

FACULTY OF SCIENCE
M. Sc. III – Semester Examination, January 2018

Subject : Physics

Paper – I
Modern Optics

Time : 3 Hours

Max. Marks: 80

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

- 1 Briefly explain various pumping mechanisms involved in laser systems.
- 2 What are the basic requirements needed to make any laser device?
- 3 Mention different applications of GaAs laser.
- 4 What is the basic principle of excimer laser?
- 5 Explain the concept of Fourier transform hologram.
- 6 Explain spatial frequency filtering.
- 7 Explain the phenomena of optical mixing.
- 8 Explain the concept of phase matching in nonlinear optics.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

- 9 (a) Discuss the advantages of a four level system over a three level laser system and justify using rate equations.
OR
(b) Explain the absorption, spontaneous emission and stimulated emission. Hence arrive at the relation between Einstein coefficients.
- 10 (a) Explain the working of Nd : YAG laser and describe its applications.
OR
(b) Explain in detail the construction and working He-Ne laser and explain gas lasers are more efficient than solid state lasers.
- 11 (a) Mention different types of holograms and explain how do you record and reconstruct a hologram.
OR
(b) Explain the concept of Fourier transform hologram and mention different applications of holograms.
- 12 (a) Discuss Fourier transform properties of thin lenses.
OR
(b) Explain nonlinear phenomena, optical harmonic generation and discuss the principle and working of parametric generation of light.
