LASERS - II

Time : Three Hours] [Maximum Marks : 40

Note : Attempt *two* questions each from Section A and B carrying 8 marks each, and the entire section C consisting of 8 short answer type questions carrying 1 mark each.

Section - A

1. Explain Einstein's coefficients, and derive an expression for them with reference to explanation of emission and absorption photon. 8

2. (a) What do you understand by broadening of spectrual lines ? Explain Natural broadening. 6

(b) The coherence length for sodium light is 2.5 cm. Find the coherence time. 2

3. (a) Explain the absorption and amplification of parallel beam of light passing throught a medium. 6
(b) Explain the spontaneous emission of radiations. 2

4. (a) Discuss elementary theory of optical cavity. 4
(b) Explain that stimulated emission and population inversion is the cause of laster. 4

Section - B

5. (a) Explain the construction, diagram and functioning of CO_2 laser. 6
(b) Explain the resonator in a laser device. 2

6. Explain the principle, construction and laser action of semiconductor laser. Derive and expression for threshold injection current density. 8

7. What do you understand by Q-switching ? Discuss the different types of Q-switching. 8

8. (a) What do you understand by Mode locking ? Discuss its types. 6
(b) Give *four* applications of laser. 2

Section - C

9. Attempt all parts.
(a) What is Tunable laser ? 1
(b) Define Quality factor for laser. 1
(c) Define Quantum efficiency. 1
(d) A laser has a band width of 3000 Hz. Calculate the coherence time. 1
(e) "Four level laser is preferred". Comment. 1
(f) What is Holography ? 1
(g) Difference between Laser and ordinary light. 1
(h) Give components of a laser. 1