

GOVERNMENT DEGREE COLLEGE - NANDIKOTKUR

DEPARTMENT OF PHYSICS

II B.Sc.(Honors) Minor Subject :Physics: Semester - IV

COURSE 4: MODERN PHYSICS

QUESTION BANK

Academic Year : 2024-25

Name of the Lecturer: C.SUMALATHA

Unit-I: Introduction to Atomic Structure and Spectroscopy:

Long Answer Questions

1. Explain Bohr's model of the hydrogen atom. Derive an expression for radius, energy and wave number .
2. State Bohr's fundamental postulates to explain the spectrum of Hydrogen atom.
3. State and explain the Vector Atom Model and how they are experimentally verified by the Stern-Gerlach experiment.
4. Describe the Quantum numbers associated with Vector Atom Model.
5. With necessary theory explain Zeeman effect. Describe the Experimental set up.

Short Answer Questions

1. Explain Bohr's Atomic model.
2. Write a note on Coupling schemes.
3. What are the spectral terms and spectral notations.
4. What are the selection rules.

Unit-II: Molecular Structure and Spectroscopy:

Long Answer Questions

1. Define Raman Effect and how Quantum theory has explained it. Describe the experimental set-up to study Raman effect.
2. Explain about Spectroscopic techniques: IR,UV-Visible and Raman Spectroscopy.

Short Answer Questions

1. Explain about Molecular rotational and vibrational spectra .
2. What are the importance of electronic energy levels and electronic transitions.
3. What are the characteristics of Raman effect?
4. What are the applications of Raman effect?

Unit-III: Matter Waves & Uncertainty Principle:

Long Answer Questions

1. Describe Davisson and Germers experimental set-up using a schematic diagram.
2. State and explain Heisenberg's uncertainty principle for a) position and momentum b) energy and time.
3. Illustrate uncertainty principle by a) Gamma ray microscope.
b) Diffraction by a single slit.

Short Answer Questions

1. What are matter waves ? Explain.
2. State and explain de Broglie hypothesis.
3. Write the properties of Matter waves.

Unit-IV: Quantum Mechanics:

Long Answer Questions

1. Derive Schrodinger time independent and time dependent wave equations..
2. Apply Schrodinger wave equation to one-dimensional potential box of infinite height(infinite potential well) .

Short Answer Questions

1. What are the basic postulates of quantum mechanics.
2. What is the physical interpretation of wave function ?
3. Explain the terms Eigen functions and Eigen values.

Unit-V: Superconductivity:

Long Answer Questions

1. What is the significance of critical temperature and critical magnetic field for superconductors?
2. Describe the London's equation and penetration Depth.
3. What are Type -I and Type – II superconductors ? Explain.

Short Answer Questions

1. What is superconductivity?
2. Explain Meissner effect.
3. Describe isotope effect in superconductors.
4. Write a short note on BCS theory.
5. What are high T_c superconductors.
6. What are the applications of superconductors ?