QP CODE: 18103332

18103332

Reg No : .....

Name : .....

B.Sc. DEGREE(CBCS) EXAMINATION, NOVEMBER 2018

Third Semester

B.Sc Physics Model I

CORE COURSE - PH3CRT03 - OPTICS, LASER AND FIBER OPTICS

(Common to B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2017 Admission Onwards

7BB61628

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

Part A

Answer any **ten** questions.

Each question carries **1** mark.

1. Is it necessary that the interfering waves should have the same frequency to get sustained interference pattern? If so why?
2. Is it possible to observe interference pattern with light emanating from two independent sources? Why?
3. Write the condition for obtaining bright fringes in interference pattern due to transmitted light ?
4. How can you obtain straight line fringes using Michelson's interferometer?
5. Plot the intensity distribution of Fresnel's diffraction at a straight edge
6. Distinguish between single slit and double slit diffraction pattern
7. Mention two applications of polaroids
8. What is a quarter wave plate?
9. Define photolithography
10. Why core material is having a higher refractive index than that of cladding?
11. What do you mean by index profile of optical fiber?
12. Distinguish between coherent and incoherent fiber bundle

(10×1=10)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. A parallel beam of light strikes an oil m=1.4 film floating in surface of water with m=1.33. When viewed at an angle 300 from the normal 6th dark fringe is seen. Find the thickness of the film, if wavelength of light is 589nm

14. A wedge shaped air film, having an angle of 40 seconds is illuminated by monochromatic light and fringes are observed vertically through a microscope. The distance measured between the consecutive bright fringes is 0.12×10^{-2} m. Calculate the wavelength of light used.

15. In a Newton's ring experiment the diameter of the 5^{th} dark ring is 0.336cm. The wavelength of light used is 588nm. Find the radius of curvature of lens.

16. Show that the area of all half period zones in a zone plate is a constant. For a zone plate of focal length 50 cm and an incident wavelength of 640 nm, find the radius of the first and 9^{th} half period zones.

17. *In an arrangement of Fraunhofer diffraction, with a slit width of 0.2mm , the first minimum is at 5mm on either side of the central maximum. If the distance between the lens and screen is 2 m, calculate the wavelength of light.*

18. Calculate the thickness of a calcite plate which would convert plane polarized light into circularly polarized light. Wavelength of light used is 589nm. Refractive index of calcite for Oray is 1.658 and that of e-ray is 1.486

19. What fraction of atoms is in the excited state in a laser medium at temperature 300°C? Given λ = 590nm.

20. At what temperature is the rate of spontaneous and stimulated emissions equal? Given λ = 500nm

21. A typical helium –neon laser radiation of wavelength 632.8nm. Howmany photons per second would be emitted by a 1 mW helium neon laser?

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **10** marks.

22. Discuss the conditions for interference. Describe Young's experiment and derive an expression for (i) intensity at a point on the screen and (ii) fringe width.

23. Explain the theory of plane transmission grating. How can you determine the wavelength of monochromatic light using grating?

24. Distinguish between plane polarised and unpolarised light. Discuss the production and detection of plane, circularly and elliptically polarized light

25. What are the essential requirements and various steps involved for the producing laser action.? Explain the components of a laser. Discuss the important applications of lasers

(2×10=20)