Name of the Assistant/Associate Professor Sundeep Kumar
Department of Physics
Class and Semester: B.Sc I year (2 Semester) Session: 2025-26

Sub Lesson Plan: 18 Weeks (Jan 9, May 14, 26)

Week I (9 Jan to 10 Jan) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: **Unit 1 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,

Week 2 (12 Jan to 17 Jan) Prerequisites: Electricity, Magnetism and EM Theory
Discussion: Gauss‟s divergence theorem, Stoke‟s theorem. Conservative nature of Electrostatic Field, Electrostatic Potential, Potential as line integral of field,

Week 3 (19 Jan to 24 Jan) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: potential
difference Derivation of electric field E from potential as gradient. Derivation of Laplace and Poisson equations. Electric flux, Gauss‟s Law,

Week 4 (27 Jan to 31 Jan) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: Differential form of Gauss‟s law and
applications of Gauss‟s law. Mechanical force of charged surface, Energy per unit volume.

Week 5 (2 Feb to 7 Feb) Prerequisites: Electricity, Magnetism and EM Theory
Discussion:**Unit-2** Magnetic Field: Biot-Savart law and its simple applications: straight wire and circular
loop, Current Loop as a Magnetic Dipole and its Dipole Moment,

Week 6 (9 Feb to 14 Feb) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: Ampere‟s Circuital Law
and its applications (1) Solenoid and (2) Toroid, properties of B: curl and divergence,

Week 7 (16 Feb to 21 Feb) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: 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,

Week 8 (23 Feb to 28 Feb) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: 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.

Week 9 (9 March to 14 March) Prerequisites: Electricity, Magnetism and EM Theory
Discussion: **Unit-3** Time varying electromagnetic fields: Electromagnetic induction,Faraday‟s laws of induction and Lenz‟s Law, Self-inductance, Mutual inductance,

Week 10 (16 March to 21 March) Prerequisites: Electricity, Magnetism and EM Theory
Discussion: Energy
stored in a Magnetic field, Derivation of Maxwell‟s equations,

Week 11 (24 March to 28 March) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: Displacement current,
Maxwell‟s equations in differential and integral form and their physical significance.

Week 12 (30 March to 4 Apr)Prerequisites: Electricity, Magnetism and EM Theory
Discussion: Electromagnetic Waves: Electromagnetic waves, Transverse nature of electromagnetic
wave, energy transported by electromagnetic waves,

Week 13 (6 Apr to 11 Apr) Prerequisites: Electricity, Magnetism and EM Theory
Discussion: Poynting vector, Poynting‟s theorem.
Propagation of Plane electromagnetic waves in free space & Dielectrics

Week 14 (13Apr to 18 Apr) Prerequisites: Electricity, Magnetism and EM Theory
Discussion: **Unit-4** DC current Circuits: Electric current and current density, Electrical conductivity and
Ohm‟s law (Review), Kirchhoff‟s laws for D.C. networks,

Week 15 (20 Apr to 25 Apr) Prerequisites: Electricity, Magnetism and EM Theory
Discussion: Network theorems: Thevenin‟s
theorem, Norton theorem, Superposition theorem.

Week 16 (27 Apr to 2 May) Prerequisites: Electricity, Magnetism and EM Theory
Discussion: Alternating Current Circuits: A resonance circuit, Phasor, Complex Reactance and
Impedance,

Week 17 (4 May to 9 May) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: Analysis for RL, RC and LC Circuits, Series LCR Circuit: (1) Resonance, (2) Power Dissipation (3) Quality Factor

Week 18 (11 May to 14 May) Prerequisites: Electricity, Magnetism and EM Theory

Discussion: (4)Band Width, Parallel LCR Circuit.

Name of the Assistant/Associate Professor Sundeep Kumar
Department of Physics
Class and Semester: B.Sc II year (4 Semester) Session: 2025-26

Sub Lesson Plan: 18 Weeks (Jan 9, May 14, 26)

Week I (9 Jan to 10 Jan) Prerequisites: Waves and Optics
Discussion: **Unit 1** Interference by Division of Wave front: Young‟s double slit experiment, Coherence,
Conditions of interference,

Week 2 (12 Jan to 17 Jan) Prerequisites: Waves and Optics
Discussion: Fresnel's biprism and its applications to determine the
wavelength of sodium light and thickness of a mica sheet, phase change on reflection.

Week 3 (19 Jan to 24 Jan) Prerequisites: Waves and Optics

Discussion: 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,

Week 4 (27 Jan to 31 Jan) Prerequisites: Waves and Optics
Discussion: Interference due to transmitted light and
reflected light, wedge shaped film, Newton's rings

Week 5 (2 Feb to 7 Feb) Prerequisites: Waves and Optics
Discussion:**Unit-2** DIFFRACTION: Fresnel‟s diffraction: Huygens-Fresnel‟s theory, Fresnel‟s assumptions,

Week 6 (9 Feb to 14 Feb) Prerequisites: Waves and Optics
Discussion: rectilinear
propagation of light, diffraction at a straight edge, rectangular slit and diffraction at a
circular aperture.

Week 7 (16 Feb to 21 Feb) Prerequisites: Waves and Optics
Discussion: Diffraction due to a narrow slit, diffraction due to a narrow wire.

Week 8 (23 Feb to 28 Feb) Prerequisites: Waves and Optics

Discussion: Fraunhoffer diffraction: Single slit diffraction, double slit diffraction, plane transmission grating spectrum,

Week 9 (9 March to 14 March) Prerequisites: Waves and Optics
Discussion: dispersive power of grating, limit of resolution, Rayleigh's criterion,
resolving power of telescope and a grating.

Week 10 (16 March to 21 March) Prerequisites: Waves and Optics
Discussion: **Unit-3** POLARIZATION
Polarization: Polarisation by reflection, refraction and scattering, Malus Law,

Week 11 (24 March to 28 March) Prerequisites: Waves and Optics

Discussion: Law, Phenomenon
of double refraction, Huygens‟s wave theory of double refraction (Normal and oblique incidence),

Week 12 (30 March to 4 Apr)Prerequisites: Waves and Optics
Discussion: Analysis of polarized Light. Nicole prism, Quarter wave plate and half wave plate,

Week 13 (6 Apr to 11 Apr) Prerequisites: Waves and Optics

Discussion: production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light.

Week 14 (13Apr to 18 Apr) Prerequisites: Waves and Optics
Discussion: Optical activity, Fresnel's theory of optical rotation,
Specific rotation, Polarimeters (half shade and Biquartz).

Week 15 (20 Apr to 25 Apr) Prerequisites: Waves and Optics

Discussion: **Unit-4** Laser :Basic concept of absorption and emission of radiations, amplification and population inversion; Main components of lasers: (i) Active Medium (ii) Pumping (iii) Optical Resonator;

Week 16 (27 Apr to 2 May) Prerequisites: Waves and Optics

Discussion: 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.

Week 17 (4 May to 9 May) Prerequisites: Waves and Optics

Discussion: Fibre optics: Optical fibres and their properties, Principal of light propagation through a optical fibre, Acceptance angle and numerical aperture,

Week 18 (11 May to 14 May) Prerequisites: Waves and Optics

Discussion: Types of optical fibres: Single
mode and multimode fibres, Advantages and Disadvantages of optical fibres, Applications of optical fibres, Fibre optic sensors: Fibre Bragg Grating.

Government College for Women, Pali, Rewari Haryana
Name of the Assistant/Associate Professor Sundeep Kumar
Department of Physics
Class and Semester: B.Sc III year (6 Semester) Session: 2025-26

Sub Lesson Plan: 19 Weeks (Jan 1, May 14, 26)

Week I (1 Jan to 3 Jan) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: **Unit 1** Vector atom model

Week 2 (5 Jan to 10 Jan) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: quantum numbers associated with vector atom model, penetrating and non-penetrating orbits (qualitiative description)

Week 3 (12 Jan to 17 Jan) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: spectral lines in different series of ailkali spectra,
spin orbit interaction and doublet term seperation

Week 4 (19 Jan to 24 Jan) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: n LS or Russel-Saunder Coupling jj coupling
(expressions for inteaction energies for LS and jj coupling required)

Week 5 (27 Jan to 31 Jan) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: Unit-2 Zeeman effect (normal and Anormalous) Zeeman pattern of D 1 and D2 lines of Na-atom

Week 6 (2 Feb to 7 Feb) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: Paschen, Back effect of a single valence electron system. Weak field Strak effect of Hydrogen
atom

Week 7 (9 Feb to 14 Feb) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: Diseete set of electronic energies of molecules. quantisation of Vibrational and ratiational
energies

Week 8 (16 Feb to 21 Feb) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS

Discussion: Raman effect (Quantitative description) Stoke's and anti Stoke's lines

Week 9 (23 Feb to 28 Feb) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: Unit-3 Main features of a laser : Directionality, high intensity, high degree of coherence, spatial and
temporal coherence, Einstein's coefficients and possibility of amplification

Week 10 (9 March to 14 March) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSICS
Discussion: momentum transfer,
life time of a level, kinetics of optical obsorption. Threshold condition for laser emission, Laser
pumping

Week 11 (16 March to 21 March) Prerequisites: ATOMIC MOLECULAR AND LASER PHYSIC
Discussion: He-Ne laser and RUBY laser (Principle, Construction and Working).
Applications of
laser in the field of medicine and industry

Week 12 (24 March to 28 March) Prerequisites: NUCLEAR PHYSICS

Discussion: Unit 1 Nuclear mass and binding energy, systematics nuclear binding energy, nuclear stability, Nuclear
size, spin, parity, statistics magnetic dipole moment, quadrupole moment (shape concept

Week 13 (30 March to 4 Apr)Prerequisites: NUCLEAR PHYSICS

Discussion: Determination of mass by Bain-Bridge, Bain-Bride and Jordan mass spectrograph, Determination
of charge by Mosley law Determination of size of nuclei by Rutherford Back Scattering

Week 14 (6 Apr to 11 Apr) Prerequisites: NUCLEAR PHYSICS
Discussion: Interaction of heavy charged particles (Alpha particles), alpha disintegration and its theory
Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Energetics of alpha
-decay, Range and straggling of alpha particles. Geiger-Nuttal law

Week 15 (13Apr to 18 Apr) Prerequisites: NUCLEAR PHYSICS

Discussion: Introduction of light charged particle (Beta-particle), Origin of continuous beta-spectrum
(neutrino hypothesis) types of beta decay and energetics of beta decay, Energy loss of beta- particles (ionization), Range of electrons, absorption of beta-particles

Week 16 (20 Apr to 25 Apr) Prerequisites: NUCLEAR PHYSICS

Discussion: Interaction of Gamma Ray, Nature of gamma rays, Energetics of gamma rays, passage of Gamma
radiations through matter (photoelectric, compton and pair production effect) electron position
anhilation. Asborption of Gamma rays (Mass attenuation coefficient) and its application

Week 17 (27 Apr to 2 May) Prerequisites: NUCLEAR PHYSICS

Discussion: Nuclear reactions, Elastic scattering, Inelastic scatting, Nuclear disintegration, photoneclear
reaction, Radiative capture, Direct reaction, heavy ion reactions and spallation Reactions, conservation laws. Q-value and reaction threshold.

Week 18 (4 May to 9 May) Prerequisites: NUCLEAR PHYSICS

Discussion: Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators. Ionization chamber, proportional counter, G.M. counter detailed study, scintillation counter and
semiconductor detector.

Week 19 (11 May to 14 May) Prerequisites: NUCLEAR PHYSICS

Discussion: Nuclear Reactors General aspects of Reactor design. Nuclear fission and fusion reactors
(Principles, construction, working and use)

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