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Register Number

Name of the Candidate:

M.Sc. DEGREE EXAMINATION, May 2015

(ELECTRONIC SCIENCE)

(SECOND YEAR)

630: LASER AND FIBRE OPTICS

Time: Three hours

Maximum: 100 marks

SECTION-A

(5×4=20)

Answer any FIVE questions

1. What is population inversion? What are the different techniques used to produce population inversion.
2. Write a note on mode locking in Lasers.
3. Give an account of liquid laser.
4. Briefly explain the principle of semi conductor laser.
5. Explain how holography is used for non-destructive testing.
6. Give the classification of optical fibres.
7. Explain distortion due to dispersion.
8. List any four advantages of optical communication sources.

SECTION-B

(5×16=80)

Answer any FIVE questions

9.
 - i) What are Einstein coefficients? Find the relation between them.
 - ii) Derive an equation for the threshold population inversion required for the oscillation of a laser.
10. Write down the rate equations for a four level system and derive the equation for population inversion. Also show that the inversion can be much more easily obtained in a four-level scheme as compared to a three-level scheme.
11. Explain the modes of vibrations of CO₂ molecule. Describe the construction and working of CO₂ laser with necessary diagram.
12. Explain the principle, construction and working of a semiconductor diode laser with necessary diagram.
13. Describe the role of Laser instruments in
 - i) the removal of tumours of vocal cords
 - ii) Brain surgery and
 - iii) Plastic Surgery
14. Discuss in detail any one Fibre optic fabrication technology.
15. Write down the scalar wave equation and find the solution to step index fibre. Apply boundary condition and discuss the wave guidance in the optic fibre.
16. Describe in detail the following detector in fibre optic communication
 - i) Semiconductor PIN and
 - ii) Avalanche photodiode
