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FOR PUNJAB CLASS 12 PREPARATION

PSEB 12th Class Syllabus 2027 Physics

EXAM	YEAR	TYPE	SUBJECT
Punjab Class 12	2027	Syllabus	Physics

Class-XII

PHYSICS

2026-27

Time3hrs

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

Unit-1:Electrostatics

Electric Charges; basic properties of electric charge (addition of charges, quantisation of charges and their Conservation)

Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and contineous charge distribution.

Electrical field, electric field due to a point charge, electric field due to system of charge, physical significance of electric field, electric-field lines; electric dipole, electric field due to a dipole;(on its axis, on equatorial plane) physical significance of dipoles; torque on a dipole in uniform electric field. Electric field due to continuous charge distribution.

Electric flux, statement of Gauss's theorem proof of Gauss's theorem for a charge enclosed in sphere, and its applications to find electric field due to infinitely long straight wire, uniformly charged infinite thin plane sheet and uniformly charged thin spherical shell (Field inside and outside).

Electric potential, potential difference, electric potential due to a point charge, potential due to an electric dipole with special cases for axil and equatorial plane and system of charges; equipotential surfaces, its properties, relation between field and potential electrical potential energy of a system of two point charges, potential energy in external field and of electric dipole in an electrostatic field.

Conductors and insulators, electrostatics of conductors, free charges and bound charges inside aconductor. Electrostatic shielding its uses, 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.

Unit-II: Current Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity, drift of electron mobility and their relation with electric current: Ohm's law, limitations of Ohm's law electrical resistance. V-1 characteristics (linear and non linear), electrical energy and power, electrical resistivity and conductivity. temperature dependence of resistance and resistivity. Internal resistance of a cell, potential difference and emf of cell, combination of cells in series and in parallel.

Kirchhoff's laws and simple applications of Wheatstone bridge, meter bridge.

Unit-III: Magnetic Effects of Current and Magnetism

Concept of magnetic field. Oersted's experiment;

Biot-savart law and its application to find mangnetic field on the axis of a current carrying circular loop, Ampere's circuital law (no proof) and its applications to infinitely long straight wire, straight solenoids.

Forceon a moving charge in uniform magnetic and electric fields, motion in a magnetic field.

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; moving coil galvanometers- its current sensitivity and conversion to ammeter and voltmeter.

Current loop as a magnetic dipole and its magnetic dipolemoment. 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; magnetism and Gauss's law; Earth's

magnetisation and magnetic intensity, magnetic properties of materials, Para-, dia-and ferro- magnetic substances with examples,

Unit-IV: Electromagnetic Induction and Alternating Currents

Electromagnetic induction, Faraday's and henry experiments, magnetic flux,Faraday laws, induced emf and current, Lenz's Law and conservation of energy, motional emf, Self and mutual inductance.

Alternating current, phasors, ac applied across resistance, ac applied across inductor, ac applied across capacitor, ac applied across LCR, (qualitative treatment only), LCR series circuit resonance; power in AC circuit, wattles current.

AC generator and transformer.

Unit-V: Electromagnetic Waves

Need for displacement current, Electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves.

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

Unit-VI:Optics

Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibers, refraction at spherical surfaces, refraction by lens, lenses, thin lens formula/equation, lens- maker's formula. Magnification, power of a lens, combination of thin lenses in contact, combination of lens and

Refraction through a prism.

Optical instruments:

Microscopes and astronomical tetescopes (reflecting and refracting) and their magnifying powers.

Waves optics :

wave front and Huygens' Principle, reflection and refraction of plane wave at a plane surface using Huygens' Principle, wave fronts. Proof of laws of reflection and refraction using Huygens 'Principle. Interference Young's double slit experiment and expression for fringe width, coherent sources and incoherent addition of waves Diffraction due to a single slit, width of central maximum.. Polarisation, uses of plane polarised light and Polaroids.

Unit-VII: Dual nature of Matter and Radiation

Electron emission, Photoelectric effect, Hertz and Lenard's observations'; experimental study of photoelectric effect, and wave theory of light, Einstein's photoelectric equation, particle nature of light, the photon, Matter waves-wave nature of particles, de Broglie relation.

Unit-VIII: Atoms &Nuclei

Alpha-particle scattering experiment; Rutherford's model of

atom; Bohar modal of hydrogen atom, expression for radius, velocity and energy of electron in orbit, energy levels, line spectrum of hydrogen atom, atomic spectra,de- Broglie's explanation of Bohr' s second postulate of quantization.

Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity- alpha, beta and gamma particles/rays. Mass-energy relation, mass-defect; binding energy per nucleon and its variation with mass number; nuclear fission, nuclear force, Nuclear energy, Nuclear Fusion.

Unit-IX: Electronic Devices

Classification of metal insulator and semiconductor, Energy bands in solids (qualitative idea only) conductor, insulators and Semiconductors; intrinsic and extrinsic semiconductors, p-n junction, semiconductor Diode-1-V characteristics in forward and reverse bias, diode as a rectifier,

STRUCTURE OF PAPER (PRACTICAL)

Time: 3 hrs. **Total: 25 Marks**

Two experiment	10Marks
Record of Activities	2 Marks
Viva on Activities	3 Marks
Record of Experiments	2 Marks
Viva of Experiments	3 Marks
Investigatory Project	5 Marks
TOTAL	25

PRACTICALS SYLLABUS

Experiments

SECTION-A

1. To determine resistance per unit length of a given wire by plotting a graph of potential difference versus current.
2. To find resistance of a given wire using meter bridge and hence determine the specific resistance of its material.
3. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.
4. To convert the given galvanometer of known resistance and figure of merit into an ammeter and voltmeter of desired range and to verify the same.

SECTION-B

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

ACTIVITIES

SECTION-A

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

   (i) The use of an improvised fuse that melts with the flow of a certain current through it and

   (ii) Different kinds of fuses used in everyday life.
8. To demonstrate that a current measuring device has finite non- zero resistonce. (measurement of resistance of an ammeter).
9. To demonstrate that a voltage measuring device has non- infinite resistance (measurement of resistance of an voltmeter).
10. To show the magnetic field lines with the help of iron fillings of bar magnet solenoid.
11. To show the production of induced emf. in a coil due to movement of (i) a magnet towards and away from it (ii) similar coil carrying current towards & away from it.
12. To show that there are two kinds of charges and that like charges repel and unlike charges attract each other.
13. To demonstrate that a large emf is induced when direct current is switched off in an inductive circuit.
14. Make a solenoid for study of its magnetic field.

SECTION-B

1. To identify a diode, 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 ad 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 observe refraction and lateral deviation of a beam of light incident obliquely on a glass stab.
4. To study the nature arid 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).
5. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.
6. To observe polarization of light using two Polaroids.
7. To observe diffraction of light due to a thin slit.