

22U514

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Name:

Reg.No:

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(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. Write down the Newtons formula and explain its symbols.
2. Write down the expression for the resultant intensity of two waves when they undergo superposition and explain the symbols
3. Why is the angle of Fresnel's biprism kept so small?
4. Explain the interference of light by a thin film.
5. What is a non-reflecting film? How it can be achieved?
6. Write down the condition for obtaining intensity minima and maxima in Fraunhofer single slit diffraction pattern and explain the symbols.
7. Draw the intensity distribution pattern of double slit Fraunhofer diffraction.
8. What is meant by phase reversal zone plate?
9. What is a quarter wave plate? What is its use?
10. What is a polarimeter?
11. Write down the process of reconstruction from a hologram.
12. Give the expression for numerical aperture of a optical fibre.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. State and explain Fermat's principle of least time. Using this explain the rectilinear propagation of light.
14. The Michelson's interferometer experiment is performed with a source which consists of two wavelengths 4882 \AA and 4886 \AA . Through what distance does the mirror have to be moved between two positions of the disappearance of the fringes.

15. Calculate the angle between the central image of lamp filament and its first diffracted image produced by a fabric with 160 threads per cm. $\lambda = 6 \times 10^{-5}$ 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. Explain the detection of plane, circularly and elliptically polarised light.
18. Explain any five applications of holography.
19. Write a short note on optical fibre.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. What are Newton's rings? Derive an expression for the radii of rings.
21. Explain the rectilinear propagation of light on the basis of Fresnel's half period zones.

(1 × 10 = 10 Marks)
