K25U 2943

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Supplementary/ Improvement) Examination, November 2025
(2019 to 2023 Admissions)
COMPLEMENTARY ELECTIVE COURSE IN PHYSICS FOR B.SC. PROGRAMMES
3C03PHY : Optics and Photonics

Time : 3 Hours Max. Marks : 32

PART – A

Short answer questions. Answer **all** questions. **Each** question carries **1** mark.

1. Why the fringes in an air wedge arrangement are straight and parallel ?
2. Mention the basic difference between grating and prism spectra based on their origin.
3. How can you detect a circularly polarized light ?
4. What are the basic steps involved in holography ?
5. What do you mean by a coherent bundle ? **(5×1=5)**

PART – B

Short essay questions. Answer **any 4** questions. **Each** question carries **2** marks.

6. What are coherent sources ? Give the conditions for sustained interference of light waves.
7. Distinguish between Fresnel and Fraunhofer diffractions.
8. Explain the polarization of light by pile of plates.
9. What do you mean by pumping in lasers ? Discuss the different pumping methods adopted.
10. Explain the light propagation mechanism in optical fibers.
11. What do you mean by a fibre-optic communication system ? List its advantages. **(4×2=8)**

P.T.O.

PART – C

Problems. Answer **any 3** questions. **Each** question carries **3** marks.

12. Light of wavelength 6000 Å from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen placed 100 cm away is 1 cm, determine the fringe separation.
13. A parallel beam of monochromatic light is allowed to incident normally on a plane diffraction grating having 1250 lines/cm and a second order spectral line is observed to be deviated through 30 degrees. Determine the wavelength of the spectral line.
14. Calculate the thickness of a half-wave plate for light of wavelength 500 nm. Given, the principal refractive indices are $n_0 = 1.544$ and $n_e = 1.553$.
15. Using a suitable figure, explain the working principle of a ruby laser.
16. A step index fiber has a core of refractive index 1.55 and cladding of refractive index 1.5. Determine the numerical aperture of the fiber. Assume that light enters the fiber from air. **(3×3=9)**

PART – D

Long essay questions. Answer **any 2** questions. **Each** question carries **5** marks.

17. With the help of a neat diagram, discuss a method by which Newton's rings are formed by reflected light. Obtain an expression for the radii of the rings.
18. Discuss the Frensel's explanation of rectilinear propagation of light.
19. What do you mean by a plane, circularly and plane polarized light ? Discuss briefly the theory of production of plane, circularly and elliptically polarized light.
20. Discuss the processes induced absorption, spontaneous emission and simulated emission. Express the transition rates of these processes in terms of the Einstein's coefficients and write down the relations between them. **(2×5=10)**
