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

PAPER ID : 0929 Roll No. ☐☐☐☐☐☐☐☐☐☐

B.Tech.

(SEM. IV) EVEN THEORY EXAMINATION 2012-13
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) Discuss the de-Broglie wave particle duality. Explain how it is helpful to explain the Bohr quantization rules.

   (b) Derive time independent Schrödinger wave equation. What do you mean by eigen value and eigen function ?

   (c) What do you understand by absorption and emission of radiation ? An atom has two atomic levels separated by energy of 2.26 eV. Find the temperature in Kelvin at which the population ratio of two levels is 0.5. Boltzmann constant $k = 8.6 \times 10^{-5}$ eV/K.

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

   (a) What do you understand by pumping ? Discuss different types of pumping schemes. How can it help in obtaining population inversion ?

   (b) What do you understand by laser gain ? Derive an expression for it.

   (c) What are optical cavities ? Describe working of different types of cavities.

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

   (a) What is the principle of laser action ? Explain pulse laser and continuous laser.

   (b) What are three level lasers ? Explain the construction and working of Ruby laser.

   (c) What do you mean by Q switching ? Describe two methods of Q switching.

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

   (a) What are ionic lasers ? Describe construction and excitation mechanism of argon ion laser.

   (b) Discuss the functioning, properties and applications of Excimer lasers.

   (c) How the optical pumping takes place in solid states lasers ? Showing energy level diagram, explain the working of Nd-YAG laser.

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

   (a) Discuss the application of laser in general surgery. What are advantages of laser surgery ?

   (b) How laser is important for material processing ? Discuss its advantages and disadvantages.

   (c) What do you understand by Light Detection and Ranging ? How laser is important for its principle of operation ? Also, give some applications of LIDAR.