Reg. No. : ....

Name : ....

III Semester B.Sc. Degree (CCSS – 2014 Admn. – Regular) Examination, November 2015
COMPLEMENTARY COURSE IN PHYSICS
3C03 PHY : Optics and Photonics

Time : 3 Hours

Max. Marks : 32

SECTION – A

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

1. When white light used in double slit experiment, the color of the central fringe is _____

2. For a grating with N number of planes, the numbers of secondary maxima possible in between any two principal maxima are _____

3. In a uniaxial crystal the velocities of e-ray and o-ray are equal along _____

4. _____ is expression for numerical aperture.

5. Expand LASER.

(5×1=5)

SECTION – B

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

6. Distinguish between Fraunhofer and Fresnel classes of diffraction.

7. Discuss about fiber optic sensors.

8. What do you mean by interference ? What are the conditions for sustained interference of light waves ?

9. Explain polarization by reflection.

10. Define and explain the term 'dispersive power of a grating'. Derive an expression for it.

11. Explain light propagation in fibers.

(4×2=8)

P.T.O.

SECTION – C

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

12. A soap film of thickness 5×10^{-5} cm is viewed at an angle of 35° to the normal. Find the wavelength of light in visible region which are absent in the reflected light. Refractive index of soap film is 1.33.

13. Establish the relation between Einstein's coefficients.

14. The core and cladding of a silica optical fiber have refractive indices of $n_1 = 1.5$ and $n_2 = 1.4$, respectively.

    a) Calculate the critical angle of reflection for the core-cladding boundary.

    b) Calculate the acceptance angle of the fiber.

15. Calculate the thickness of a half-wave plate for light of wavelength 589.3 nm. Principal refractive indices are $n_o = 1.544$ and $n_e = 1.553$.

16. Explain about He-Ne laser. $(3 \times 3 = 9)$

SECTION – D

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

17. Describe Fresnel's diffraction at a straight edge. Derive an expression for the distance of nth bright band from the edge of geometrical shadow. Sketch the intensity distribution of Fresnel's diffraction by a straight edge.

18. Explain production and detection of plane, circularly and elliptically polarized light.

19. Explain the formation of Newton's rings. Describe the method of determination of wavelength of monochromatic light by Newton's ring apparatus.

20. Explain Raman effect. Describe quantum theory of Raman effect. $(2 \times 5 = 10)$

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