

- (c) (i) Discuss briefly the different configurations of optical cavities.

- (ii) Laser beam has a band width of 2500 Hz. What are the values of coherence length and coherence time ?

3. Answer any **two** parts of the following :— (10×2=20)

- (a) Describe main components of a laser and explain the principle involved for laser action.
- (b) Explain the operation of four level lasers. Discuss the construction and working of He-Ne laser.
- (c) What do you mean by Q switching ? Describe various methods of Q switching.

4. Answer any **two** parts of the following :— (10×2=20)

- (a) What are ionic lasers ? Describe Argon ion laser along with its uses.
- (b) Explain the construction, working and application of excimer laser.
- (c) What are semiconductor lasers ? How spontaneous and stimulated emissions take place in semiconductor ?

5. Answer any **two** parts of the following :— (10×2=20)

- (a) Discuss the importance of laser in medicine and surgery.
- (b) What are the components of optical communication ? Explain how laser becomes important for optical communication.
- (c) How the laser is important for holography ? Explain the use of laser for construction and reconstruction of image in holography.

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0929

Roll No.

**B.Tech.**

(SEM. IV) THEORY EXAMINATION 2011-12

**LASER SYSTEMS AND APPLICATIONS**

Time : 3 Hours

Total Marks : 100

**Note :—**Attempt **all** questions. All questions carry equal marks.

1. Answer any **two** parts of the following :— (10×2=20)

- (a) What are matter waves ? Discuss the dual nature of radiation and derive an expression for de-Broglie wavelength.
- (b) State and explain Heisenberg's uncertainty principle. An electron has a speed of 10.5 km/s within the accuracy of 0.01%. Calculate the uncertainty in the position of the electron.
- (c) Derive both time independent and time dependent Schrödinger wave equation for a non relativistic particle.

2. Answer any **two** parts of the following :— (10×2=20)

- (a) What is the concept of coherence ? Explain spatial and temporal coherence.
- (b) Describe spontaneous and stimulated emission of radiation and establish a relation between transition probabilities of spontaneous and stimulated emissions.