K20U 1300

Reg. No. : .....

Name : .....

**III Semester B.Sc. Degree (CBCSS – Sup./Imp.)**
**Examination, November 2020**
**(2014 – '18 Admns)**
**COMPLEMENTARY COURSE IN PHYSICS**
**3C03PHY : Optics and Photonics**

Time : 3 Hours Max. Marks : 32

***Instruction** : Write answers in **English** only.*

SECTION – A

Very short answer type. **Each** carries **1** mark. Answer **all 5** questions.

1. If the thickness of the air film at the centre is zero, the centre of the Newton's rings will be
2. The concept of _____ is applied in the construction of the zone plate.
3. When a ray of light enters a calcite crystal it gets split up into two rays namely
4. Optical fiber works on the principle of
5. In He-Ne lasers, population inversion is achieved by **(5×1=5)**

SECTION – B

Short answer type. **Each** carries **2** marks. Answer **any 4** questions.

6. Write down the conditions for maximum and minimum intensities.
7. What are the differences between grating spectra and prism spectra ?
8. How can you produce elliptically polarised light ?
9. What is meant by pumping ? What are the different types of it ?

P.T.O.

10. Write any 4 applications of optical fibers.

11. What are the uses of optical fibers ?

**(4×2=8)**

## SECTION – C

Short essay/problem type. **Each** carries **3** marks. Answer **any 3** questions.

12. Calculate the numerical aperture and hence the acceptance angle for an optical fiber if the refractive indices of the core and the cladding are 1.50 and 1.40 respectively.

13. Explain the method of producing plane-polarised light using pile of plates.

14. The diameter of the central zone of a zone plate is 2.3 mm. If a point light source of wavelength 589 nm is placed at a distance of 6 m from it, find the position of the brightest image.

15. Newton's rings are formed in reflected light of wavelength 589 nm with a lens of radius of curvature 1.1 m and a glass plate. Find the radius of the $7^{th}$ dark ring.

16. What is LASER ? Explain the terms spontaneous emission and stimulated emission.

**(3×3=9)**

## SECTION – D

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

17. With a neat diagram explain the formation of Newton's rings in reflected light. How can you determine the wavelength of light ?

18. What is a zone plate ? Explain how focussing of light is achieved by a zone plate. Deduce the expression for focus of a zone plate.

19. Explain how can you make elliptically and circularly polarised light using a quarter wave plate. How can you use a quarter wave plate to detect the type of polarization ?

20. Describe Raman Effect. Explain the origin of Stoke's and Anti-Stoke's lines in Raman Effect. What are their characteristics ?

**(2×5=10)**