LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2022**

UPH 5503 – OPTICS

Date: 28-11-2022 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A

Answer ALL questions **(10x 2 = 20 marks)**

1. What is dispersion? Define dispersive power of a prism.
2. What is a thin lens? Write the thin lens formula.
3. What are coherent sources?
4. Write the use of antireflection coating on a surface.
5. What are half-period zones?
6. What will be the diffraction pattern of a circular aperture?
7. What is a quarter wave plate?
8. State Malu's law.
9. What are spontaneous and stimulated emissions?
10. What is optical fibre? State the principle involved.

PART – B

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

11. Determine the matrices that will represent the effect of translation and refraction in a medium of refractive index μ.
12. Explain the determination of wavelength using Lloyd's mirror experiment. How does it differ from Fresnel's biprism.
13. What is meant by resolving power? Obtain an expression for the resolving power of a telescope.
14. What is a Nicol prism? Discuss the method of production of circularly polarized light and how to detect it.
15. What are singlemode and multimode optical fibres? Compare the propagation of light through these two.
16. Determine the diameter of thin wire by forming a wedge shaped air film using it.

PART – C

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

17. Explain chromatic and spherical aberrations in lenses. Discuss the condition for achromatism of two thin lenses separated by a distance.
18. Describe Michelson's interferometer with a neat diagram. Explain the determination of wavelength using it.
19. (a) Describe Fraunhofer diffraction at a double slit. (b) Find the missing orders in double slit diffraction pattern.
20. Define optical activity. What are the factors on which the optical activity of a medium depends? Discuss the Fresnel's explanation of optical activity.
21. Explain with neat diagram the construction and working of He-Ne laser. State any three medical applications of laser.
22. Explain the theory of plane diffraction grating and describe how it can be used to determine the wavelength of light by normal incidence method.

$$$$$$$