

Serial No of Q.P -3055

Roll No. ....

Unique Paper Code: 2223510026

Name of the Paper: Laser Physics and its Applications (DSE Paper)

Name of Course : B.Sc. Prog.–Physical Sciences\_NEP: UGCF-2022

Semester : VI- Semester (DSE Paper)

Duration : 2 Hours

Maximum Marks : 60

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

**Attempt *Four* questions in all including Q.No. 1 which is compulsory.**

Non-programmable scientific calculator is allowed

Q1. Attempt any five:

(3x5 = 15)

- (a) What is the full form of LASER?
- (b) Name three medical applications of Laser.
- (c) What is population inversion? How is it achieved?
- (d) Write the 3-level laser rate equation.
- (e) Give two examples of solid state lasers.
- (f) If light of 660nm has a coherence length of  $13.2 \times 10^{-6}$  m. Calculate coherence time.

Q2. (a) What are Einstein's A and B coefficients? Derive expressions for these. (12)

- (b) Find the ratio of spontaneous emission to stimulated emission for a cavity of temperature 50K and wavelength  $10^{-5}$  m. Given  $h = 6.626 \times 10^{-34}$  J.s,  $k = 1.38 \times 10^{-23}$  J/K
- (3)

Q3. (a) Discuss in detail the concept of directionality, monochromaticity, intensity and coherence of laser light. (12)

- (b) A gas laser is generating a laser beam of 4mW power. Calculate the number of photons emitted by the laser. The wavelength of the emitted radiation is 680 nm. (3)

Q4. Discuss the construction and working of Helium-Neon (He-Ne) laser. (15)

Q5. Discuss briefly the use of laser in Holography. (15)

