**Name of Assistant Professor: Miss. Jyoti**

**Class and Section: B.Sc 3rd year, 6th Semester** and Section-A

**Subject: Atomic and Molecular Spectroscopy**

**Lesson Plan**: 18Weeks (from January 2018 to April 2018)

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| Week 1, **January 1 to January 7**  **Unit 1: Historical Background of atomic spectroscopy** |
| Assignments |
| Week 1, Day 1, January 1   * 1.1 Introduction |
| Week 1, Day 2, January 2   * 1.2 Transition Probabilities |
| Week 1, Day 3, January 3   * 1.3 Transition Probabilities |
| Week 1, Day 4, January 4   * 1.4A Historical Introduction of early observations of Atomic Spectra |
| Week 1, Day 5, January 5 **Holiday** |
| Week 1, Day 6, January 6   * 1.4A Historical Introduction of early observations of Atomic Spectra |
| Week 2, **January 8 to January14**  Unit **: 1: Historical Background of atomic spectroscopy** |
| Assignments : assignment 1st |
| Week 2, Day 1, January 8   * 1.5 A Brief Review of Quantum Theory,Bhor Atom Model and Bhor-Sommerfeld Atom Model |
| Week 2, Day 2, January 9   * 1.5 A Brief Review of Quantum Theory,Bhor Atom Model and Bhor-Sommerfeld Atom Model |
| Week 2, Day 3, January 10   * 1.5.5 de-Broglie’s Interpretation of Bhor’s Quantization Law |
| Week 2, Day 4, January 11   * 1.5.6. Bohr Somerfield Atom Model |
| Week 2, Day 5, January 12   * 1.6 Space Quantization and Larmor’s Theorem |
| Week 2, Day 6, January 13   * 1.9-Sommerfeld Relativity Correction |
| Week 3, **January 15 to January 21**  Unit **1: Historical Background of atomic spectroscopy** |
| Assignments |
| Week 3, Day 1, January 15   * 1.10 Solved example s |
| Week 3, Day 2, January 16   * Revision of 1.2 Transition Probabilities |
| Week 3, Day 3, January 17   * Revision of1.4A Historical Introduction of early observations of Atomic Spectra |
| Week 3, Day 4, January 18   * Revision of of1.4A Historical Introduction of early observations of Atomic Spectra |
| Week 3, Day 5, January 19   * Revision of1.5 A Brief Review of Quantum Theory,Bhor Atom Model and Bhor-Sommerfeld Atom Model |
| Week 3, Day 6, January 20   * Revision of1.5.5 de-Broglie’s Interpretation of Bhor’s Quantization Law |
| Week 4, **January 22 to January 28**  Unit 1: **1: Historical Background of atomic spectroscopy** |
| Assignments |
| Week 4, Day 1, January 22 **Holiday** |
| Week 4, Day 2, January 23   * Class test on Transition Probabilities |
| Week 4, Day 3, January 24   * Class test on Historical Introduction of early observations of Atomic Spectra |
| Week 4, Day 4, January 25   * Class test on A Brief Review of Quantum Theory,Bhor Atom Model and Bhor-Sommerfeld Atom Model |
| Week 4, Day 5, January 26 **Holiday** |
| Week 4, Day 6, January 27   * Class test on de-Broglie’s Interpretation of Bhor’s Quantization Law |
| Week 5, **January 29 to February4**  Unit 1: **1: Historical Background of atomic spectroscopy** |
| Assignments |
| Week 5, Day 1, January 29   * Revision of complete unit 1 |
| Week 5, Day2, January 30   * Class Test of unit 1 |
| Week 5, Day 3, January 31 **Holiday** |
| Week 5, Day 4, February 1   * 1.6 Space Quantization and Larmor’s Theorem |
| Week 5, Day 5, February 2   * 1.9-Sommerfeld Relativity Correction |
| Week 5, Day 6, February 3   * Class Test on Space Quantization and Larmor’s TheoremSommerfeld Relativity Correction |
| **Week 6, February 5to February 11**  **Unit 2:Vector Atom Model (Spectra of Alalkali Metals and Penetrating and Non Penetrating Orbits)** |
| Assignments : Assignment1st |
| Week 6, Day 1, February 5   * 2.1-Gross Structure of the Spectra of alkali metals |
| Week 6, Day 2, February 6   * 2.2 Penetrating and Non Penetrating Orbits in the alkali metals |
| Week 6, Day 3, February 7   * 2.2.1 Penetrating orbits |
| Week 6, Day 4, February 8   * Revision of Gross Structure of the Spectra of alkali metals |
| Week 6, Day 5, February 9   * Revision of2.2 Penetrating and Non Penetrating Orbits in the alkali metals |
| Week 6, Day 6, February 10 **Holiday** |
| Week 7, **February 12 to February 18**  Unit 2: **Vector Atom Model (Spectra of Alalkali Metals and Penetrating and Non Penetrating Orbits)** |
| Assignments |
| Week 7, Day 1, February 12   * Class Test on Penetrating and Non Penetrating Orbits in the alkali metals |
| Week 7, Day 2, February 13 **Holiday** |
| Week 7, Day 3, February 14   * Class Test on Penetrating orbits |
| Week 7, Day 4, February 15   * Solved Examples on Penetrating orbits |
| Week 7, Day 5, February 16   * Solved Examples on Penetrating orbits |
| Week 7, Day 6, February 17   * Class Test on Solved Examples on Penetrating orbits |
| Week 8 **February 19 to February25**  Unit **2: Vector Atom Model (Spectra of Alkali Metals and Penetrating and Non Penetrating Orbits)** |
| Assignments |
| Week 8, Day 1, February 19   * 3.1 Vector Model |
| Week 8, Day 2, February 20   * Observed Doublet Fine Structure in The Spectra Of Alkali Elements |
| Week 8, Day 3, February 21   * Interpretation of the Doublet Fine Structure on the basis of Vector Atom Model |
| Week 8, Day 4, February 22   * Spin-Orbit Interaction of the elements |
| Week 8, Day 5, February 23   * Spin-Orbit Interaction of the elements |
| Week 8, Day 6, February 24   * Spin-Orbit interaction for the Penetrating Orbits |
| Week 9, **February26 to March4**  Unit **2: Vector Atom Model (Spectra of Alkali Metals and Penetrating and Non Penetrating Orbits)** |
| Assignments |
| Week 9, Day 1, February 26   * Spin-Orbit interaction for the Non- Penetrating Orbits |
| Week 9, Day 2, February 27   * Class Test of unit 2 |
| Week 9, Day 3, February 28 **Holiday** |
| Week 9, Day 4, March 1 **Holiday** |
| Week 9, Day 5, March 2 **Holiday** |
| Week 9, Day 6, March 3 **Holiday** |
| Week 10, **March 5 to March11**  **Unit 3:Vector Atom Model** |
| Assignments |
| Week 10, Day 1, March 5   * 4.1 LS-Coupling or Russell-Saunder’s Coupling |
| Week 10, Day 2, March 6   * 4.1.1 ll-Coupling |
| Week 10, Day 3, March 7   * 4.1.2 ss-coupling and LS-Coupling |
| Week 10, Day 4, March 8   * 4.1.2 ss-coupling and LS-Coupling |
| Week 10, Day 5, March 9   * Revision of ss-coupling and LS-Coupling |
| Week 10, Day 6, March 10   * Class Test on LS-Coupling or Russell-Saunder’s Coupling |
| Week 11, **March 12 to March 18**  **Unit 3:Vector Atom Model** |
| Assignments |
| Week 11, Day 1, March 12   * Class Test on ss-coupling and LS-Coupling |
| Week 11, Day 2, March 13   * 4.1.4 Pauli Exclusion Principle and Term Values of Equivalent Electrons |
| Week 11, Day 3, March 14   * 4.1.4 Pauli Exclusion Principle and Term Values of Equivalent Electrons |
| Week 11, Day 4, March 15   * Revision on Pauli Exclusion Principle and Term Values of Equivalent Electrons |
| Week 11, Day 5, March 16   * 4.2 Pauli Principle and periodic classification of Elements |
| Week 11, Day 6, March 17   * 4.2 Pauli Principle and periodic classification of Elements |
| Week 12, **March 19 to March25**  **Unit 3:Vector Atom Model** |
| Assignments |
| Week 12, Day 1, March 19   * Revision of 4.2 Pauli Principle and periodic classification of Elements |
| Week 12, Day 2, March 20   * 4.3 Spin-Orbit Interaction Energies for Two Valence-Electron Systems |
| Week 12, Day 3, March 21   * 4.3.1Factors for LS-coupling |
| Week 12, Day 4, March 22   * 4.3.1Factors for LS-coupling |
| Week 12, Day 5, March 23   * 4.3.2The Lande Interval Rule |
| Week 12, Day 6, March 24   * 4.4 jj-Coupling Scheme |
| Week 13, **March26to April 1**  **Unit 3:Vector Atom Model** |
| Assignments : Assignment 2nd |
| Week 13, Day 1, March 26   * 4.3.2The Lande Interval Rule |
| Week 13, Day 2, March 27   * 4.4 jj-Coupling Scheme |
| Week 13, Day 3, March 28   * 4.5 Spectra of Two Valence Electron Systems |
| Week 13, Day 4, March 29 **Holiday** |
| Week 13, Day 5, March 30   * Solved Examples |
| Week 13, Day 6, March 31   * Class Test on Unit 3 |
| Week 14, April 2 to April 8  Unit**4:Atom in External Field and Molecular Physics** |
| Assignments |
| Week 14, Day 1, April 2   * 5.1 Zeeman Effect for a Single Valance Electron System |
| Week 14, Day 2, April 3   * 5.1.1Experimental Set up for Observing Zeeman Effect |
| Week 14, Day 3, April 4   * 5.1.2 Classical Theory of Normal Effect |
| Week 14, Day 4, April 5   * 5.1.3Quantum Theory of Normal Zeeman Effect |
| Week 14, Day 5, April 6   * 5.1.4 Theoretical Explanation of Zeeman Effect of one Valence-Electron System |
| Week 14, Day 6, April 7   * 5.1.4 Theoretical Explanation of Zeeman Effect of one Valence-Electron System |
| Week 15, **April 9 to April15**  Unit**4:Atom in External Field and Molecular Physics** |
| Assignments |
| Week15 , Day 1, April 9   * 5.2 Paschen-Back Effect for a Single Valence-Electron System |
| Week 15, Day 2, April 10   * 5.3 Stark Effect of Hydrogen Atom |
| Week 15, Day 3, April 11   * 5.3.1 Theoretical Explanation |
| Week 15, Day 4, April 12   * 5.4 Applications of Atomic Spectroscopy |
| Week 15, Day 5, April 13   * 5.5 Hyperfine Structure of spectral lines |
| Week 15, Day 6, April 14 **Holiday** |
| Week 16, **April 16 to April22**  Unit**4:Atom in External Field and Molecular Physics** |
| Assignments |
| Week 16, Day 1, April 16   * Solved Examples |
| Week 16, Day 2, April 17   * 6.1 General Considerations |
| Week 16, Day 3, April 18 **Holiday** |
| Week 16, Day 4, April 19   * 6.2 Electronic States of Diatomic Molecules |
| Week 16, Day 5, April 20   * 6.3 Rotational Spectra in the Far Infrared or Microwave Region |
| Week 16, Day 6, April 21   * 6.3.2Non-Rigid Rotator |
| Week17 **April 23 to April29**  Unit**4:Atom in External Field and Molecular Physics** |
| Assignments |
| Week17 , Day 1, April 23   * 6.4 .2 Anharmonic Oscillator Model |
| Week 17, Day 2, April 24   * 6.5 Vibrating Rotator Model of the Diatomic Molecule |
| Week 17, Day 3, April 25   * 6.6 Raman Effect |
| Week 17, Day 4, April 26   * 6.6.2 Quantum Theory of Raman effect |
| Week 17, Day 5, April 27   * 6.7 Electronic Spectra |
| Week 17, Day 6, April 28   * Revision and Class Test of unit 4 |
| Week 18 **April 30 to May 6**  Unit**4:Atom in External Field and Molecular Physics** |
| Assignments |
| Week18 , Day 1, April 30 **Holiday** |