



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – NOVEMBER 2017

PH 5511 – OPTICS

(12 BATCH ONWARDS)

Date: 03-11-2017

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART – A

Answer **All** the questions:

(10x 2 = 20 marks)

- 1) What are nodal points and nodal planes?
- 2) What is an eyepiece?
- 3) A biprism is placed at a distance of 4 cm from a narrow slit illuminated by sodium light of wavelength 5890×10^{-10} m. The distance between the coherent sources is 0.06 cm. Find the width of the fringes observed in an eyepiece placed at a distance of 80 cm from the biprism.
- 4) How coherent source can be obtained in practice?
- 5) What is a zone plate?
- 6) Define dispersive power.
- 7) Distinguish between plane of polarisation and plane of vibration.
- 8) State Malu's law.
- 9) Explain second harmonic generation.
- 10) What are meta-stable states?

PART – B

Answer any **FOUR** questions:

(4x 7.5 = 30 marks)

- 11) Explain the defects of astigmatism and coma. How are they minimized or eliminated?
- 12) Explain how white and dark interference fringes are formed using white light in Lloyd's single mirror experiment?
- 13) Give Fresnel's explanation for rectilinear propagation of light.
- 14) Write a note on Nicol prism.
- 15) Describe Nd-YAG laser and explain its working?
- 16) Explain the construction and working of Huygen's eye piece.

PART – C

Answer any **FOUR** questions:

(4x 12.5 =50 marks)

- 17) Explain chromatic aberration? Derive an expression for longitudinal chromatic aberration for an object at infinity?
- 18) Describe a Michelson's interferometer. How can it be used for the measurement of wavelength of monochromatic light?
- 19) Discuss the Rayleigh's criterion for the limit of resolution. Obtain an expression for the resolving power of a plane transmission grating.
- 20) Describe the process of production and detection of circular and elliptically polarized light.
- 21) Discuss Einstein's theory of stimulated and spontaneous emission/absorption and hence deduce the conditions for laser action.
- 22) Describe with necessary theory an experiment to determine the wavelength of light by Fresnel's biprism.
