

**S.C.I.M GOVERNMENT COLLEGE(A), TANUKU, W.G**  
**DEPARTMENT OF PHYSICS**  
**MODERNPHYSICS-FOURTH SEMESTER**  
**List of Important Questions**

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**UNIT-1:**

1. Describe the Stern-Gerlach experiment and discuss how it verifies the concepts Space quantization and electron spin.
2. Describe the Bohr's model of Hydrogen atom.
3. Derive the expressions for the Radius, energy and wave number for the hydrogen atom.
4. What is Zeeman effect? Describe the experimental set up of Zeeman effect
5. Describe the quantum numbers associated with the vector atom Model.
6. Explain the hydrogen spectrum with neat energy level diagram.
7. What are the selection rules of electron transitions?
8. Explain the L-S and J-J coupling schemes
9. What are the term symbols and notations, give examples.
10. Explain the spin Quantization and Electron spin

**Note:** Solve the problems from this unit

**UNIT-2:**

1. Define Raman effect. Describe the experimental set up of Raman effect
2. Define Raman effect. Explain the quantum theory of Raman effect
3. Give the theory of the origin of Pure rotational spectrum of a molecule.
4. Explain the Pure Vibrational spectrum of a molecule.
5. Write about the spectroscopic techniques: IR, UV-Visible and Raman Spectroscopy.
6. What are the applications of Raman effect
7. What are the characteristics of Raman effect.
8. Write the characteristics of Raman lines.
9. Explain the Pure electronic spectrum of a molecule

**UNIT-3:**

1. What are matter waves? Derive the expression for wave length of matter waves.
2. Describe Davisson and Germer experiment.
3. State and explain the Heisenberg's uncertainty principle for Energy and time
4. State and explain the Heisenberg's uncertainty principle for Position and momentum
5. Write about De Broglie's hypothesis and properties of matter waves.
6. Obtain the uncertainty principle from Gamma ray microscope.
7. Illustrate the uncertainty principle using diffraction beam of electrons.

**Note:** Solve the problems from this unit

**Unit-4:**

1. Derive Schrodinger time independent wave equation.
2. Derive time dependent Schrödinger wave equation.
3. Obtain the energy of the particle in a one-dimensional potential box
4. Mention the postulates of Quantum Mechanics
5. Give the Physical Significance of wave function.
6. Explain the terms Eigen values, Eigen function and operators.

**Unit-5:**

1. What is superconductivity? Discuss Type-1 and Type-2 superconductors.
2. Derive the expressions for London equations and penetration depth.
3. Give a Qualitative description of the BCS theory.
4. Write about critical Temperature and critical Magnetic Field.
5. Explain the Meissner effect
6. Explain the isotope effect in superconductors.
7. What are the applications of superconductors?
8. Write a brief note on High  $T_c$  Super Conductors.

**Note:** Solve the problems from this unit.