D5BPH2303   Reg. No: ....

                                                     Name: ....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(Regular/Improvement/Supplementary)

PHYSICS

GPHY5B08T: OPTICS

Time: 2 Hours   **Maximum Marks: 60**

SECTION A: Answer the following questions. Each carries *two* marks.

(Ceiling 20 marks)

1. Prove law of reflection using Fermat's principle.

2. What do you mean by non-reflecting films? Write the expression of the minimum thickness of a non reflecting film for a particular wavelength.

3. How does the resolving power of an optical instrument changes with wavelength? What is the advantage of electron microscope?

4. Distinguish between positive and negative crystals with examples.

5. State any two properties of a Hologram.

6. Distinguish between step index and graded index fibers.

7. What is Fresnel half period zones?

8. What is acceptance angle of an optical fiber? Write its expression.

9. Comment on limit of resolution.

10. Draw the intensity distribution pattern in N-slit diffraction.

11. What do you mean by fiber optic sensors?

12. Mention any two applications of Holography.

SECTION B: Answer the following questions. Each carries *five* marks.

(Ceiling 30 marks)

13. Obtain Newton's formula for focal length of a lens with the help of a diagram.

14. Draw Fresnel's two mirror arrangement and explain it.

15. A biprism is placed 5 cm from a slit illuminated by sodium light of wavelength $5890A^0$. The width of the fringes obtained on the screen 75 cm from the biprism is 9.4×10^{-2} cm. Find the distance between the two coherent sources.

16. Explain Fraunhoffer diffraction at a circular aperture.

17. Explain the construction of a Hologram.

18. Find the radius of the first, second and third half period zones in a zone plate behaving like a convex lens of focal length 60 cm for light of wavelength 5000A^0.

19. The refractive index of the core and cladding of an optical fiber are 1.55 and 1.51 respectively. Determine the numerical aperture and acceptance angle of the fiber.

SECTION C: Answer any *one* question. The question carries *ten* marks.

20. (a) Explain Newton's ring formation with a neat diagram. Obtain the expression for radius of the mth dark ring.

    (b) Explain how Newton's rings can be used for the determination of wavelength of light.

21. Explain the production and analysis of plane, circularly and elliptically polarized light.

(1 × 10 = 10 Marks)