2013

OPTOELECTRONICS AND LASER MATERIAL PROCESSING

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Objective Type Questions)

1. Write brief answers for the following : 5 × 2 = 10

i) What are the coherent properties of two light beams ?

ii) What is the power measurement unit of a lens ? How is it represented mathematically ?

iii) Explain the term "Population Inversion".

iv) Write down Snell's law of refraction.

v) State two industrial applications of LASER.

GROUP – B

(Short Answer Type Questions)

Write short notes any *three* of the following. 3 × 5 = 15

2.CO_2 LASER.

3. LASER cutting.

4. Refraction through single lens (Double convex).

5. LASER surface treatment.

6. Advantages of LASER diode over LED.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What do you man by LASER welding ?

b) Explain the LASER welding process.

c) Write a note on Eximer LASER. 3 + 7 + 5

8. a) What does the acronym LASER represent ?

b) Explain the concept of spontaneous emission.

c) What do you understand by stimulated emission ?

d) Why is GaAs a better material for LED ? 2 + 5 + 4 + 4

9. a) What do you understand by the term 'coherence' ?

b) How is coherence achieved in LASER beam ?.

c) Why is DH LASER better than homojunction LASER ?

3 + 7 + 5

10. a) Explain how the rates of the three transition processes of absorption, spontaneous emission and stimulated emission are mathematically related.

b) Explain the concepts of radiative and non-radiative recombination.

c) Distinguish between direct and indirect band gap semiconductors. 7 + 4 + 4

11. a) Explain population inversion in a three level system.

b) What do you understand by LASER safety ? Explain LASER safety in brief. 7 + 8

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