Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(CS) (2013 & Onwards) (Sem.–4)

ATOMIC MOLECULAR & SPECTROSCOPY

Subject Code : BCS-403

M.Code : 72319

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

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.**

SECTION-A

1. Answer briefly :

(a) The wavelength of first line of Balmer's series is 6563 Å. Calculate Rydberg's constant.

(b) Can Stern Gerlach experiment be performed with ions rather than neutral atoms?

(c) Explain what is magnetic moment of an atom?

(d) What is 'exchange degeneracy'?

(e) State Pauli exclusion principle.

(f) "*The light emitted from a conventional source is said to be incoherent*". Why?

(g) Why four level lasers are better than three level lasers?

(h) Explain the term 'stimulated emission' and 'spontaneous emission'.

(i) What is the importance of 'metastable state' for working of a Laser?

(j) What is the difference between holography and photography?

SECTION-B

2. What are the various series of hydrogen spectrum? Calculate the wavelength of the first member and limiting member of each series.

3. Describe Normal Zeeman effect and obtain expression for Zeeman shift. Why it occurs only in atoms with even number of electrons?

4. Describe and explain *LS* coupling. Under what conditions does it hold? Under what conditions *LS* coupling breaks down and what kind of new coupling takes over?

5. What is population inversion in a Laser? How can we achieve higher probability of stimulated emission as compare to that of spontaneous emission? Explain optical pumping.

6. Discuss with suitable diagram the principle of construction and working of 'Ruby laser'.

7. Derive the frequency condition to be satisfied for stationary waves in optical cavity. Also derive the threshold condition for laser oscillations.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.