Lesson Plan (Even Semester) Session 2023-24

Name of the Assistant Professor: - Dr. Richa Rani

Class: - B. Sc 3rd Year (6th-Sem.)

Subject: - Physics

Paper – XII: Atomic and Molecular Spectroscopy (PH-602)

Period	Topics to be covered (From 05/01/2024)	Topic of Assignments / Tests to be given to the students
05 Jan to 15 Jan	**Unit – 1: 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 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, short comings of Bohr's theory.	
16 Jan to 31 Jan	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.	Unit Test
01 Feb to 15 Feb	**Unit –2: Vector Atom Model (single valance electron)** Orbital magnetic dipole moment (Bohr megnaton), behavior of magnetic dipole in external magnetic field; Larmor's precession and theorem. 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,	
16 Feb to 29 Feb	Hydrogen fine spectra, Main features of Alkali Spectra and their theoretical interpretation, term series and limits, Rydeburg-Ritze	Unit test

	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 Hydrogen spectrum .	
01 March to 15 March	**UNIT-3: Vector Atom model (two valance electrons)** 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 principal 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,	Assignment
16 March to 31 March	Comparison of spectral terms in L-S And J-J coupling. Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin. **Unit –4: 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	Unit Test
01 April to 15 April	Weak field Stark effect of Hydrogen 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.	Unit Test
16 April to 30 April	Revision	

Dr. Richa Rani
Assistant Prof.
Dept. of Physics
K.T. Govt. College, Ratia

30/01/2024

Lesson Plan (Even Semester) Session 2023-24

Name of the Assistant Professor: - Mr. Kapil Dev

Class: - B. Sc 3rd Year (6th-Sem.)

Subject: - Physics

Paper – XI: Solid State and Nano Physics (PH-601)

Period	Topics to be covered (From 05/01/2024)	Topic of Assignments / Tests to be given to the students
05 Jan to 15 Jan	**Unit – I Crystal Structure-I:** Crystalline and glassy forms, Liquid Crystal, Crystal structure, Periodicity, Lattice and Basis, Crystal translational vectors and axes, Unit Cell and Primitive cell, Winger Seitz primitive cell, Symmetry operations for two dimensional crystal.	
16 Jan to 31 Jan	Bravais lattices in two and three dimension, Crystal Planes and Miller Indices, Interplaner spacing, Crystal Structures of Zinc Sulphide, Sodium Chloride and Diamond.	Unit Test
01 Feb to 15 Feb	**Unit-II Crystal Structure-II:** X- Ray diffraction, Bragg's law and experimental x-ray diffraction methods, K-space and reciprocal lattice and its physical significance,	
16 Feb to 29 Feb	Reciprocal lattice vectors, Reciprocal lattice to a simple cubic lattice, B.C.C. and F.C.C. **Unit-III Superconductivity:** Historical introduction, Survey of superconductivity, Superconducting systems, High Tc Super conductors,	Unit test
01 March to 15 March	Isotopic Effect, Critical Magnetic Field, Meissner Effect, London Theory and Pippards' equation, Classification of Superconductors (Type-I and Type-II).	

P.T.O.

16 March to 31 March	BCS Theory of Superconductivity, Flux quantization, Josephson Effect (AC & DC), Practical Application of Superconductivity and their limitations, Power applications of Superconductors.	Unit Test
01 April to 15 April	**Unit- IV- Introduction to Nano Physics:** Definition, Length scale, Importance of Nano-scale and technology, History of Nano-Technology, Benefits' and Challenges in molecular manufacturing, Molecular assembler concept.	
16 April to 30 2024	Understanding advanced Capabilities, Vision and objectives of Nano-technology , Nano-technology in different field, Automobile, Electronics, Nano-Biotechnology, Materials, Medicine.	Unit Test
01 May to 10 May 24	Revision	

01/02/24