

Exam. Code : 103204

Subject Code : 1360

B.A/B.Sc. Semester—IV

PHYSICS

Paper—B (Atomic Spectra and Lasers)

Time Allowed—3 Hours] [Maximum Marks—35

Note :— Section A is compulsory. Attempt **ONE** question each from Sections B, C, D and E. All questions carry equal marks.

SECTION—A

Note :— Attempt All the **SEVEN** Parts.

- I. (a) What is Larmor precession ? Define Larmor frequency.
- (b) Write down the possible terms of one electron system corresponding to $n = 2$.
- (c) What is the significance of Stern-Gerlach experiment ?
- (d) What is the basic principle of Holography ?
- (e) Explain the principle of semiconductor laser.
- (f) How many electrons could be accommodated in $n = 4$ shell according to Pauli's exclusion principle ?
- (g) Calculate Lande g factor of p electron in case of one electron system. 7

SECTION—B

- II. What do you mean by fine structure of spectral lines ? Explain the fine structure of hydrogen on the basis of spin orbit interactions. 7
- III. Describe the Stern Gerlach experiment and discuss its significance. 7

SECTION—C

- IV. Distinguish between symmetrical and anti symmetrical wave functions. Explain Pauli's exclusion principle on the basis of anti symmetrical wave functions. 7
- V. Describe the general features of alkaline earth spectra and explain its fine structure by drawing energy level diagram. 7

SECTION—D

- VI. Explain the concept of coherence. Discuss the spatial coherence as related to the size of the source. 7
- VII. Derive Schawlow-Townes condition for laser oscillations. 7

SECTION—E

- VIII. What is the active material in He-Ne laser ? How is population inversion achieved in He-Ne laser ? Explain with the help of energy level diagram. 7
- IX. What do you mean by spiking in laser system ? Describe the principle and working of ruby laser. 7