TB245792X

Reg. No :.....

Name :.....

BACHELOR'S DEGREE (C.B.C.S.) EXAMINATION, FEBRUARY 2024

2021 ADMISSIONS SUPPLEMENTARY (SAY)

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. Explain the refraction and reflection in a thin film.
2. The central part of Newton's ring is dark in the reflected system, explain the mathematical reason.
3. Explain the term localized fringes.
4. Define dispersive power of grating.
5. Distinguish between the single slit and double-slit diffraction patterns.
6. Describe the applications of Brewster's law.
7. Discuss double refraction in uniaxial crystal.
8. Distinguish between thick and thin hologram.
9. Briefly explain is laser spiking.
10. Mention the advantages of four level pumping scheme over three level scheme.
11. Explain how does pulse dispersion affect data transmission?
12. Specify the telecom window used in optical fiber communication.

Part B

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

13. Explain analytically how the intensity is distributed when two coherent sources superpose.
14. A biprism is placed 5cm from a slit illuminated by sodium light of wavelength 589nm. The width of the fringes obtained on a screen 75cm from the biprism is 0.9424mm. What is the distance between the two coherent sources?
15. Explain the rectilinear propagation of light using the concept of half-period zones.
16. Find the half angular width of the central bright maximum in Fraunhoffer diffraction pattern of a single slit of width 0.0012mm when the slit is illuminated by monochromatic light of wavelength 600nm.
17. Explain the production of linearly polarised light by the method of reflection.
18. Unpolarized light falls on two polarizing sheets placed one on the top of the other. What must be the angle between the characteristic direction of the sheet if the intensity of the transmitted light is one-fourth the intensity of the incident beam.
19. Obtain the relation between Einstein's A and B coefficients.
20. A step index fiber has radius a = 5 micro meter, core refractive index 1.45, and fractional refractive index change 0.002. Determine the shortest wavelength for which the fiber will act as a single mode waveguide.
21. What is the numerical aperture of a cable whose critical angle is 30 degrees.

Part C

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

22. Discuss the theory of air wedge and explain an experiment to determine the wavelength of monochromatic light.
23. Explain the theory of transmission grating.
24. Describe the production and detection of circularly polarized light
25. Write an essay on optical fibre communication system. What are its advantages and disadvantages over signal transmission through coaxial cables?