# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – November 2009

**PH 5506 - OPTICS**

Date & Time: 07/11/2009 / 9:00 - 12:00 Dept. No. Max. : 100 Marks

## SECTION – A

**Answer ALL the questions.** **(10×2 = 20 Marks)**

1. What is system matrix?
2. What do you mean by chromatic aberration of a lens?
3. Interference fringes are observed with a biprism of refracting angle 1º and refractive index 1.5 on a screen 85cm away from it. If the distance between the source and the biprism is 15cm, calculate the fringe width when the wavelength of light used is 5890Å.
4. What is an antireflection coating?
5. Distinguish between Fresnel and Fraunhoffer diffraction.
6. What is meant by resolving power of an optical instrument?
7. State Malus' law.
8. What is a quarter- wave plate? Mention its use.
9. What do you understand by the term metastable state?
10. What is meant by second harmonic generation?

## SECTION – B

**Answer any FOUR questions.** **(4×7.5 = 30 Marks)**

11. Define dispersive power of a Prism. Derive the condition to produce dispersion without deviation in a combination of prisms.
12. Describe Fabry–Perot etalon and give the qualitative explanation for the formation of fringes .
13. What is Rayleigh's criterion for resolution? Derive an expression for the resolving power of a plane transmission grating.
14. Explain how plane polarised, circularly polarised and elliptically polarised light are produced.
15. Discuss the characteristics of spontaneous emission and stimulated emission.

## SECTION – C

**Answer any FOUR questions.** **(4×12.5 = 50 Marks)**

16. Give the construction and theory of Huygens eyepiece. Mention its merits and demerits.

17. Describe Michelson interferometer and explain the formation of circular fringes. How will you determine the wavelength of a monochromatic source of light using it?

18. Explain, with theory, the phenomenon of diffraction due to a straight edge. Discuss the results.

19. (a) Describe Laurent's half- shade polarimeter and explain how its is used to determine the specific rotation of a given solution.

    (b) A 100mm long tube containing sugar solution produces an optical rotation of 6º when placed in a saccharimeter. If the specific rotation of the sugar solution is 60 º, calculate the concentration of the solution.

20. What is laser action? Describe He-Ne laser and explain its working with energy level diagram.

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