TB145660D

Reg.No:.....

Name: .....

B.Sc. DEGREE (C.B.C.S.S) EXAMINATIONS NOVEMBER 2018

(2014 Admission Supplementary)

SEMESTER V- CORE COURSE (PHYSICS)

PHY5POP – PHYSICAL OPTICS & PHOTONICS

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

PART A

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

1. Define optical path.
2. Write on the Fresnel's assumptions of diffraction.
3. Distinguish between unpolarised and polarised light.
4. Define double refraction.
5. What is the wavelength of emission from ruby laser?
6. Give an example of a laser that employs mode locking.
7. What is the frequency of the carrier waves in optical fiber communication?
8. Write down the equation for numerical aperture.

(8x1 =8)

PART B

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

9. Write a note on coherent sources.
10. Explain two applications of Michelson's interferometer.
11. Differentiate between interference and diffraction.
12. Describe the missing orders in a double slit pattern.
13. Briefly discuss the principle in Nicol Prism.
14. Distinguish between o-ray and e-ray.
15. Briefly outline the three level pumping scheme.
16. Give the schematic diagram of energy levels and possible transitions in He-Ne laser.
17. What is material dispersion?
18. What is normalized frequency?

(6x2 =12)

PART C

III. Answer any four questions. Each question carries 4 marks.

19. A glass wedge of angle 0.01^c is illuminated by monochromatic light of wavelength $6000A^0$ falling normal on it. At what distance from the edge of the wedge will be 10^{th} fringe be observed by reflected light.
20. Newton's rings are observed in reflected light of $\lambda = 5.9 \times 10^{-5}$ cm. the diameter of 10^{th} dark ring is 0.5 cm. Find the radius of curvature and the thickness of the air film.

21. Calculate the length of the solution of concentration 50kgm^{-3} which produces an optical rotation of 45^0. The specific rotation of solution is 0.0523radm^{2}kg^{-1}.
22. The wavelength of emission of a laser is 532 nm and the upper laser level has a life time of 2 micro seconds. Determine the coefficient of stimulated emission.
23. Find the ratio of population of the two states of Nd:YAG laser that produces a light of wavelength 1064 nm at 30°C.
24. Find the critical angle of a ray travelling from glass with refractive index 1.6 to water of refractive index 1.33.

(4x4 =16)

PART D

IV. Answer any two questions. Each question carries 12 marks.

25. With necessary theory explain the method to determine the wavelength of a light source using Newton's ring arrangement.
26. Explain Fraunhoffer diffraction through a single slit. Draw the intensity distribution curve.
27. Explain double refraction. Give Huygen's explanation for double refraction. Explain the construction and working of a polarizer employing the principle of double refraction.
28. Outline various dispersion mechanisms in optical fibers. What are the telecom windows and how are they connected to fiber attenuation?

(2x12 =24)