



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

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

**FIFTH SEMESTER – APRIL 2013**

**PH 5509/PH 5506/PH 3500 - OPTICS**

Date: 11/05/2013  
Time: 9:00 - 12:00

Dept. No.

Max. : 100 Marks

**PART A**

Answer ALL the questions

**10 x 2 = 20**

1. Which of the following sources produce chromatic aberration in lenses? Why?  
Hydrogen lamp, Mercury Source, He –Ne Laser .
2. Red ray deviates more than yellow and green ray. Is it true? Why?
3. What for reflective and antireflective coatings used?
4. Two electromagnetic waves of amplitudes 'a' and '2a' constructively interfere with each other.  
What is the Intensity of the resultant wave produced?
5. How is a grating made?
6. What is a zone plate? In what way it is different from a convex lens?
7. For a wavelength 540 nm, if the difference between  $\mu_e$  and  $\mu_o$  is 0.009, what is the thickness of the half wave plate of quartz to be used?
8. State Malu's law.
9. What are Einstein's coefficients?
10. What is meant by second harmonic generation?

**PART B**

Answer any FOUR questions

**4 x 7.5 = 30**

11. What is 'Spherical Aberration' in lenses? Explain four methods of minimizing spherical aberration.
12. Explain the methodology of determining the thickness of a thin wire using interference technique.
13. Derive the expression for the resolving power of a telescope.
14. Give Huygen's explanation of double refraction.
15. What are metastable states, optical pumping and population inversion in laser action?

**PART C**

Answer any FOUR questions:

**4 x 12.5 = 50**

16. What are Achromatic Prisms? Deduce the condition for combining two thin prisms to produce [a] deviation without dispersion and [b] dispersion without deviation.
17. Explain the construction and working of Michelson's interferometer and how is it used to determine the wavelength of the given source.

18. Distinguish the Fresnel's diffraction patterns produced by a circular aperture, opaque circular disc, and a straight edge
19. Define Specific Rotatory Power and explain [a] the construction of Laurent's half shade polarimeter and [b] how the specific Rotatory power is determined using the same.
20. With the neat diagram give the construction and working of [a] He Ne laser and [b] Carbon dioxide laser.

\$\$\$\$\$\$