



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Sc. DEGREE EXAMINATION – PHYSICS**

**FIFTH SEMESTER – APRIL 2017**

**PH 5509 / PH 5506 - OPTICS**

Date: 26-04-2017  
01:00-04:00

Dept. No.

Max. : 100 Marks

**PART – A**

**Answer ALL the questions:**

**(10 x 2 = 20 Marks)**

1. Find the system matrix for a thin lens placed in air and made of refractive index 1.5 and radii of curvature 50 cm each.
2. What is meant by distortion?
3. Compare the fringes produced by Fresnel biprism and Lloyd's mirror.
4. What are achromatic fringes?
5. What is a zone plate?
6. How is the resolving power of a microscope increased?
7. State Malus law.
8. A 20 cm long tube containing sugar solution rotates the plane of polarization by 11 degrees. If the specific rotation of sugar is 66 degrees, calculate the strength of the sugar solution.
9. What is meant by population inversion?
10. What is stimulated Raman scattering?

**PART – B**

**Answer any FOUR questions:**

**(4 x 7.5 = 30 Marks)**

11. Explain the construction and working of Huygen's eyepiece. Give its merits and demerits.
12. Obtain the expression for fringe width in a wedge shaped film.
13. Derive the expression for resolving power of a plane transmission grating.
14. Describe the construction and working of Laurent's half shade polarimeter.
15. Derive the expressions for Einstein coefficients.

**PART – C**

**Answer any FOUR questions:**

**(4 x 12.5 = 50 Marks)**

16. (a) Find the positions of the unit planes in a thick double convex lens. **(6.0)**
- (b) Derive the condition for the combination of two narrow angled prisms to produce dispersion without deviation. **(6.5)**
17. With a neat diagram, explain the principle, construction and working of Michelson interferometer. How it is used to determine the wave length of a monochromatic light? **(9+3.5)**
18. (i) Discuss Fraunhofer diffraction due to a double slit. **(9.5)**
- (ii) Find the missing orders for a double slit Fraunhofer diffraction pattern if the slit widths are 0.16 mm and they are 0.8 mm apart. **(3)**
19. (a) Explain how a Nicol prism works as a polarizer.
- (b) What is a quarter wave plate? Explain how it is used to produce and detect elliptically polarized light. **(5.0+7.5)**
20. Describe the construction and working of He-Ne laser with neat diagrams.

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