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B.Sc.(CS) (2013 & Onwards) (Sem.-4)
ATOMIC MOLECULAR & SPECTROSCOPY
Subject Code : BCS-403
Paper ID : [72319]

Max. Marks : 60

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **SIX** questions carrying **TEN** marks each and a student has to attempt any **FOUR** questions.

1. Answer briefly :

- List the set of quantum numbers for $n=3$; hydrogen atom.
- Spin orbit coupling splits all states except s-state into two sub states. Why are s-states exceptions to this rule?
- Calculate Lande's g factor for a p-electron.
- Explain why normal Zeeman effect occurs only in atoms with even number of electrons.
- What is the difference between singlet and triplet state?
- Show that no two electrons have same quantum state.
- How does symmetry of wave function correspond to degeneracy of states?
- What is the difference between holography and photography?
- What do you think that energy conservation is violated in a laser or not? Explain.
- What are the characteristics that distinguish laser from ordinary light?

SECTION-B

2. Describe Stern Gerlach experiment with necessary theory. What was the aim of the experiment? Discuss its significance.
3. State and explain Pauli's exclusion principle. How knowledge of symmetric and antisymmetric wave function leads to this principle?
4. Describe and explain LS coupling, under what conditions does it hold?
5. Derive the frequency condition to be satisfied for stationary waves in optical cavity. Discuss the nature of mirrors in case of resonance cavity.
6. What is population inversion in a laser? How can we achieve higher probability of stimulated emission as compared to that of spontaneous emission?
7. Discuss with suitable diagram the principle of construction and working of Nd:YAG laser.

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