



K22U 3643

Reg. No. :

Name :

**Third Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/
Improvement) Examination, November 2022
(2019 Admission Onwards)**

**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** carries **one** mark.

1. State the superposition principle.
2. What is meant by population inversion ?
3. State Brewster's law.
4. What is the principle of optical fibre ?
5. What do you mean by holography ?

(5×1=5)

PART – B

Short essay questions. Answer **any 4** questions. **Each** carries **two** marks.

6. What are the conditions of obtaining constructive and destructive interference ?
7. Distinguish between e-rays and o-rays.
8. Compare a zone plate and a convex lens.
9. Explain how circularly polarised light can be produced.
10. Discuss the advantages of fibre optic communication system.
11. What is the difference between a step index fibre and graded index fibre ? **(4×2=8)**

P.T.O.



PART – C

Problems. Answer **any three** questions. **Each** carries **three** marks.

12. A soap film 5×10^{-5} cm thick is viewed at an angle of 35° to the normal. Find the wavelength of light in the visible spectrum, which will be absent from the reflected light, $\mu = 1.33$.
13. If the grating element is 2×10^{-6} m. How many order of spectrum are possible for a light of wavelength 650 nm ?
14. Calculate the thickness of ice capable of inverting a circularly polarised light. $n_o = 1.309$, $n_c = 1.313$, wavelength of light = 590 nm.
15. When sunlight is incident on water surface at a glancing angle of 37° , the reflected light is found to be completely plane polarised. Determine the refractive index of water and angle of refraction.
16. Calculate the numerical aperture and acceptance angle of a fibre having core refractive index = 1.55 and cladding refractive index = 1.50. **(3×3=9)**

PART – D

Long essay. Answer **any two** questions. **Each** carries **five** marks.

17. Explain the formation of Newton's rings. How can these be used to determine the wavelength of monochromatic light ?
 18. Explain double refraction. Explain the working of Nicol prism. Give Huygen's theory of double refraction.
 19. Discuss the phenomenon of Fraunhofer diffraction at a single slit.
 20. Explain the principle, construction and working of a He-Ne laser. **(2×5=10)**
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