TB165405D

Reg. No.: .....

Name : .....

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2018
(2016 Admission Regular & 2015 Admission Supplementary)
SEMESTER V- CORE COURSE (PHYSICS)
PH5B06TB – PHYSICAL OPTICS AND PHOTONICS

Time: Three Hours **Maximum Marks: 60**

PART A

I. Answer all questions. Each question carries 1 mark.

1. Define interference.
2. What are Fizeau Fringes? Give an example.
3. Define birefringence.
4. What are the features of laser light?
5. What is the typical unit of pulse dispersion in optical fiber?

(5 x 1 = 5)

PART B

II. Answer any five questions. Each question carries 2 marks.

6. What are the features of fringes formed in an air wedge?
7. What is the law of conservation obeyed by interference phenomena? Briefly explain.
8. How would you obtain Newton's rings with bright center?
9. State and Prove Malus Law.
10. Distinguish between negative and positive crystals.
11. What are active centers in a laser system?
12. What are the advantages of four level pumping scheme over three level scheme?
13. Explain how optical fiber system shields against data stealing?

(5 x 2= 10)

PART C

III. Answer any five questions. Each question carries 5 marks.

14. The inclined faces of a glass prism (μ=1.5) make an angle 1^0 with base of the prism. The slit is 10 cm from the biprism and is illuminated by light of wavelength $5900A^0$. Find the fringe width observed at a distance of 1m from the biprism.
15. A parallel beam of light of wavelength $5890A^0$ is incident on a thin glass plate of refractive index 1.50 such that the angle of refraction is 60^0. Calculate the smallest thickness of the plate which will appear dark by reflection.
16. Explain the cases of missing orders in the double slit diffraction pattern? Deduce the missing orders for a double slit Fraunhoffer diffraction pattern if the slit widths are 0.16 mm and they are 0.8 mm apart.
17. A ray of light is incident on glass surface at the polarizing angle. Calculate the angle of refraction of the ray. Refractive index of the glass= 1.63.

18. Obtain the relation between Einstein's A and B coefficients.
19. Drive the threshold condition for laser action.
20. An optical fiber has attenuation of 3.2dB/km at 900nm. If 1.2 mW power is launched at the input what is the power output after 10km?
21. A step index fiber of diameter 60micrometer has a numerical aperture of 0.32. if the input wavelength is 1.6 micrometer, determine the number of modes in the cable.

(5 x 5 = 25)

PART D

IV. Answer any two questions. Each question carries 10 marks.

22. Explain how a plane transmission grating is used to determine the wavelength of sodium light?
23. Discuss the theory of interference due to a wedge shaped film and hence determine the thickness of the spacer.
24. Discuss the theory of formation of elliptically polarized light and hence explain the experiment to produce and detect it.
25. Discuss the working principle of holography. Discuss any three applications of hologram.

(2 x 10 = 20)