TB205415V

Reg. No :.....

Name :.....

B. Sc. DEGREE (C.B.C.S.) EXAMINATION, NOVEMBER 2022

2020 ADMISSIONS REGULAR AND 2019, 2018 ADMISSIONS SUPPLEMENTARY

SEMESTER V - CORE COURSE (PHYSICS)

PH5B07B18 - PHYSICAL OPTICS AND PHOTONICS

Time : 3 Hours **Maximum Marks : 60**

Part A

I. Answer any Ten questions. Each question carries 1 marks **(10x1=10)**

1. Differentiate between optical path difference and geometrical path difference and connect them.
2. Determine the phase difference between two coherent waves having wavelength 540nm when the path difference between them is 36nm.
3. Distinguish between coherent sources produced by division of amplitude and division of wavefront.
4. Explain the missing orders in the Fraunhofer diffraction pattern of a double slit.
5. Distinguish between Fresnels and Fraunhofer diffractions.
6. Discuss double refraction in uniaxial crystal.
7. Explain the term optic axis.
8. Explain the significance of A and B coefficients?
9. Define spontaneous emission.
10. Name the active material in ruby laser.
11. Discuss four advantages of optical fibre communication.
12. Write down an equation for mode volume in terms of V parameter of optical fiber.

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. Derive an expression for the radius of an n^{th} dark ring of Newton's ring system
14. Newton's rings are observed in reflected system of light of wavelength 590nm. The diameter of dark ring is 0.5cm. Find the radius of curvature of lens.
15. Explain the rectilinear propagation of light using the concept of half-period zones.
16. Deduce the missing orders for a double-slit Fraunhoffer diffraction pattern if the slit widths are 0.16mm and they are 0.8mm apart.
17. Explain the production of linearly polarised light by the method of reflection.
18. If the plane of vibration of the incident beam makes an angle of 60 degrees with the optic axis. Compare the intensities of ordinary and extraordinary rays.
19. Derive the threshold condition for laser action.
20. Prove that population inversion is the necessary condition for laser action.
21. A step index fiber of diameter 60 micrometer has a numerical aperture of 0.32. If the input wavelength is 1.6 micrometer, determine the number of modes in the cable.

Part C

III. Answer any Two questions. Each question carries 10 marks **(2x10=20)**

22. With the necessary theory, describe an experiment to determine the refractive index of liquid using Newton's ring apparatus.
23. With the necessary theory, explain an experiment to determine the wavelength of monochromatic light using transmission grating.
24. Describe the production and detection of circularly polarized light
25. Describe the attenuation and dispersion mechanisms in optical fiber.