LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

THIRD SEMESTER – NOVEMBER 2007

PH 3500 - OPTICS

AC 61

Date : 27/10/2007   Dept. No.   Max. : 100 Marks
Time : 9:00 - 12:00

PART –A

Answer all questions. All questions carry equal marks   **(10 x 2 = 20 marks)**

1. Give the translation matrix and its determinant value.
2. What is astigmatism?
3. When the movable mirror of Michelson's Interferometer is shifted by 0.03mm, a shift of 100 fringes is observed. Calculate the wavelength of light used.
4. What are Coherent sources?
5. What is the radius of the tenth zone in a zone plate of focal length 20 cm for a light of wavelength 5000A$^\circ$?
6. State Rayleigh's criteria for just resolution
7. State Brewster's law.
8. Two polarizing plates have polarizing directions parallel so as to transmit maximum intensity of light. Through what angle must either plate be turned if the intensity of the transmitted beam is to drop to half of its value?
9. What is stimulated emission?
10. What is resonant cavity?

PART – B

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

11. Derive Abbe's sine condition for elimination of spherical aberration
12. Describe Fresnel's biprism experiment to determine wavelength of light.
13. Derive an expression for the resolving power of a microscope.
14. Describe how plane polarized light is produced by Nicol prism.
15. Write a note on stimulated Raman scattering

PART – C

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

16. Explain with the help of a neat diagram the construction and working of Huygen's eyepiece and indicate the position of its cardinal points.
17. With necessary theory describe Newton's rings experiment to determine the refractive index of a liquid.
18. Describe the feature of a double slit Fraunhoffer diffraction pattern.
19. a) Explain the construction and application of Laurent's half shade polarimeter   9 marks

    b) Calculate the thickness of a quarter wave plate of quartz for sodium light of wavelength 5893A$^\circ$. The refractive indices of quartz for extraordinary and ordinary are equal to 1.5533 and 1.5442 respectively.
        3.5 marks
20. Describe the construction and working of a Ruby laser.

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