M.D. Govt. Girls College, Dadupur Roran (Karnal)

LESSON PLAN (w.e.f. February 2025)

Name: Mr. Subash Chand (Assistant Professor) **Subject: Physics**

Class: B.Sc. I year 2nd Sem (C.S.) **Paper: Electricity, Magnetism and EM Theory**

Month/Week	Contents
February	**Unit – I**
	Vector Background and Electric Field: Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of a vector and their physical significance, Flux of a vector field, Divergence and curl of a vector and their physical significance, Gauss"s divergence theorem, Stoke"s theorem. Conservative nature of Electrostatic Field, Electrostatic Potential. Potential as line integral of field, potential difference Derivation of electric field E from potential as gradient. Derivation of Laplace and Poisson equations. Electric flux, Gauss"s Law, Differential form of Gauss"s law and applications of Gauss"s law. Mechanical force of charged surface, Energy per unit volume.
March	**Unit –II**
	Magnetic Field : : Biot-Savart law and its simple applications: straight wire and circular loop, Current Loop as a Magnetic Dipole and its Dipole Moment, Ampere"s Circuital Law and its applications to (1) Solenoid and (2) Toroid, properties of B: curl and divergence , Magnetic Properties of Matter: Force on a dipole in an external field, Electric currents in Atoms, Electron spin and Magnetic moment , types of magnetic materials, Magnetization vector (M), Magnetic Intensity (H), Magnetic Susceptibility and permeability, Relation between B, H and M, Electronic theory of dia and paramagnetism, Domain theory of ferromagnetism (Langevin"s theory), Cycle of Magnetization- B-H curve and hysteresis loop: Energy dissipation, Hysteresis loss and importance of Hysteresis Curve.
April	**UNIT-III**
	Time varying electromagnetic fields: Electromagnetic induction, Faraday"s laws of induction and Lenz"s Law, Self-inductance, Mutual inductance, Energy stored in a Magnetic field. Derivation of Maxwell"s equations, Displacement current, Maxwell"s equations in differential and integral form and their physical significance. **Electromagnetic Waves:** Electromagnetic waves, Transverse nature of electromagnetic wave, energy transported by electromagnetic waves, Poynting vector, Poynting"s theorem. Propagation of Plane electromagnetic waves in free space & Dielectrics
May	**Unit –IV**
	DC current Circuits: Electric current and current density, Electrical conductivity and Ohm"s law (Review), Kirchhoff"s laws for D.C. networks, Network theorems: Thevenin"s theorem, Norton theorem, Superposition theorem **Alternating Current Circuits:** A resonance circuit, Phasor, Complex Reactance and Impedance, Analysis for RL, RC and LC Circuits, Series LCR Circuit: (1) Resonance, (2) Power Dissipation (3) Quality Factor and (4) Band Width, Parallel LCR Circuit.

Incharge

M.D. Govt. Girls College, Dadupur Roran (Karnal)

LESSON PLAN (w.e.f. February 2025)

Name: Mr. Subash Chand (Assistant Professor) **Subject: Physics**

Class: B.Sc. II year 4th Sem (C.S.) **Paper: Waves and Optic**

Month	Contents
February	**Unit – I**
	INTERFERENCE **Interference by Division of Wave front:** Young"s double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determine the wavelength of sodium light and thickness of a mica sheet, phase change on reflection. **Interference by Division of Amplitude:** Plane parallel thin film, production of colors in thin films, classification of fringes in films, Interference due to transmitted light and reflected light, wedge shaped film, Newton's rings.
March	**Unit –II**
	DIFFRACTION **Fresnel's diffraction:** Huygens-Fresnel's theory, Fresnel's assumptions, rectilinear propagation of light, diffraction at a straight edge, rectangular slit and diffraction at a circular aperture. Diffraction due to a narrow slit, diffraction due to a narrow wire. **Fraunhoffer diffraction:** Single slit diffraction, double slit diffraction, plane transmission grating spectrum, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating.
April	**UNIT-III**
	POLARIZATION Polarization: Polarisation by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction, Huygens"s wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz).
May	**Unit –IV**
	Lasers: Basic concept of absorption and emission of radiations, amplification and population inversion; Main components of lasers: (i) Active Medium (ii) Pumping (iii) Optical Resonator; Properties of laser beam: Monochromaticity, Directionality, Intensity, Coherence (Spatial & Temporal coherence); Metastable state, Excitation mechanism and Types of Lasers (He-Ne Laser & Ruby Laser), Applications of Lasers **Fibre optics:** Optical fibres and their properties, Principal of light propagation through a optical fibre, Acceptance angle and numerical aperture, Types of optical fibles: Single mode and multimode fibres, Advantages and Disadvantages of optical fibres, Applications of optical fibres, Fibre optic sensors: Fibre Bragg Grating).

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