

# Govt. College, Alewa (Jind)

Session: 2023-2024 (Even Semester)

## Lesson Plan

**Name of the Teacher: Dr. MANJEET SINGH, ASSISTANT PROFESSOR**

**Subject: PHYSICS (Theory) Class: B. Sc. 6<sup>th</sup> Sem.**

**Physics Paper: I (Solid State and Nano Physics)**

**Paper's Code: NPH06(I)**

**Max. Marks: 50 (External Assessment: 40 Marks, Internal Assessment: 10 Marks)**

**Contact Hours Per Week: 5**

**Physics Paper: II (Atomic and Molecular Spectroscopy)**

**Paper's Code: NPH06(II)**

**Max. Marks: 50 (External Assessment: 40 Marks, Internal Assessment: 10 Marks)**

**Contact Hours Per Week: 5**

Sr. No.	Week	Dates	Topic
1	1st	31-01-2024 to 03-02-2024	Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis, crystal translational vectors and axes. Unit cell and Primitive Cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal,
2	2nd	05-02-2024 to 10-02-2024	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, experimental X-ray diffraction methods.
3	3rd	12-02-2024 to 17-02-2024	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,
4	4th	19-02-2024 to 24-02-2024	Critical Magnetic Field, Meissner Effect, London Theory and Pippards' equation, Classification of Superconductors (type I and Type II), BCS Theory of Superconductivity, Flux quantization, Josephson Effect (AC and DC), Class test
5	5th	26-02-2024 to 02-03-2024	Practical Applications of superconductivity and their limitations, power application of superconductors. Definition, Length scale, Importance of Nano-scale and technology, History of Nanotechnology Benefits and challenges in molecular manufacturing. Molecular assembler concept,
6	6th	04-03-2024 to 09-03-2024	Understanding advanced capabilities. Vision and objective of Nano-technology, Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology, Materials, Medicine. Introduction of early observations, emission and absorption spectra, atomic spectra, wave number, spectrum of Hydrogen atom in Balmer series,
7	7th	11-03-2024 to 16-03-2024	Bohr atomic model(Bohr's postulates), spectra of Hydrogen atom, explanation of spectral series in Hydrogen 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, Class test

Sr. No.	Week	Dates	Topic
8	8th	18-03-2024 to 22-03-2024	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, Shortcomings of Bohr-Sommerfeld theory, Vector atom model; space quantization, electron spin,
		23-03-2024 to 27-03-2024	<b>University Vocations (Holi Vocations)</b>
9	9th	28-03-2024 to 30-03-2024	coupling of orbital and spin angular momentum, spectroscopic terms and their notation, quantum numbers associated with vector atom model, transition probability and selection rules. Orbital magnetic dipole moment (Bohr magneton), behavior of magnetic dipole in external magnetic field; Larmor's precession and theorem. Penetrating and Non-penetrating orbits,
10	10th	01-04-2024 to 06-04-2024	Penetrating orbits on the classical model; Quantum defect, spin orbit interaction energy of the single valence 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. Class test
11	11th	08-04-2024 to 13-04-2024	observed doublet fine structure in the spectra of alkali metals and its Interpretation, Intensity rules for doublets, comparison of Alkali spectra and Hydrogen spectrum. Essential features of spectra of Alkaline-earth elements, Vector model for two valence electron atom: application of spectra, Coupling Schemes; LS or Russell – Saunders Coupling Scheme and JJ coupling scheme,
12	12th	15-04-2024 to 20-04-2024	Interaction energy in L-S coupling (sp, pd configuration), Lande interval rule, Pauli principal and periodic classification of the elements, Interaction energy in JJ Coupling(sp, pd configuration), equivalent and non-equivalent electrons,
13	13th	22-04-2024 to 27-04-2024	Two valence 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. Paschen-Back effect of a single valence electron system.
14	14th	29-04-2024 to 04-05-2024	Weak field Stark effect of Hydrogen atom. General Considerations, Electronic States of Diatomic Molecules,
15	15th	06-05-2024 to 11-05-2024	Rotational Spectra (Far IR and Microwave Region), Vibrational Spectra (IR Region), Rotator Model of Diatomic Molecule, Raman Effect, Electronic Spectra. Class Test
16	16th	13-05-2024 to 15-05-2024	Revision