Lesson Plan

Name : **Dr. Mukesh Chander (Physics)**

Subject: **Physics**

Class and Section: **B.Sc.-3rd (6th Sem.)**

Paper 1

Jan 2025	Unit 1st	Crystal Structure Introduction Crystalline and glassy forms, liquid crystal crystal structure, periodicity translation vector and axes unit cell, primitive cell Wienger sietz primitive cell symmetry operation for a two dimensional crystal Bravis lattice for two and three dimension crystal plane and miller indices inter planar spacing and numerical crystal structures
Jan 2025	Unit 2nd	Introduction X-Ray and Braggs Diffraction K –spacing and reciprocal lattice and its physical significance reciprocal lattice vectors reciprocal lattice to a simple cubic lattice,b.c.c and f.c.c.
Feb 2025	Unit 3rd	Introduction survey of superconductivity, high and tc superconductor isotopic effect,critical magenetic field, miessner effect London and peppards equation classfication of superconductor BCS Theory and flux quantisation Josephon effect , application and limitation of superconductivity
Feb 2025	UNIT 4th	Introduction to Nano Physics, definition, length scale ,importance of Nano scale and technology history, benefits and challenge in molecular manufacturing molecular assembler concept,vision and objective of nano technology application of nano techonology in different fields

Paper 2

March 2025	Unit 1	Introduction , emission and absorption spectra Bohr Atomic Model spectra of hydrogen atom complete explanation of spectra, Rydberg constant mass shortcoming of Bohr model wilson sommerfieid quantization rule Bohr corresponding model, shortcoming of this model vector atom model various quantum no. associated with vector model and selection rule
March 2025	Unit 2nd	Introduction orbital ,magnetic dipole moment larmor precession and theorem penetrating and non penetrating model quantum defect and spin orbit interaction energy hydrogen fine spectra main feature of alkali spectra and theoretical interpretation absorption spectra of alkali atom intensity rule for doublets comparison of alkali and hydrogen spectra
Apr 2025	unit 3rd	Vector atom model for two valence electron LS Coupling and jj coupling hyperfine structure of spectral line and its origin ,nuclear spin
Apr 2025	Unit 4th	Atoms in external field Zeeman effect,types and lande –g factor Paschen –Back effect of a single valence electron system rotation spectra,vibration spectra and rotator model of diatomic model

Lesson Plan

Name : **Dr. Mukesh Chander (Physics)**

Subject: **Physics**

Class and Section: **B.Sc.-2nd (4th Sem.)**

Name of the Course **Waves and Optics** Course Code B23-PHY-401 Credits Theory(3) Practical(1) Total(4) Contact Hours T3 + P2 = 5 **Max. Marks:100** **Internal Assessment Marks:30** **End Term Exam Marks: 70** **Time:3hrs**	**Internal Assessment: Theory (20 Marks)** Class Participation: **05 Marks** Seminar/presentation/assignment/quiz/class test etc.: **05 Marks** Mid-Term Exam: **10 Marks** **End Term Examination (T) : 50 Marks** **Internal Assessment: Practicum (10 Marks)** Seminar/Demonstration/Viva-voce/Lab records etc.: **10 Marks** **End Term Examination (P) 20 Marks**

Feb 2025	Unit 1 **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
Mar 2025	Unit 2nd **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 aperature. 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
Apr 2025	**unit 3rd** **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 2025	**Unit 4th** **Lasers:** **Fibre optics:**	**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; 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 **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

Practicum

1 To determine Refractive index of the material of a prism using sodium source.
2 Determination of wave length of sodium light using Newton‟s Rings.
3 To determine the dispersive power and Cauchy constants of the material of a prism using Mercury discharge source.
4 Determination of wavelength of sodium light by using a diffraction grating.
5 Resolving power of a telescope.
6 Resolving power of a prism.
7 Resolving power of a grating .
8 Comparison of Illuminating Powers by a Photometer.
9 Measurement of (a) Specific rotation (b) concentration of sugar solution using polarimeter.
12 To find the equivalent focal length of a lens system by nodal slide assembly

Note: Student will perform at least six experiments.

Lesson Plan

Name : **Dr. Mukesh Chander (Physics)**

Subject: **Physics**

Class and Section: **B.Sc.-1st (2nd Sem.)**

Name of the Course **Electricity, Magnetism and EM Theory** Course Code B23-PHY-201 Credits Theory(3) Practical(1) Total(4) Contact Hours T3 + P2 = 5 **Max. Marks:100** **Internal Assessment Marks:30** **End Term Exam Marks: 70** **Time:3hrs**		**Internal Assessment: Theory (20 Marks)** Class Participation: **05 Marks** Seminar/presentation/assignment/quiz/class test etc.: **05 Marks** Mid-Term Exam: **10 Marks** **End Term Examination (T) : 50 Marks** **Internal Assessment: Practicum (10 Marks)** Seminar/Demonstration/Viva-voce/Lab records etc.: **10 Marks** **End Term Examination (P) 20 Marks**
Feb 2025	**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.
Mar 2025	**Magnetic Field: Magnetic Properties of Matter:**	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, 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
Apr 2025	**Time varying electromagnetic fields: Electromagnetic Waves:**	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, 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 2025	**DC current Circuits: Alternating 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. 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.

Practicum

1. Use of Multimeter for measuring Resistance, A.C. and D.C. Voltage and Current, checking of electrical fuses.
2. Determination of Impedance of an A.C. circuit and its verification.
3. Frequency of A.C. mains using an electromagnet.
4. Frequency of A.C. mains Electrical vibrator.
5. High resistance by substitution method.
6. To study the Characteristics of a Series RC Circuit.
7. To study a series LCR circuit and determine its (a) Resonant frequency, (b) Quality factor.
8. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor..
9. Verification of laws of electromagnetic induction.
10. Study of B-H curves of various materials using C.R.O, and determination of various parameters.

Note: Student will perform at least six experiments.

Lesson Plan

Name : **Dr. Mukesh Chander (Physics)**

Subject: **Physics**

Class and Section: **B.A.-1st (2nd Sem.)**

Name of the Course Physics Fundamentals-II **Course Code** B23-PHY-204 **Credits** Theory(2) Practical(1) Total(3) **Contact Hours** T2 + P1 = 4 **Max. Marks:75** **Internal Assessment Marks:20** **End Term Exam Marks: 55** **Time:3hrs**	**Internal Assessment: Theory (15 Marks)** Class Participation: **04 Marks** Seminar/presentation/assignment/quiz/class test etc.: **04 Marks** Mid-Term Exam: 07 **Marks** **End Term Examination (T) : 35 Marks** **Internal Assessment: Practicum (05 Marks)** Seminar/Demonstration/Viva-voce/Lab records etc.: **05 Marks** **End Term Examination (P) 20 Marks**

Feb 2025	**Wave motion and applications**	Wave motion and applications – Waves - definition, types (mechanical and electromagnetic wave), Wave motion - transverse and longitudinal with examples, terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length. Simple harmonic motion (SHM): definition, examples, free, forced and resonant vibrations with examples.
Mar 2025	**Light and ray optics**	Light and ray optics – Definition, nature, speed and properties of light, reflection and refraction of light, laws of reflection and refraction, examples and applications in daily life, reflection through mirrors (plane, convex and concave) and refraction through lenses (concave and convex), refractive index, refraction of light through prism (dispersion of light), rainbow formation, twinkling of stars, advance sunrise and delayed sunset.
Apr 2025	**Electricity -**	Electricity - electric charge, types of charges, unit of charge, frictional electricity, Coulomb's law of electrostatics, electric field, electric lines of force, electric field intensity (definition and properties), electric flux, Gauss's law (statement and formula only), electric current, units of electric current, direct and alternating current, measurement of current, resistance, resistivity and Ohm's law, electric potential, potential difference and emf.
May 2025	**Electric components and circuits**	Electric components and circuits - resistor, capacitor, electric cell, ammeter, voltmeter, galvanometer, keys and variable resistors. Series and parallel combinations of resistors, domestic electrical wiring and electrical safety (fuse, hot wire, neutral, ground and short circuit), electric power and electric power transmission; Heating effect of current and its practical applications.

Practicum

1. To find the focal length of a convex mirror using a convex lens.
2. To find the value of v for different values of u in the case of a concave mirror and to find the focal length
3. To find the focal length of a concave lens using a convex lens.
4. To determine the refractive index of a glass slab
5. To find the refractive index of a liquid using a convex lens and plane
6. To determine the resistivity of different wires by plotting a graph for potential difference versus current.
7. To verify Ohm's law for metallic conductor and to determine its resistance.
8. To find the frequency of AC mains with a sonometer.
9. Use of Multimeter for measuring Resistance, A.C. and D.C. Voltage and Current, checking of electrical fuses.
10. Use of Multimeter to check the working condition of diode, an LED, a resistor and a capacitor.

Note: Student will perform at least six experiments.