

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), electrical 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 difference 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. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference 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 details 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 5 Marks

Viva base on the project :

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 meter 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 voltmeter 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 $1/u$ 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.
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 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. 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. Gomer 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

