2316 170

Class – B.Sc(Sem.-IV)
Subject – Physics
Paper – B (Atomic, Molecular & Spectroscopy

Time Allowed : 3 Hours Maximum Marks : 35

Note:– Attempt five questions in all, selecting one question from each of sections B, C, D and E. Section A is compulsory.

SECTION-A (COMPULSORY)

Attempt All questions. Each question carries 1 mark.

1. (a) What do you mean by space quantization?
   (b) Differentiate between symmetric and antisymmetric wavefunction.
   (c) What do you mean by Q-switching in laser?
   (d) What are the conditions for laser action?
   (e) Write down the term corresponding to the state given by L = 3, S = 1.
   (f) What is the stimulated emission of radiation?
   (g) Define Bohr's Magneton. Give its value.

7 × 1 = 7

SECTION-B

2. (a) Explain the term 'Larmor Precession'. 2
   (b) Explain classical theory of Normal Zeeman Effect. 5

OR

3. (a) Calculate Lande's g factor for s-electrons. 2
   (b) Describe stern-gerlach experiment with necessary theory. What does it demonstrate? 5

SECTION-C

4. (a) Two Bosons can exist in same quantum state but two Fermions cannot exist in same quantum state. Explain why? 2
   (b) Explain spectra of alkaline earth atom. 5

OR

5. (a) Distinguish between L-S and J-J coupling schemes. 2
   (b) Describe helium atom spectrum and discuss the difference between orthohelium and parahelium. 5

SECTION-D

6. (a) Define the concept of directionality, monochromaticity, intensity and coherence of laser light. 2
   (b) Derive Schawlow-Townes condition for Laser oscillations. 5

OR

7. (a) Differentiate between three level and four level laser. Give example of each. 2
   (b) Derive an expression for Einstein coefficients. 5

SECTION-E

8. (a) Explain any one method of pumping in Laser system. 2
   (b) Explain principle, construction and working of Ruby Laser including its applications. 5

OR

9. (a) What are the applications of lasers in day to day life? 2
   (b) Give principle, construction and working of He-Ne laser. What are its applications? 5

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