



Date: 15-06-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART – A

Q. No Answer **ALL** Questions **(10 x 2 = 20 Marks)**

- 1 What are nodal planes and nodal points in a lens system?
- 2 Define resolving power of a prism.
- 3 Distinguish between the spectra of prism with that of grating.
- 4 State Brewster's law.
- 5 Define optical activity with examples.
- 6 Mention any two methods to minimize spherical aberration.
- 7 Yellow light of wavelength 5800 \AA from a narrow slit is incident on a double slit. If the overall separation of 15 fringes on a screen 150 cm away is 3.5 cm, find the slit separation.
- 8 Write any two properties of laser beam.
- 9 What is Kerr effect?
- 10 If the refractive index of glass is 1.7, what is the angle of polarization?

PART – B

Answer any **FOUR** Questions **(4 x 7.5 = 30 Marks)**

- 11 What is a system matrix? Obtain it for two thin lenses separated by a distance and hence derive the formula for focal length.
- 12 What is an air wedge? Explain the formation of interference fringes by an air-wedge and derive an expression for fringe width.
- 13 Explain the phenomenon of double refraction with a neat diagram. Discuss the Huygens's theory of double refraction in uniaxial crystals.
- 14 Outline the theory of second harmonic generation with any two relevant applications.
- 15 With a neat diagram, explain the construction and working of Helium-Neon laser.
- 16 (i) Describe the method of production and detection of circular polarized light. (5)
(ii) In an optical fiber, the core material has refractive index 1.8 and refractive index of clad material is 1.4. What is the value of critical angle? (2.5)

PART – C

Answer any **FOUR** questions

(4 x 12.5 = 50 Marks)

- 17 Explain in detail, the different types of monochromatic and chromatic aberrations and how they can be reduced/eliminated?
- 18 Discuss the theory of Fresnel diffraction at circular aperture and find the i) intensity at an axial point ii) intensity at a non-axial point. Give its importance.
- 19 Discuss the construction and working of a Michelson's Interferometer and hence determine the wavelength of light.
- 20 (i) Explain the theory of interference due to reflected light with a neat diagram. (9)
(ii) A crown glass prism of refracting angle 12° is combined with a flint glass prism to obtain deviation without dispersion. If the refractive indices for red and violet rays for crown glass are 1.612 and 1.654 and for the flint glass are 1.532 and 1.575 respectively, find the angle of flint glass prism and net deviation. (3.5)
- 21 (i) Describe Fresnel's Biprism. Explain how the wavelength of light can be determined. (9)
(ii) Interference fringes are observed with a biprism of refracting angle 10° and refractive index 1.5 on a screen 70 cm away from it. If the distance between the source and the biprism is 25 cm, calculate the fringe width when the wavelength of light used is 5800 \AA . (3.5)
- 22 Explain the construction and working of a Laurent's half shade polarimeter.

@@@@@@