(Pages : 3) **S – 4204**

Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree Examination, February 2024

Restructured Course

Physics and Computer Applications

Paper VIII – OPTICS

(2003 Scheme)

Time : 3 Hours Max. Marks : 40

SECTION – A

Answer any **three** questions, each carries **6** marks.

1. Describe the experimental setup for producing Newton's rings by reflected light. Explain how this method to is used to measure the refractive index of a liquid.

2. Discuss the analytical theory of Young's double slit experiment. Derive an expression for bandwidth.

3. Discuss the theory and intensity distribution of the Fraunhofer diffraction by a double slit.

4. Explain with theory the production of circularly polarized and elliptically polarised light waves.

5. What do you mean by spherical and chromatic aberration of a lens? Explain how they are caused.

(3 × 6 = 18 Marks)

P.T.O.

SECTION – B

Answer any **ten** questions, each carries **1** mark.

6. What are coherent sources?

7. Why the center of Newton's rings is dark for reflected light?

8. Explain the phenomenon of interference.

9. What are the condition for producing sustained interference?

10. What is meant by diffraction of light?

11. Why do we not see diffraction of light in everyday life?

12. What would happen when the circular aperture in Fresnel's diffraction is replaced by a

13. What is the difference between Fresnel's and Fraunhofer diffraction?

14. What is dispersive power of a grating?

15. Distinguish between ordinary light and polarised light.

16. What is optical activity?

17. Distinguish between ordinary and polarised light.

18. State and explain Brewster's law.

19. Explain the double refraction in calcite crystal.

20. What is a graded index fiber? What is its advantage over step index fiber?

(10 × 1 = 10 Marks)

SECTION – C

Answer any **four** questions, each question carries **3** marks.

21. Two coherent sources of monochromatic light of wavelength 6000A produces pattern on a screen kept at a distance of 1 m from them. The distance between two consecutive bright fringes on the screen is 0.5 m. Find the distance between the coherent sources.

22. The source intensities I_1 and I_2 are superimposed so that the ratio of maximum to minimum intensity is found to be 25. Find $\frac{I_1}{I_2}$.

23. A plane transmission grating has 14,000 lines to an inch for a length of 6 inches. If the wavelength region is 5×10^{-5} cm, find the resolving power of the grating in the first order and the smallest wavelength difference that can be resolved.

24. Find the half angular width of the central bright maximum in the Fraunhoffer diffraction pattern of a slit of width 12×10^{-5} cm when the slit is illuminated by monochromatic light of wavelength 6000A.

25. Calculate the specific rotation for sugar solution using the following data :
    Length of the tube = 20 cm
    Volume of the tube = 120 cm^3
    Quantity of sugar dissolved - 6 g
    Angle of rotation of the analyser for restoring equal intensity = 6.6º.

26. If the critical angle for glass air boundary is 40º. Calculate the polarizing angle for glass.

27. Find the numerical aperture, acceptance angle and the critical angle of the fibre if light enters from air. Given refractive index of the core = 1.52 and the refractive index of the cladding = 1.47.

(4 × 3 = 12 Marks)

———————