QP CODE: 19102032

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Reg No : .....

Name : .....

B.Sc. DEGREE(CBCS) EXAMINATION, OCTOBER 2019

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

588E4DD5

Maximum Marks: 60 Time: 3 Hours

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Can interference occur with sound waves? Explain
2. Oil spread on the surface of water appears colored. Why?
3. Write the condition for obtaining bright fringes in interference pattern due to transmitted light ?
4. How would you obtain Newton's rings with bright centre?
5. Distinguish between interference and diffraction
6. What is a plane diffraction grating?
7. What are polaroids?
8. What is the disadvantage of retardation plates?
9. Write any two methods to produce population inversion
10. The efficiency of a four level laser is less than that of a three level laser. Still the four level laser is better than the three level laser. Explain
11. Write two characteristics of a laser beam
12. What is the basic principle of guiding light through an optical fiber?

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. The intensities of the maxima and minima and interference fringe pattern are in the ratio 16:9. Calculate the ratio between amplitude and intensities of 2 interfering beams.

14. Two narrow and parallel slits 0.1 cm apart are illuminated with a monochromatic light of wavelength 589.3nm. The interference pattern is observed at a distance of 25cm from the slits. Calculate the fringe width.

15. A shift of 100 circular fringes is observed, when the movable mirror of Michelson's interferometer is shifted by 0.0295mm.Calculate the wavelength of light.

16. A convex lens of focal length 20cm is placed after a slit of width 0.6mm. If a plane wave of wavelength $6000A^0$ falls normally on the slit, calculate the separation between the second minima on either side of the central maximum.

17. A ray of light is incident on the surface of a plate of glass of refractive index 1.62 at the polarizing angle. Calculate the angle of refraction

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. At what temperature are the rays of spontaneous and stimulated emission equal if the wavelength l of emitted photon 500nm. If the temperature is 300K at what wavelength they are equal

20. Find the relative population of two states in a Ruby laser that produces light beam of wavelength 694.3nm at 300K.

21. What ido you mean by modes of propagation? Compare a single mode and multimode fiber.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Explain the formation of interference fringes formed by an air wedge. Derive an expression for the fringe width. How can the above method used for determining the diameter of thin wire accurately

23. Show that the radii of its half period zones are proportional to the square root of natural numbers. Derive an expression for its focal length. Aslo show that for a given wavelength, zone plate has multiple foci.

24. Explain the Fraunhofer diffraction at double slits and compare the intensity distribution pattern with that of a single slit.

25. Write names of various losses taking place in the optical fiber. If the length of optical fiber is 6km and output power is 1/120 of input power, then find fiber loss and attenuation coefficient.

(2×10=20)