M.TECH. LASER SCIENCE AND TECHNOLOGY - FIRST YEAR - 1st SEM 2024

School of Laser Science and Engineering

Jadavpur University, Jadavpur, Kolkata 700032, India

Subject: LASER AND ITS APPLICATIONS

Total Marks 100

Ref.:Ex/PG/LST/T/112A/2024

Answer any five questions

1. a) What are the basic differences between the two solid state lasers- Ruby laser and Nd:YAG laser? What is the fundamental of Nd:YAG laser? b) Explain Ti sapphire laser. Why Ti Sapphire laser is important in scientific research purposes?

   (9+1) + (8+2)

2. a) Describe the construction and working of a He-Ne laser, What is Green laser line in this laser? What are its uses?

   b) With the help of an energy level diagram describe the working of a CO_2 laser. Discuss the role of N_2 and He in this laser. (8+2) + (6+4)

3. How hologram is made and how it is reconstructed? What are the important applications of holographic interferometry? Explain each of them.

   10+ (3+7)

4. Explain the mechanisms of optical fiber communication? Name the three important defects of optical fiber.

   What are the advantages and disadvantages of optical fiber transmission?

   If n_{core} is 1.46 and n_{clad} is 1.45,

   find the numerical aperture (N.A) of the optical fiber

   (7+3) +5+5

[Turn over

5. a) Explain Gravitational wave using the idea of squeezed state. Give 4 important uses of this wave.

   b) What is the speed of gravitational wave? Compared to electromagnetic wave, how much the value of frequency of gravitational wave?

   (12+4) + 2+2

   6.Explain the basic differences between excimer and dimer. Explain Excimer laser with the help of potential energy diagrams.. Why invention of excimer laser was so important?

   6+12+2