Reg. No. : ....

Name : ....

III Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.)
Examination, November 2017
COMPLEMENTARY COURSE IN PHYSICS
3C03 PHY : Optics and Photonics
(2014 Admn. Onwards)

Time : 3 Hours   Max. Marks : 32

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

SECTION – A

Answer **all**. Very short answer type. **Each** question carries **one** mark :

1. In a Ruby laser , the active medium is _____

2. Raman effect is an optical analogue of _____

3. The expression for numerical aperture is _____

4. To invert a circularly polarized light we use _____

5. A soap bubble appears multicoloured in white light due to _____   **(5×1=5)**

SECTION – B

Answer **any four**. Short answer type. **Each** question carries **two** marks :

6. What do you mean by population inversion process ?

7. State Brewster's law.

8. Define dispersive power of a grating.

9. What are the necessary conditions for interference of light waves ?

10. Distinguish between Raman spectra and fluorescence spectra.

11. What are the advantages of optical fiber communication system ?   **(4×2=8)**

P.T.O.

SECTION – C

Answer **any three**. Short essay/problem type. **Each** question carries **three** marks :

12. Derive an expression for acceptance angle.

13. A quarter wave plate is constructed from quartz crystal whose refractive indices are $n_e = 1.553$ and $n_0 = 1.544$. Calculate the thickness of the plate for wavelength of 6500 A°.

14. The radius of the first zone on the zone plate is 0.05 cm. If a plane wave front of light of wavelength $\lambda = 5000$ A° is incident on it. Find the distance of the screen from the zone plate so that light is Focussed to bright spot.

15. Light of wavelength 500 nm is incident normally on a plane transmission grating second order Spectral line is observed at an angle of 30°, calculate the number of lines per meter on the grating surface.

16. The core and cladding of the silica fibre have refractive indices of $n_1 = 1.5$ and $n_2 = 1.4$ respectively. Calculate the critical angle of reflection for the core cladding boundary and acceptance Angle of the fibre.

(3×3=9)

SECTION – D

Answer **any two**. Long essay type. **Each** question carries **five** marks :

17. Explain with theory the production of circularly polarized and elliptically polarized light waves.

18. Discuss in detail Franhuffer diffraction due to a single slit.

19. Explain the formation of Newton's rings. Derive an expression for the radius of the mth dark ring formed by reflection.

20. Derive the relation between Einstein's coefficients.

(2×5=10)

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