Name of the Asstt./ Asso.Professor: **Darshan Lal**

Class and Section: **B.Sc. 6th Semester, section A**

Subject/ Paper: **Atomic and molecular Spectroscopy**

Subject Lesson Plan:  **12 weeks**

Week 1

DAY 1 Unit 1: Historical background of atomic spectroscopy, Introduction of early

Observations,

DAY 2 emission and absorption spectra, Spectrum of hydrogen atom in Balmer series

DAY 3 Bohr atomic model, spectra of hydrogen

atom explanations of spectral seris in hydrogen atom

Week 2

DAY 1 Variation in rydberg contant due to finite mass ,short coming of bohr’s theory

DAY 2 Wilson’sommerfield quantisation rule, quantisation rule,

DAY 3 De-broglie interpretation of bohr quantisation law, , bohr’s corresponding principle,

Week 3

DAY 1 Sommerfeld’s extension of Bohr’s model, Sommerfeld relativistic correction,

Short coming of bohr-sommerfied theory

DAY 2 Short coming of bohr-sommerfied theory, Vector atom model, space quantisation

,electron spin

DAY 3 coupling of orbital and spin angular momentum, Spectroscopic terms and their

Notations, quantum numbers

Week 4

DAY 1 transition probability, selection rules, Vector atom model(single valence electron)

DAY 2 quarries of unit Inviting 1 and assignment 1 (allotment)

DAY 3 **Unit –II**: Orbital magnetic dipole moment (Bohr megnaton), behavior of magnetic

dipole in external magnetic filed; Larmors’ precession and theorem

Week 5

DAY 1 Penetrating and Non-penetrating orbits, Penetrating orbits on the classical model;

Quantum defect

DAY 2 spin orbit interaction energy of the single valance electron, spin orbit interaction for

penetrating and non-penetrating orbits.

DAY 3 quantum mechanical relativity correction, Hydrogen fine spectra

Week 6

DAY 1 Main features of Alkali Spectra and their theoretical interpretation, term series and

limits

DAY 2 Rydeburg-Ritze combination principle, Absorption spectra of Alkali atoms. observed

doublet fine structure in the spectra of alkali metals and its Interpretation,

DAY 3 Intensity rules for doublets, comparison of Alkali spectra and Hydrogen spectrum .

Week 7

DAY 1 Test of Unit 1 and Unit 2

DAY 2 **UNIT-III:** Essential features of spectra of Alkaline-earth elements, Vector model for

two valance electron atom: application of spectra.

DAY 3 Coupling Schemes;LS or Russell – Saunders Coupling Scheme and JJ coupling scheme

Week 8

DAY 1 Interaction energy in L-S coupling (sp, pd configuration)

DAY 2 Lande interval rule, Pauli principal and periodic classification of the elements

DAY 3 Two valance electron system-spectral terms of non-equivalent and equivalent electrons

Week 9

DAY 1 Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin.

DAY 2 **Unit –IV:** Zeeman Effect (normal and Anomalous),Experimental set-up for studying

Zeeman effect,

DAY 3 Explanation of normal Zeeman effect(classical and quantum mechanical),

Explanation of anomalous Zeeman effect(Lande g-factor)

Week 10

DAY 1 Zeeman pattern of D1 and D2 lines of Naatom, Paschen-Back effect of a single valence

electron system

DAY 2 General Considerations, Electronic States of Diatomic Molecules, Rotational Spectra

(Far IR and Microwave Region)

DAY 3 Vibrational Spectra (IR Region), Rotator Model of Diatomic Molecule

Week 11

DAY 1 Zeeman pattern of D1 and D2 lines of Naatom, Paschen-Back effect of a single valence

electron system

DAY 2 General Considerations, Electronic States of Diatomic Molecules, Rotational Spectra

(Far IR and Microwave Region)

DAY 3 Vibrational Spectra (IR Region), Rotator Model of Diatomic Molecule

Week 12

DAY 1 Raman Effect, Electronic Spectra.

DAY 2 Inviting queries and doubts on Unit-3

DAY 3 Unit test of Unit 3 & 4