension), Expression(Exp), Skill(S), E(Essay Type), SA(Short Answer Type), VSA(Very Short Answer Type), MCQ(Multiple Choice Question)

**FROM THE ACADEMIC SESSION 2025-26**

**DESIGN OF  
QUESTION PAPER**

Subject : **PHYSICS**  
Paper : Theory  
Class : XII  
Full Mark : 70  
Time : 3 Hours

1.	WEIGHTAGE TO OBJECTIVES:			
	Objectives		Marks	Percentage
	Knowledge (K)		10	15
	Understanding (U)		35	50
	Application (A)		21	30
	Skill (S)		4	5
	Total:		70	100
2.	WEIGHTAGE TO FORM OF QUESTIONS:			
	Form of Questions	No. of Question	Time (in minutes)	Marks
	Essay/Long Answer (E/LA)	3	60	15
	Short Answer (SA-I)	6	37	18
	Short Answer (SA-II)	10	40	20
	Very Short Answer (VSA)	7	21	7
	MCQ	10	22	10
	Total:	36	180	70
3.	WEIGHTAGE TO CONTENT:			
	UNIT/CONTENTS:		Marks	Percentage
	I	Electrostatics	09	12
	II	Current Electricity	07	10
	III	Magnetic effect of current & Magnetism	09	12
	IV	Electromagnetic Induction and Alternating current	08	11
	V	Electromagnetic Waves	03	5
	VI	Optics	15	23
	VII	Dual Nature of Matter	05	7
	VIII	Atoms and Nuclei	07	10
IX	Electronic Devices	07	10	
Total:		70	100	
4.	SCHEME OF SECTIONS: Nil			
5.	SCHEME OF OPTIONS: 1. Internal option will be given in Essay Type Question. 2. Internal option will be given in three questions of SA-I including one case study based question.			
6.	DIFFICULTY LEVEL: Difficult : 35% of the total marks Average : 50% of the total marks Easy : 15% of the total marks			

Abbreviation: K(Knowledge), U(Understanding), A(Application), Skill(S), E/LA(Essay /Long Answer Type), SA(Short Answer Type), VSA(Very Short Answer Type), MCQ(Multiple Choice Question)

**NOTE-** Two questions out of ten questions of MCQ will be assertion & reason type question.

## DESIGN OF QUESTION PAPER

**Subject : PHYSICS**  
**Paper : Practical**  
**Class : XII**  
**Full Marks : 30**  
**Time : 3 Hours**

Sl. No.	Forms of exercise	Nature of Exercise	Skill/Objective to be tested					Marks Allotted	Estimated Time in Minute
			O.S.	M.S	D.S.	R.S.	R.U		
1.	Short	Theory (Principle/ working formula) illustration diagrams	0	0	$\frac{1}{0}$	$\frac{3}{4}$	0	4	40
2.	Short	Setting of instruments and using it.	0	2	0	0	2	4	20
3.	Major Experiment	Experimental procedure, tabulation, etc.	2	2	0	0	0	4	100
4.	Short	Reading of measurement	2	0	0	2	0	4	20
5.	Short	Viva-Voce	0	0	0	0	4	4	X
6.	Sessional Record	Practical Note Book	1	1	1	1	1	5	–
7.	Sessional Record	Project Report	1	1	1	1	1	5	
<b>Total</b>			<b>6</b>	<b>6</b>	<b>3/2</b>	<b>7/8</b>	<b>8</b>	<b>30</b>	<b>180</b>

O.S.= Observational Skill, M.S.=Manipulative Skill, D.S. = Drawing Skill, R.S.= Reporting Skill, R.U.= Related Understandings.

\* No fixed time is allotted for viva-voce. It is to be conducted during the course of the experiment.

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