Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/
Improvement) Examination, April 2023
(2019 and 2020 Admissions)
CORE COURSE IN PHYSICS
6B11PHY : Optics and Photonics

Time : 3 Hours

Max. Marks : 40

SECTION – A

(Short answer **six** questions. Answer **all** questions. **Each** carries 1 mark.)   **6**

1. The angle of biprism is _____

2. In Fraunhofer class of diffraction the source is _____ distance from the obstacle.

3. Phase difference between two successive Fresnel's half period zones is _____

4. In propagation of electromagnetic waves, the angle between the direction of propagation and plane of polarization is _____

5. A soap bubble appears multicoloured in white light due to _____

6. The interference in which there is an increase in amplitude and hence intensity is called _____

SECTION – B

(Short answer **eight** questions. Answer **any six**. **Each** carries 2 marks.)   **12**

7. Draw the intensity distribution curve of interference pattern.

8. What are coherent sources ? How are they realized in practice ?

9. Compare a zone plate and a convex lens.

10. Explain the phenomenon of polarization by double refraction.

P.T.O.

---

11. What is metastable state ?

12. Distinguish between step index fibre and the graded index fibre.

13. Explain how image is constructed from hologram.

14. Discuss any two applications of holography.

SECTION – C

(Problem **six** questions. Answer **any four**. **Each** carries 3 marks.)   **12**

15. In Youngs experiment, the interference pattern is found to have an intensity ratio between the bright and dark fringes as 9. What is the ratio of a) intensities and b) amplitudes of the two interfering waves.

16. Light of wavelength 588 nm is incident on a thin film of glass of $\mu = 1.5$ such that the angle of refraction in the plate is 60°. Calculate the smallest thickness of the plate which will make it dark by reflection.

17. A narrow slit is illuminated by a light of wavelength 640 nm is placed at a distance of 3 m from a straight edge. If the distance between the straight edge and the screen is 6 m. Calculate the distance between the first and fourth bands.

18. Calculate the thickness of double refracting plate capable of producing a path difference of $\lambda/4$ between extra ordinary and ordinary waves. Given $\lambda = 589$ nm $\mu_0 = 1.53$, $\mu_e = 1.54$.

19. What is the numerical aperture of an optical fibre cable with a clad index of 1.378 and a core index of 1.546 ?

20. At what temperature are the rates of spontaneous and stimulated emission equal ? Assume $\lambda = 5000$Å.

SECTION – D

(Long essay **four** questions. Answer **any two**. **Each** carries 5 marks.)   **10**

21. Explain the formation of Newton's rings. How can these be used to determine the wavelength of monochromatic light ?

22. Discuss the Fraunhofer diffraction pattern due to double slit in detail.

23. Explain the production and detection of elliptically polarized light.

24. Explain the principle and working of a He-ne laser.

_____