

21U510

(Pages: 2)

Name:

Reg.No:

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U PHY5 B08 / CC20U PHY5 B08 - 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. Give three laws that can be deduced using Fermat's principle.
2. Two sources of intensities I and $4I$ are superimposed. Obtain the intensities where the phase difference is a) $\pi/2$ and b) π .
3. What is Fresnel's biprism? What is its use?
4. Write down the conditions to be satisfied for an anti-reflection coating?
5. Why is the interference pattern observed in Newton's rings arrangement appears as concentric circles?
6. Write down the expression for intensity distribution in the diffraction pattern of Fraunhofer single slit experiment and explain the symbols.
7. Why the diffraction of sound is more evident in daily life than light?
8. Define the dispersive power of a grating and write down an expression for it.
9. What happens to the intensity of light when it emerges from a polaroid?
10. How will you distinguish a circularly polarised light and partially polarised light?
11. Give any two applications of holography.
12. What is numerical aperture of an optical fibre?

(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. Derive the condition for brightness for normal incidence of light on a plane film.

15. The radius of the first zone on the zone plate is 0.05cm. A plane wave front of light of wavelength 5000\AA is incident on it. Find the distance of the screen from the zone plate so that light is focussed to bright spot.
16. Calculate the thickness of a quarter wave plate and a half wave plate for the light of wavelength 500nm. Given $\mu_e=1.553$ and $\mu_o=1.544$.
17. Explain optical activity, specifying dextro and laevo rotation. Give examples.
18. Explain different types of holograms.
19. What is pulse dispersion? What are the three types of pulse dispersion?

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. How can Michelson's interferometer is used for (1) Determining the difference of wavelengths of two nearby spectral lines (2) Calibrating standard metre.
21. Starting from the intensity distribution of a double slit diffraction pattern, find the intensity distribution in an N slit slit diffraction. Draw the intensity distribution for $N=6$.

(1 × 10 = 10 Marks)
