MPH24C — NONLINEAR OPTICS

Time : Three hours   Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL questions.

All questions carry equal marks.

1.   (a)   Discuss briefly the working of Ruby laser.

Or

(b)   Explain the principle of p-n junction laser.

2.   (a)   Give the theory of parametric oscillation. What is the condition for oscillation?

Or

(b)   What do you mean by self-focusing? Explain briefly.

3.   (a)   What is two photon absorption? Give the experimental setup for the detection of two photon absorption.

Or

(b)   What is electro-optic effect? What are the applications of electro-optic effect?

4. (a) Write a note on nonlinear optical properties of borates.

Or

(b) How does FTIR work? Explain.

5. (a) Explain the concept of acceptance angle in an optical fiber with the help of proper diagram. How it is related to numerical aperture of an optical fiber?

Or

(b) What do you understand by attenuation? Explain its various types.

SECTION B — (3 × 15 = 45 marks)

Answer any THREE questions.

All questions carry equal marks.

6. Describe the construction and working of a He-Ne laser.

7. Discuss the optical second harmonic generation with the relevant theory.

8. Discuss the basic theory of stimulated Raman scattering.

9. Describe how the structure of a crystal can be determined by X-ray diffraction.

10. Discuss the propagation of electromagnetic waves in a step index optical fiber.