LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc.DEGREE EXAMINATION – **PHYSICS**

SIXTH SEMESTER – **APRIL 2019**

16UPH6MC02– OPTICS

Date: 08-04-2019   Dept. No. _____   Max. : 100 Marks

Time: 09:00-12:00

PART-A

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

1. What are cardinal points?

2. What is meant by chromatic aberration?

3. What are coherent sources?

4. Green light of wavelength 5100   from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 200 cm away is 2 cm, find the slit separation.

5. Distinguish between Fresnel and Fraunhofer diffraction.

6. Define resolving power of a prism.

7. State Brewster's law.

8. Calculate the thickness of double refracting plate capable of producing a path difference of /4 between ordinary and extraordinary waves. Given: =5890 ,μ_o=1.53, μ_e=1.54 .

9. Write any two properties of laser beam.

10. What is Kerr effect?

PART-B

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

11. What is system matrix? Obtain it for two thin lenses separated by a distance and hence derive the formula for focal length and also find the positions of principal planes.

12. Explain the theory of interference due to reflected light with a neat diagram.

13. What is zone plate? Give the theory of it. Derive an expression for its focal length.

14. i)Show that the resolving power of a plane transmission grating is proportional to the number of opaque rulings per meter.   **(5.5)**

    ii) A diffraction grating has 0.15 m of surface ruled with 6×10^5 lines/metre. What is its Resolving power in the first order?   **(2)**

15. What is meant by double refraction? Explain the construction, working and uses of Nicol prism.

16. Explain how the light is propagated through an optical fiber and derive an expression for the acceptance angle.

PART–C

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

17. i) Explain the construction and working of Huygen's eye piece with a neat diagram.
                                                                                    (6.5)

   ii) Derive the conditions for the combination of two narrow angled prisms to produce deviation without dispersion.   **(6)**

18. Describe in detail about Michelson's interferometer with a neat diagram. How will you produce circular fringes with it?.

19. i) How would you determine the wavelength of light with the Lloyd's single mirror experiment? In what respect do the fringes in this case differ from those obtained with Fesnel'sbiprism?

                                                                                    (5+2.5)

ii) A glass wedge of angle 0.01 radian is illuminated by monochromatic light of wavelength 6000 falling normally on it. At what distance from the edge of the wedge will the 10th fringe be observed by reflected light?   **(5)**

20. i) Explain the phenomenon of Fraunhoffer diffraction due to a double slit.   **(10.5)**
ii) What are missing orders in Fraunhofer diffraction?   **(2)**

21. i) Explain the production and detection of circularly polarized light.   **(5)**

   ii) What is optical activity? Describe the working of Laurentz half shade polarimeter to determine the specific rotation of a solution.   **(1.5+6)**

22. i) With the necessary diagram, explain the construction and working of He-Ne laser**. (7.5)**

   ii) In an optical fiber, the core material has refractive index 1.6 and refractive index of clad material is 1.3. What is the value of critical angle? Also calculate the value of angle of acceptance cone.

                                                                                    (5)

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