FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19UPHY5B08 / CC20UPHY5B08 - OPTICS

(Physics - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours   Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. State Fermat's principle of extremum path.

2. What are the necessary conditions for producing sustained interference?

3. Write down the conditions of brightness and darkness for oblique incidence of light on plane film producing interference.

4. What happens to the Newtons rings when the space between the lens and glass plate is filled with water instead of air?

5. Define standard metre in terms of wavelength of cadmium.

6. Distinguish between Fresnel diffraction and Fraunhofer diffraction.

7. Draw the intensity distribution pattern of double slit Fraunhofer diffraction.

8. What is the principle of Fresnel diffraction?

9. Write the expression for the thickness of quarter wave plate and halfwave plate.

10. Define optical rotation and optical activity.

11. What is an optical fibre?

12. What are the advantages of fibre optic sensors?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. Two plano-convex lenses each of $\mu = 1.5$ have radii of curvature of 20 cm and 30 cm. They are placed in contact with curved surfaces towards each other and the space between them is filled with a liquid of $\mu = 4/3$. Find the focal length of the system.

14. A non-reflecting film of refractive index μ_f is coated on a glass having refractive index μ_g. Obtain the condition on μ_f when light is incident from air.

15. A plane wavefront of wavelength 6×10^{-7}m is intercepted by a circular aperture of radius 0.3cm. Calculate the number of half period zones in the aperture with respect to an axial point at distance (i) 100 cm (ii) 500 cm.

16. When sunlight is incident on water surface at glancing angle of 37°, the reflected light is found to be completely plane polarised. Determine the refractive index of water and angle of refraction.

17. How can a plane polarised light be converted into a circularly polarised light?

18. Explain how image is constructed from a hologram.

19. Explain the use of holograms (a) in interferometry and (b) in optical instruments.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

20. Describe an experiment to detemine the wave length of sodium light using Fresnel's biprism.

21. Give the theory of plane diffraction grating and explain how it is used to measure the wavelength of given source of light.

(1 × 10 = 10 Marks)

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