West Bengal Council of Higher Secondary Education.

SYLLABUS SESSION:- 2021-2022.

CLASS-XII. SUBJECT:-. PHYSICS(PHYS)

MARKS:-100. THEORETICAL MARKS :-70

Unit-I. Electrostatics

Chapter-1:. Electric charges and Coulomb's Law.

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

Chapter-2: Electric field and Gauss's Theorem.

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

Electric flux, statement of Guess's theorem and its applications to find field due to infinitely long straight wire and uniformly charged infinite plane sheet.

Chapter-3: Electrostatic potential.

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

Chapter-4: Capacitors and Dielectrics.

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.

Unit – II. Current Electricity.

Chapter-1:- Electric Current and Electric cell.

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 E.M.F. of a cell, combination of cells in series and in parallel.

Chapter-2: Electric network rules and electrical measurements.

Kirchhoff's laws and simple applications. Wheatstone bridge and metre bridge.

Potentiometer ; principle and it's applications to measure potential difference and for comparing e.m.f. of two cells, measurement of internal resistance of a cell.

Unit – III. Magnetic effect of current and Magnetism.

Chapter-1: Concept and laws of magnetic field.

Concept of magnetic field, Orested's experiment. Biot-Savart law and it's application to current carrying circular loop.

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

Chapter-2: Force on a Charge and current.

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

Chapter-3: Magnetic Dipole and Earth's Magnetism.

Current loop as a magnetic dipole and it's magnetic dipole moment. Magnetic dipole moment of a resolving electron. Bar magnet as an equivalent solenoid, magnetic field lines; earth's magnetic field and magnetic elements.

Unit- IV. Electromagnetic Induction and Alternating Currents.

Chapter-1: Electromagnetic Induction.

Electromagnetic Induction; Faraday's law. Induced emf and current; Lens's law, Eddy currents, Self and mutual inductance.

Chapter-2: Alternating Current.

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.

AC generator and transformer.

Unit-V. Electromagnetic waves.

Chapter-1:. Electromagnetic Waves.

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 :- Part A: Ray Optics and Optical Instrument.

Chapter-1: Refraction of light.

Refraction of light, total internal reflection and it's 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. Refraction of light through a prism.

chapter-2:. Optical Instruments.

Visual angle and magnifying power. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers.

Part B:- Wave Optics:-

Chapter-1:- Propagation principle of wavefront

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.

Chapter-2: Interference of light.

Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light.

Chapter-3: Diffraction of light.

Diffraction due to a single slit, width of central maximum.

Unit -VII. Dual Nature of Matter and Radiation.

Chapter-1: Particles Nature of Radiation.

Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light.

Chapter-2: Wave Nature of Matter.

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

Unit – VIII. Atoms and Nuclei

chapter-1: Atoms

Alpha particle scattering experiment: Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.

Chapter-2:- Nuclei.

Composition and size of nucleus , Mass-energy relation, mass defect; binding energy per nucleon and it's variation with mass number; nuclear fission and fusion.

Unit- IX. Electronic Devices.

Chapter-1: Band theory of solids

Energy bands in conductors , insulators and Semiconductors.

Chapter-2:-. semiconductor Electronics.

semiconductor diode, I-V characteristics of diode in forward and reverse bias, diode ad a rectifier.

Special purpose p-n junction diodes; LED, photodiode, solar cell and their Characteristics.

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QUESTION STRUCTURE AND MARK DISTRIBUTION

Class – XII Subject-Physics (PHYS)

Session-2021-2022

		Section I		Section II			
Sl No	Unit	MCQ	Very Short Answer Question.	Short Answer Questions I	Short Answer Questions Ii	Long Answer Questions	Total Marks
		1 mark	1 mark	2 marks	3 marks	5 mark	
1	Electrostatics	1X2=2	00	2×1=2	3×2=6	00	10
2	Current Electricity	1×1=1	00	2×1=2	00	5×1=5	08
3	Magnetic Effect of current and magnetism	1×1=1	1×1=1	00	3×1=3	5×1=5	10
4	Electromagnetic induction and Alternative current	1×1=1	00	2×1=2	3×1=3	00	06
5	Electromagnetic waves	1×1=1	00	2×1=2	00	00	03
6	Optics: Ray Optics and instruments.	1×2=2	00	00	3×2=6	00	8
	Optics: wave optics.	1×1=1	1×1=1	00	00	5×1=5	7
7	Dual Nature of radiation and matter	1×1=1	00	2x1=2	3×1=3	00	6
8	Atoms and Nuclei	1×2=2	1×1=1	00	3×1=3	00	6
9	Electronic Devices	1×2=2	1×1=1	00	3×1=3	00	6
Total.		14	4	10	27	15	70