Cambridge International School, Mohal, Kullu

Class - XII

Subject – Physics, 2020-21

Subject Code (042)

TOPIC	LEARNING OBJECTIVES	MONTH	ASSESMENT/ ASSIGNMENT
1) ELECTROSTATICS	Electric charge and their conservation. Coulomb's law-force between two point charges, force 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 dipole; torque on a dipole in a uniform electric field. Electric flux, statement of Gauss' theorem and its applications to find field due to infinity 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 dipoles in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization, capacitors and capacitance, combination of capacitor in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor.	**FEBRUARY-MARCH**	Knowledge based questions Conceptual questions HOTS **SKLLS** Analytical skills Reasoning skills Numerical solving skills
2) CURRENT ELECTRICITY	Electric current, flow of electric charges in a metallic conductor, drift velocity and mobility and their relation with electric current; Ohm's law, electrical resistance, V-1 characteristics (linear and non-linear), electrical energy and power, electrical 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 e.m.f of a cell, combination of cells in series and in parallel. Kirchhoff's laws and simple applications. Wheatstone bridge, meter bridge. Potentiometer-principle and applications to measure potential difference , and for comparing e.m.f of two cells; measurement of internal resistance of a cell.	**APRIL- JUNE**	Group discussion Conceptual questions Pen paper test Solving Numerical
3) MAGNETIC EFFECTS OF CURRENT AND MAGNETISM	Concept of magnetic field. Oersted's experiment. Biot-Savart's 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 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.		Numerical solving skills Practical skills Pen paper test Assignment on numerical Solving previous years C.B.S.E questions question Analytical skills Reasoning skills Numerical solving skills Lab work

3) MAGNETIC EFFECTS OF CURRENT AND MAGNETISM (Cont.) 4) ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS	Earth's magnetic field and magnetic elements. Para-, dia- and ferro-magnetic substances with examples. Electromagnets and factors affecting their strengths. Permanent magnets. Electromagnetic induction; Faraday's law, induced e.m.f and current; Lenz's law, Eddy currents. Self and mutual inductance. Alternating currents, peak and r.m.s value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in a.c. circuitswattless current. a.c .generator and transformer.	**JULY- AUGUST**	Knowledge based questions HOTS Numerical solving skills Conceptual understanding of the subject matter
5) ELECTROMAGNETIC WAVES 6) OPTICS	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. Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and 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 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) using lenses. Microscopes and 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 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 microscopes and astronomical telescopes. Polarisation, plane polarised light; Brewster's law, uses of plane polarised light and polaroids.	**AUGUST-** **SEPTEMBER**	MCQ test Assignment on numerical Solving previous year C.B.S.E question Numerical solving skills Analytical skills Practical skills
7) DUAL NATURE OF MATTER AND RADIATION	Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observation; Einstein's photoelectric equation-particle nature of light. Matter waves-wave nature of particles, de Broglie relation. Davisson-Germer experiment.	**OCTOBER**	Pen paper test Conceptual understanding
8) ATOMS AND NUCLEI	Alpha-particle scatting experiment; Rutherford's model of atom; Bohr model, energy 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.		Knowledge based questions Questions from previous C.B.S.E exams
9) ELECTRONIC DEVICES	Energy bands in solids (qualitative) conductors, insulators and semiconductors; semiconductor diode l-V characteristics in forward and reverse bias, diode as a rectifier; I-V characteristics of LED, photodiode, solar cell, and Zener diode;		Basic understanding of nuclear

	Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor and amplifier (Common emitter configuration) and oscillator. Logic gates (OR, and, not, nand and nor). Transistor as a switch.	**NOVEMBER**	energy Conceptual understanding of elementary electronics and physics behind communication.

PRACTICALS

Section A

April-June

1. To find resistance of a given wire using metre 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 metre bridge.
4. To compare the emf 's 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.

Section B

August-November

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 deviation for a given prism by plotting a graph between the angle of incidence and the angle of deviation.
6. To draw the I-V characteristics curves of a p-n junction in forward bias and reverse bias.

Evaluation scheme for Practical Examination:

- Two experiments one from each section — 8+8 Marks
- Practical record — 6 Marks
- Project — 3 Marks
- Viva on experiments and project — 5 Marks