P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2024-25) EVEN SEMESTER

Name of Teacher: Ms. Aashi Mittal
Designation: Assistant Professor
Subject: PHYSICS
Class: B.Sc. (2nd Sem)
Subject/Paper: Electricity, Magnetism and EM theory

Sr. No.	Months	Topics to be covered	Remarks if any,
1	January-February	**Vector Background and Electric Field:** Gradient of a scalar and its physical significance, Flux of a vector field, Divergence and curl of a vector and their physical significance, 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. Mechanical force of charged surface.	Videos of the related topics will be shown on smart board. Class Test/Quiz shall be conducted after the completion of the unit.
2	March	**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. **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'stheory)	
3	April	**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.	

*Vacation as per university calendar

- Assignment and unit test will be taken as per schedule.

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2024-25) EVEN SEMESTER

Name of Teacher: **Dr. Manoj Kumar**
Designation: **Assistant Professor**
Subject: **Physics (Solid State and Nano Physics)**
Class: **B. Sc. (NM & CS) VI sem**

Subject/Paper: Sr. No.	**Months**	**Topics to be covered**	**Remarks if any,**
1	Jan.	Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice andbasis.	
2	Feb	crystal translational vectors and axes. Unit cell and Primitive Cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions. Crystal planes and Miller indices, Interplaner spacing, Crystal structures of Zinc Sulphide, Sodium Chloride and Diamond. X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods.	
2	March	K-space and reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c.Historical introduction, Survey of superconductivity, Super conducting systems, High Tc Super conductors, Isotopic Effect, Critical Magnetic Field, Meissner Effect, London Theory and Pippards' equation, Classification of Superconductors (type I and Type II),BCS Theory of Superconductivity,	1st assignment would be taken in March.
3	April	Flux quantization, Josephson Effect (AC and DC),Practical Applications of superconductivity and their limitations, power application ofsuperconductors.Definition, Length scale, Importance of Nano-scale and technology, History of Nantechnology, Benefits and challenges in molecular manufacturing. Molecular assembler concept, Understanding advanced capabilities. Vision and objective of Nano-technology, Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology, Materials, Medicine.	Test would be taken in May.

*Vacation as per university calendar

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2024-25) EVEN SEMESTER

Name of Teacher: **Dr. Manoj Kumar (MK) & Aashi Mittal (AM)**
Designation: **Assistant Professor**
Subject: **Computational Physics (Solid State and Nano Physics)**
Class: **B. Sc. II sem (Single Major Physics)**

Subject/Paper: Sr. No.	**Months**	**Topics to be covered**	**Remarks if any,**
1	Jan./Feb (MK)	Solution of Algebraic and Transcendental Equations. Fixed-Point Iteration Method, Bisection Method, Secant Method, Newton-Raphson Method, Comparison and Error Estimation.	
2	Jan/Feb (AM)	Interpolation :- Forward and Backward Differences. Symbolic Relation. Differences of a Polynomial. Newton' Forward and Backward Interpolation Formulas. Divided Differences. Newton's General Interpolation Formula.	
2	March/April (MK)	Solution of ODE First order Differential equation: Euler, modified Euler and Runge- Kutta second order methods Second order differential equation e.g. First order differential equation, Radioactive decay, Current in RC, LC circuits with DC source.	1st assignment would be taken in March.
3	March/April (AM)	Numerical Differentiation and Integration: Forward and Backward difference formula, Trapezoidal rule, Simpson's 1/3 and 3/8 rule,	Test would be taken in May.

*Vacation as per university calendar

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (Session 2024-25) EVEN SEMESTER

Name of Teacher: Dr. Manju Sharma
Designation: Assistant Professor
Subject: ATOMIC AND MOLECULAR SPECTROSCOPY
Class: B.Sc. Final (6th Sem) NM&CS

S/No.	Months	Topics to be covered	Remarks if any,
1	January-February	**Historical background of Atomic Spectroscopy:** Introduction of early observations, emission and absorption spectra, atomic spectra, wave number, spectrum of Hydrogen atom in Balmer series, Bohr atomic model (Bohr's postulates), spectra of Hydrogen atom , explanation of spectral series in H-atom, un-quantized states and continuous spectra, spectral series in absorption spectra, effect of nuclear motion on line spectra (correction of finite nuclear mass), variation in Rydberg constant due to finite mass, shortcomings of Bohr's theory, Wilson Sommerfeld quantization rule, de-Broglie interpretation of Bohr quantization law, Bohr's corresponding principle, Sommerfeld's extension of Bohr's model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory, Vector atom model; space quantization, electron spin, coupling of orbital and spin angular momentum, spectroscopic terms and their notation, quantum numbers associated with vector atom model, transition probability and selection rules.**Vector Atom Model (Single Valence Electron)** Orbital magnetic dipole moment (Bohr magneton), behavior of magnetic dipole in external magnetic field; Larmor's precession and theorem.	Videos of related topics will be shown on smart board. Class Test/Quiz shall be conducted after the completion of the unit.
2	February-March	Penetrating and Non-penetrating orbits, Penetrating orbits on the classical model; Quantum defect, spin orbit interaction energy of the single valance electron, spin orbit interaction for penetrating and non penetrating orbits, quantum mechanical relativity correction, Hydrogen fine spectra, Main features of Alkali Spectra and their theoretical interpretation, term series and limits, Rydberg-Ritz combination principle, Absorption spectra of Alkali atoms. observed doublet fine structure in the spectra of alkali metals and its Interpretation, Intensity rules for doublets, comparison of Alkali spectra and H- spectrum.	

3	March-April	**Vector Atom Model (Two Valence Electron)** :Essential features of spectra of Alkaline-earth elements, Vector model for two valance electron atom: application of spectra. Coupling Schemes; LS or Russell – Saunders Coupling Scheme and JJ coupling scheme, Interaction energy in L-S coupling (sp, pd configuration), Lande interval rule, Pauli principle and periodic classification of the elements. Interaction energy in JJ Coupling (sp, pd configuration), equivalent and non-equivalent electrons, Two valance electron system-spectral terms of non-equivalent and equivalent electrons, comparison of spectral terms in L-S And J-J coupling. Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin.	
4	April-May	**Atom in external Field:** Zeeman Effect (normal and Anomalous), Experimental set-up for studying Zeeman effect, Explanation of normal Zeeman effect(classical and quantum mechanical), Explanation of anomalous Zeeman effect (Lande g-factor), Zeeman pattern of D1 and D2 lines of Na-atom, Paschen-Back effect of a single valence electron system. Weak field Stark effect of H- atom. **Molecular Physics:** General Considerations, Electronic States of Diatomic Molecules, Rotational Spectra (Far IR and Microwave Region), Vibrational Spectra (IR Region), Rotator Model of Diatomic Molecule, Raman Effect, Electronic Spectra.	

*Vacation as per university calendar

- Assignment and unit test will be taken as per schedule.

Lesson Plan Sem- IV (2024-25), Waves and Optics,

Dr. Ramesh Kumar (Physics)

Months	Syllabus
Jan-Feb	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 thin films, Interference due to transmitted light and reflected light, wedge shaped film, Newton's rings.
Feb-March	DIFFRACTION: Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. 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 grating.
March-Apr	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. Qualitative idea of optical rotation and Polarimeters.
Apr-May	IV Lasers: Basic concept of absorption and emission of radiations. 12 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

Lesson Plan Sem- IV (2024-25), Exploring the of Indian space satellites,

Dr. Ramesh Kumar (Physics)

Months	Syllabus
Jan-Feb	Concept of Satellite, ideas and theories, Concept of Orbits, The transfer orbit, 7 hurdles in launching a satellite, space scarcity in space. Indian pace program, Objectives of the Indian Space Program, Organizational set-up.
Feb-March	Communication Satellite: Orbit and Description: A brief History of Satellite 8 Communication, Satellite Frequency bands, Satellite Systems, Applications, Orbital Period and Velocity, Effects of Orbital inclination, Azimuth and Elevation, Coverage and Slant range, Eclipse, Orbital perturbations Placement of a Satellite in a Geo-Stationary Orbit
March-Apr	III Space Centres and institutes, Genesis of Indian's space program, Indian 8 Satellites, Indian Communications satellites and their applications. Classification of Satellites based on Orbit Height. Indian remote sensing satellites, Indian National Satellites
Apr-May	IV Launch vehicle technology, Milestones in India's Space Programme

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (SESSION 2024-25) EVEN SEMESTER

Name of Teacher: Priyanka
Designation: Ext. Lecturer
Subject: Elementary Electricity and Magnetism
Class: Minor Physics

Subject/Paper: Sr. No.	Months	Topics to be covered	Remarks if any,
1	**Jan.**	**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.	
2	**Feb.**	**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.	
3	**March**	**UNIT-III** **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.	
4	**April**	**UNIT-IV** **DC current Circuits:** Electric currents and current density, Electrical conductivity and Ohm's law (Review), Kirchhoff's laws for D.C. networks. Revision For all syllabus **Note**- assignment and Mid-term exam will be taken as per schedule	

P.I.G. GOVT. COLLEGE FOR WOMEN, JIND
LESSON-PLAN (SESSION2024-25) EVEN SEMESTER

Name of Teacher: Priyanka
Designation: Ext. Lecturer
Subject: Physics
Class: MDC-2

Subject/Paper: Sr. No.	Months	Topics to be covered	Remarks if any,
1	**Jan.**	**UNIT-I** **Light and Optics-** Nature and properties of light, its speed frequency and wavelength; Refraction of light- types of reflection and their importance in daily life, Laws of reflection. **Refraction of light-** Laws refraction, refractive index, refraction of light through prism (dispersion of light), formulation Rainbow, twinkling of stars, advance Sunrise and delayed Sunset; scattering of light and blue color of the sky; appearance depth, total internal reflection.	
2	**Feb.**	**UNIT-II** **Image formation through reflection-** image formation by plane mirrors, multiple image formed by two flat mirrors and optical illusions; Images formed by parabolic mirrors and spherical mirrors- Convex and Concave mirrors, ray diagrams, mirror equation and magnification; application of plane and curve mirror in daily life. **Image formed through reflection**- images by convex and concave lenses ray diagrams and lens equation. **UNIT-III** **Electricity**- electric charges, types of charges, unit of charge, frictional electricity, electricity by conduction and electric current, units of electric current, measurements of current, conductors and insulators; resistance, resistivity and ohm's law, electric potential and potential difference, emf.	

3	**March**	**UNIT-III** **Electric circuit**- register, capacitor, battery, ammeter and Voltmeter; Series and parallel combination of resistors, electrical wiring in houses and electrical safety (fuse, hot wire, neutral, ground and short circuit), electric power and electric power transmission current and its practical applications. **Magnetic effect of electric current**- Magnetic field and field lines, bar magnet magnetic field and direction of field due to a current through straight conductor. **UNIT-IV** **Structure of an atom**- Rutherford's model of an atom Bohr's model of an atom and composition of atom-electron, proton and neutron	
4	**April**	**UNIT-IV** Orbits or shells (energy levels in an atom), distribution of electrons in different shells of the atom, atomic number and atomic mass of an atom. valence of an atom, excitation and ionization of atom, meaning of atomic transitions; Discovery of X-rays, Generation of X-rays, composition of nucleus, meaning of nuclear transitions. Revision For all syllabus **Note**-assignment and Mid-term exam will be taken as per schedule	