LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION - **PHYSICS**

FIFTH SEMESTER – NOVEMBER 2015

PH 5511 - OPTICS

Date : 05/11/2015   Dept. No.   Max. : 100 Marks
Time : 09:00-12:00

PART – A

Answer **ALL** the questions: (10 x 2 = 20 Marks)

1. What are nodal planes?
2. What is meant by astigmatism?
3. What are achromatic fringes?
4. Calculate the wavelength of light used in a Michelson interferometer when 200 fringes moved through 0.0589 mm by movable mirror.
5. What is a zone plate?
6. Define resolving power of a prism.
7. State Malus's law.
8. Find the state of polarization represented by $E_x = E_0 \sin(\omega t - kz)$ and $E_y = E_0 \cos(\omega t - kz)$.
9. What is stimulated emission?
10. Explain Pockel's effect.

PART – B

Answer any **FOUR** questions: (4 x 7.5 = 30 Marks)

11. Explain the construction and working of Ramsden's eyepiece. Give its merits and demerits.
12. Obtain an expression for fringe width of interference fringes formed by Fresnel's double mirror arrangement.
13. Explain Fraunhoffer diffraction at a circular aperture.
14. Discuss polarization by reflection and double refraction.
15. Describe the principle and structure of optical fibres and explain how the wave is propagated in single and multimode fibres.
16. Obtain system matrix and lens formula for thin lens.

PART – C

Answer any **FOUR** questions: (4 x 12.5 = 50 Marks)

17. (i) With a neat diagram, explain the working of direct vision spectroscope.
    (ii) What is spherical aberration? Explain the methods of minimizing spherical aberration.
18. Discuss the interference in thin films due to reflected and transmitted light.
19. (i) Describe the phenomenon of Fresnel's diffraction at a straight edge to obtain the position of maximum and minimum intensity from center of screen.
    (ii) Find the missing orders for a double slit Fraunhoffer diffraction pattern if the slit widths are 0.16 mm and they are 0.8 mm apart.
20. What is a quarter wave plate? Explain the production and detection of elliptically polarized light.
21. Describe the construction and working of Carbon dioxide laser.
22. Discuss the theory of plane transmission grating and explain how the wave length of a light can be determined using that.

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