LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – APRIL 2011

# PH 5509/PH 5506/PH 3500 - OPTICS

Date : 19-04-2011 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**PART-A**

**Answer All Questions**  **(10x2=20 marks)**

1. Give any two methods to minimize the spherical aberration .
2. State any two difference between Ramsden and Huygens eyepiece.
3. Give the condition for interference maxima and minima interms of path difference.
4. What should be the positions of mirrors to produce circular fringes and straight fringes in Michelson interferometer.
5. In a plane transmission grating the angle of diffraction for the second order principal maxima for the wavelength 5x10-5 cm is 30◦.Calculate the number of lines in one cm of the grating surface.
6. Define the term Resolving power of telescope.
7. State Brewster’s law.
8. A 20 cm long tube containing sugar solution rotates the plane of polarization by 11◦ .If the specific rotation of sugar is 60◦ .Calculate the strength of the solution.
9. What is a meta stable state?
10. Write a short note on stimulated Raman scattering.

# PART-B

**Answer ANY FOUR Questions** **(4X7.5=30 marks)**

1. Derive an expression for the net dispersion without deviation using

a direct vision prism.

1. Explain the formation of fringes by an Air wedge. Derive an expression

for the fringe width.

13. What is a Zone plate? Show that it acts as a convex lens.

14. What is meant by double refraction? Give Huygens theory of double refraction

in uniaxial crystals.

15. What are Einstein coefficients? Obtain the relation between them.

**PART–C**

**Answer ANY FOUR Questions** : **( 4x12.5 = 50marks )**

16. i) What is system matrix? Analyze the system of thin lenses using the

Matrix formulation**.** (7 marks)

ii) Derive the condition for achromatism of two thin lenses placed in contact.

(5.5 marks)

17. Describe the Fresnel’s Biprism . Explain how the wavelength of light can be

determined with its help.

18. Describe with necessary theory, Fraunhoffer diffraction due to double slit.

19. i) Explain the principle ,construction, working and uses of Nicol prism

with a neat diagram. (9 marks)

ii) What is half wave plate? Calculate the thickness of Half wave plate of

quartz for a wave length of 5000 A◦. Given μe=1.553 and μ0=1.554. (3.5 marks)

20. What is carbon dioxide laser? With necessary diagrams explain the

construction and working of it.

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