PHYSICS

THEORY

COURSE STRUCTURE

CLASS - XI

One Paper ***Times : 3 Hours*** ***70 Marks***

Units	Titles	Marks
I.	Phyical World and Measurement	03
II.	Kinematics	10
III.	Laws of motion	10
IV.	Work, Energy and Power	06
V.	Motion of systems 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 of gases	05
X.	Oscillations and Waves.	10
	Total	**70**

Unit-I : PHYSICAL WORLD AND MEASUREMENT (10 Periods)

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

Need for measurement. Units of measurement; system of units; S.I. units, fundamental and derived units, length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurements; significant figures.

Dimension of physical quantities, dimensional analysis and its applications.

Unit-II : KINEMATICS (30 Periods)

Frame of reference (Inertial and non-inertial frames). 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, position-time graphs, relations for uniformly accelerated motion (graphical treatment).

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. Relative velocity.

Unit vectors, 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 (16 Periods)

Intuitive concept of force. Intertia, 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, law 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 (16 Periods)

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)

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, 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 derivations).

Statement of parallel and perpendicular axes theorems and their applications.

Unit-VI : GRAVITATION (14 Periods)

Kepler's law of planetary motion. The Universal law of gravitation, Gravitational constant.

Acceleration due to gravity and its variation with altitude and depth and rotation of earth.

Gravitional potential energy; gravitational potential, Escape velocity. Orbital velocity of satellite. Geo-stationary satellites.

Unit-VII : PROPERTIES OF BULK MATTER (28 Periods)

Elastic behaviour, stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, poison'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, Reynold's number, streamline and turbulent flow. Critical velocity. Bernoulli's theorem and its applications.

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

Heat, temperature, thermal expansion; thermal expansion of solid, liquids and gases, ideal gas laws, isothermal and adiabatic processes; anomalous expansion and its effect, specific heat capacity: Cp, Cv-Calorimetry; change of state-specific latent heat capacity.

Heat transfer-conduction, convection and radiation, Blackbody radiation Kirchoff's law, absorptive and emissive powers and green house effect thermal conductivity, Newton's law of cooling, Wein's displacement law, Stefan's law.

Unit-VIII : THERMODYNAMICS (12 Periods)

Thermal equilibrium and definition of temperature (Zeroth law of thermodynamics).

Heat, work and internal energy. First law of thermodynamics.

Second law of thermodynamics-Reversible and irreversible processes.

Heat engines and refrigerators.

Unit-IX : BEHAVIOUR OF PERFECT GAS AND KINETIC THEORY (8 Periods)

Equation of state of 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; degree of freedom, law of equipartition of energy (statement only) and application to specific heat of gases, concept of mean free path, Avogadro's number.

Unit-X : OSCILLATIONS AND WAVES (28 Periods)

Periodic motion-Period, frequency, displacement as a function of time. Periodic functions.

Simple Harmonic motion (SHM) and its equation, phase; oscillations of a spring-restoring froce and force constant, energy in SHM-kinetic and potential energies. Simple pendulum-derivation of expressions for its time period; free, forced and damped oscillations (qualitative ideas only) resonance.

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.

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PHYSICS

PRACTICAL

CLASS - XI

Note : A. Every student will perform 15 experiments (8 from section A and 7 from section B). 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 8 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^2 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 horizotal surface.

10. To find the downward force, along an inclined plane, acting on a roller due to gravitational pull of the earth and study in relationship with the angle of inclination by plotting graph between force and sinθ.

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 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 7 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 extention.
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 affacting 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. Text Book of Physics for Class XI
Part I & II
Published by : The Council of Higher Secondary Education, Manipur with copy right from NCERT, New Delhi.

REFERENCE BOOKS:

1. A Textbook of Physics Book-I
by : Stalin Malhotra
Published by: Macmillan Publishers India Pvt. Ltd.
2. Modern's abc of Physics for Class XI
By: Satish K. Gupta
Published by : Modern Publishers, Jalandhar City.
3. Senior School Practical Physics Vol. I
By: K.K. Mohindroo
Published by: Pitambar Publishing Company Pvt. Ltd.,
New Delhi - 110005
4. A Textbook of Practical Physics for Class XI
By: O. Kuber Singh
Published by: Writers Book Store, Paona Bazar, Imphal
5. Dinesh Practical Manual in Physics for Class XI
By: Navdeep Sharma
Published by: S. Dinesh & Co.
6. Pradeep's Fundamental Physics
By: K.L. Gomber and K.L. Gogia
Published by : Pradeep Publications,
Jalandhar - 144008
7. Dinesh New Millennium Physics for Class XI
By: S.K. Sharma
Published by: S. Dinesh & Co., Jalandhar City.
8. Physics for Class XI Vol. I & Vol. II
By: Satya Prakash
Published by: V.K. (India) Enterprises,
New Delhi - 110002.

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DESIGN OF QUESTION PAPER

Subject : PHYSICS
Unit/Paper : Theory
Class : XI
Time : 3 Hours
Full Marks : 70

Essay/Long Answer (E/LA)	3	60	15	21
Short Answer (SA-I)	7	42	21	30
Short Answer (SA-II)	10	40	20	29
Very Short Answer (VSA)	10	30	10	14
MCQ	4	8	4	6
Total:	34	180 m	70	100

I **WEIGHTAGE TO OBJECTIVE**

Objectives			Marks	Percentage	
Knowledge (K)			14	20	
Understanding (U)	Physical World and Measurement		28	40	03 5
Application (A)	Kinematics	Including Analysis, Synthesis and Evaluation	28	40	10 14
Skill (S)	Laws of Motion				10 14
Total :	Work, Energy and Power		70	100	06 9
	Motion of Systems of Particles and Rigidity Body				06 9
	Gravitation				05 7
	Properties of Bulk Matter				10 14
	Thermodynamics				05 7
	Behaviors of Perfect Gas and Kinetics Theory				05 7
	Oscillations and Waves				10 14
	Total :				70 100

II **WEIGHTAGE TO FORM OF QUESTIONS**

Form of Questions	No. of question	Time (in minute)	Marks	Percentage

III **WEIGHTAGE TO CONTENT:**

	CONTENTS	Marks	Percentage
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

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

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IV **SCHEME OF SECTIONS : NIL**

V **SCHEME OF OPTIONS** : Internal option may be given in Essay Type Question only.

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
Total			**6**	**6**	**3/2**	**7/8**	**8**	**30**	**180**

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	08
II.	Current Electricity	07
III.	Magnetic effects of current and Magnetism	08
IV.	Electro magnetic induction and Alternating current	08
V.	Electromagnetic waves	03
VI.	Optics	14
VII.	Dual nature of matter and Radiations	04
VIII.	Atom and Nuclei	06
IX.	Electronic Devices	07
X.	Communication systems	05
	Total	**70**

Unit-I : ELECTROSTATICS (25 Periods)

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

Electric flux, statement of Gauss's theorem and its application 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, 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 stored in a capacitor. Van de Graaff generator.

Unit-II: CURRENT ELECTRICITY (22 Periods)

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), elecrical energy and power, resistivity and conductivity.

Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors, temperature dependence of resistance.

Internal resistance of a cell, potential differance and emf of a cell, combination of cells in series and parallel. Elementary idea of secondary cells.

Kirchhoff's law and simple application. Wheatstone's bridge, meter bridge.

Potentiometer-principle and its applications to measure potential difference and for comparing emf of two cells; measurement of internal resistance of a cell.

Unit-III: MAGNETIC EFFECTS OF CURRENT AND MAGNETISM (25 Periods)

Concept of magnetic field, Oersted's experiment.

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

Ampere's law and its applications to infinitely long straight wire, straight and toroidal solenoids.

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

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 a uniform magnetic field; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter.

Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. 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; bar magnet as an equivalent solenoid, magnetic field lines. Earth's magnetic field and magnetic elements; para, dia and ferromagnetic substance, with examples. Electromagnets and factors affecting their strengths, permanent magnets.

Unit-IV: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT: (20 Periods)

Electromagnetic induction; Faraday's laws, induced emf and current; Lenz's Law, Eddy currents, self and mutual induction.

Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current.

AC generator and transformer.

Unit-V: ELECTROMAGNETIC WAVES (4 Periods)

Need for displacement current.
Electromagnetic waves and their characteristics (qualitative ideas only).
Transverse nature of electromagnetic waves.
Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.

Unit-VI: OPTICS (30 Periods)

Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, Combination of thin lenses in contact, combination of a lens and mirror. Refraction and dispersion of light through a prism.

Scattering of light-blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Optical instruments: Human eye, image formation, and accommodation, correction of eye defects (myopia, hypermetropia, presbyopia and astigmatism) using lenses. Microscopes and astronomical telescopes reflecting and refracting and their magnifying powers.

Wave optics: wave front and Huygen's principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygen's principle. Interferance, Young's double slit experiment and expression for fringe width, coherent sources and sustained interferance of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscope and astronomical telescope. Polarisation, plane polarised, light; Brewster's law, uses of plane polarised light and polaroids.

Unit-VII: DUAL NATURE OF MATTER AND RADIATION (8 Periods)

Dual nature of radiation. Photoelectric effect, Hertz Lenard's observations; Einstein's photoelectric equation-particle nature of light. Matter waves-wave nature of particles, De Broglie relation. Davisson-Germer experiment (experimental detials should be omitted; only conclusion should be explained).

Unit-VIII: ATOMS AND NUCLEI (18 Periods)

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr Model levels, Hydrogen spectrum.

Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity-alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.

Unit-IX: ELECTRONIC DEVICES (18 Periods)

Energy bands in solids, conductors, insulators and semiconductors; semiconductor diode- I-V characteristics in forward and reverse bias, diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator. Junction, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

Unit-X: COMMUNICATION SYSTEMS (10 Periods)

Elements of communication system (block diagram only); bandwidth of signals (speech, TV and digital data); bandwidth of transmission medium. Propagation of electromagnetic waves in the atmosphere, sky and space wave propagation. Need for modulation. Production and detection of an amplitude-modulated wave.

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PHYSICS

PRACTICAL

CLASS - XII

Note : A. Every student will perform at least 15 experiments (7 from section A and 8 from section B). The activities mentioned here should only be for the purpose of demonstration. One project of three 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 and Viva base on the project : 5 Marks

Practical record of experiments : 5 Marks

Viva on experiments : 2+2=4 Marks

Total = 30 Marks

Section-A

EXPERIMENTS:

(Any 7 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 combination (series/parallel) of resistances using a matter bridge.
4. To compare the emf of two given primary cells using potentiometer.
5. To determine the internal resistance of given primary cell using potentiometer.
6. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.
7. To convert a given galvanometer (of known resistance and figure of merit) into an ammeter and volmeter of desired range and to verify the same.
8. 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 8 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 I/u and I/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.
9. To draw the characteristic curve of a Zener diode and to determine its reverse break down voltage.
10. To study the characteristics of a common - emitter npn or pnp transistor and to find out the values of current and voltage gains.

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 Polariod.
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. Text Book of Physics for Class XII
Part I & II
Published by : The Council of Higher Secondary Education, Manipur with copy right from NCERT, New Delhi.

REFERENCE BOOKS:

1. A Textbook of Physics Book-II
by : Stalin Malhotra
Published by: Macmillan Publishers India Pvt. Ltd.
2. Modern's abc of Physics for Class XII
By: Satish K. Gupta
Published by : Modern Publishers, Jalandhar City.
3. Senior School Practical Physics Vol. II
By: K.K. Mohindroo
Published by: Pitambar Publishing Company Pvt. Ltd.,
New Delhi - 110005
4. A Textbook of Practical Physics for Class XII
By: O. Kuber Singh
Published by: Writers Book Store, Paona Bazar, Imphal
5. Dinesh Practical Manual in Physics for Class XII
By: Navdeep Sharma
Published by: S. Dinesh & Co.
6. Pradeep's Fundamental Physics
By: K.L. Gomber and K.L. Gogia
Published by : Pradeep Publications,
Jalandhar - 144008
7. Dinesh New Millennium Physics for Class XII (Vol. I & II)
By: S.K. Sharma & R. Jerath
Published by: S. Dinesh & Co. Jalandhar City.
8. Physics for Class XII Vol. I & Vol. II
By: Satya Prakash
Published by: V.K. (India) Enterprises,
New Delhi - 110002

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DESIGN OF QUESTION PAPER

Subject : PHYSICS
Unit/Paper : Theory
Class : XII
Time : 3 Hours
Full Marks : 70

I

WEIGHTAGE TO OBJECTIVE

Objectives		Marks	Percentage
Knowledge (K)		14	20
Understanding (U)		28	40
Application (A) / Skill (S)	Including Analysis, Synthesis and evaluation	28	40
Total :		70	100

II

WEIGHTAGE TO FORM OF QUESTIONS:

Form of Questions	No. of question	Time (in minute)	Marks	Percentage
Essay/Long Answer (E/LA)	3	60	15	21
Short Answer (SA-I)	7	42	21	30
Short Answer (SA-II)	10	40	20	29
Very Short Answer (VSA)	10	30	10	14
MCQ	4	8	4	6
Total:	34	180 m	70	100

III

WEIGHTAGE TO CONTENT:

	CONTENTS	Marks	Percentage
1.	Electrostatics	08	11
2.	Current Electricity	07	10
3.	Magnetic Effects of Current and Magnetism	08	11
4.	Electromagnetic Induction and Alternating Current	08	11
5.	Electromagnetic Waves	03	5
6.	Optics	14	20
7.	Dual Nature of Matter and Radiations	04	6
8.	Atoms and Nuclei	06	9
9.	Electronic Devices	07	10
10.	Communication Systems	05	7
	Total :	70	100

IV **SCHEME OF SECTIONS : NIL**

V **SCHEME OF OPTIONS** : Internal option may be given in Essay Type Question only.

VI

DIFFICULTY LEVEL:

Difficulty : 20%
Average : 50%
Easy : 30%

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

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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	
Total			**6**	**6**	**3/2**	**7/8**	**8**	**30**	**180**

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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