20U510 (Pages: 2) Name: .....

Reg.No: .....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2022

(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. State Fermat's principle of least time.
2. Write an expression for coherence length and explain the symbols.
3. What are the conditions for brightness and darkness for normal incidence of light on a plane film producing interference?
4. What is an air wedge?
5. Explain why the centre of Newton's rings is dark for reflected light
6. Write down the expression for intensity distribution in the Fraunhofer diffraction of a circular aperture and explain the symbols.
7. Write down the condition for diffraction maxima and minima in a double slit Fraunhofer diffraction and explain the symbols.
8. Define the principal focal length of a zone plate. Write down an expression for it.
9. What is the difference between uniaxial and biaxial crystals?
10. Write the expression for the thickness of quarter wave plate and halfwave plate.
11. Briefly explain the principle of hologram.
12. What do you mean by pulse dispersion in optical fibres?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. A convex lens of focal length 20 cm and a concave lens of focal length 10 cm are separated by 8 cm. An object of height 1 cm is placed at a distance 40 cm from the convex lens. Calculate the position and size of the image.
14. The Michelson's interferometer experiment is performed with a source which consists of two wavelengths 4882 Å and 4886 Å. Through what distance does the mirror have to be moved between two positions of the disappearance of the fringes.
15. Light of wavelength 6000 Å is incident on a slit of width 0.30mm. The screen is placed 2m away from the slit. Find the position of the first dark fringe and the width of the central bright fringe.
16. Discuss the production of circularly and elliptically polarised light.
17. Explain the working of Laurent's half shade.
18. What are the applications of Holography?
19. Derive an expression for Numerical aperture.

(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. What are Fresnel's half period zones? Show that the areas of a half period zones are equal.

(1 × 10 = 10 Marks)

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