Roll No. ....   Total Pages : 2

GSM/D-21   **930**

WAVE AND OPTICS–I

Paper–VI

Option–PH–302

Time Allowed : 3 Hours]   [Maximum Marks : 40

Note : Attempt **five** questions in all, selecting **one** question from each Unit. Question No. **1** is compulsory.

Compulsory Question

1. Write short answers of the following :

   (a) Why X-rays can not be diffracted by ordinary diffraction grating ?   1

   (b) What is Rayleigh criterion for resolution ?   1

   (c) Thin oil films on the water surface shows colours. Why ?   1

   (d) What changes do you anticipate in β, if Young double slit experiment is immersed under water ?   1

   (e) In a Michelson interferometer, a shift of 50 fringes takes place in the field of view when movable minor is moves through 0.0148 mm. Calculate wavelength of light used.   2

   (f) Explain with diagram only the formation of fringes in a Wedge-shaped films.   2

UNIT–I

2. (a) Explain the formation of Fringes by Lloyds's single mirror and discuss why the Central fringe is black.   5

   (b) Discuss interference by division of Wave-front. Give an example.   3

3. (a) Explain Young's double slit experiment and find β.   5

   (b) A Fresnel bi-prism is placed at a distance of 5 ams from a slit illuminated by sodium light of λ = 5890Å. The width of fringes obtained on a screen 75 cm from the biprism is 9.4×10^{-2} cm. Find the distance between two Coherent sources.   3

UNIT–II

4. (a) Explain the formation of Newton's ring by transmitted light. Derive the expression for the radius of nth dark ring. 6

   (b) The refracting index of a non-reflecting film is 1.37. Find the thickness of the film, when it is used for a light of wavelength 5000Å. 2

5. (a) Explain the principle and working of Michelson interferometer and discuss the nature of fringes produced. 6

   (b) Using $\lambda = 5.9 \times 10^{-7}$ m, it is found that in a film of air, 7.4 fringes occurs between two points. Deduce the difference of the film thickness between those points. 2

UNIT–III

6. (a) What is a Zone plate ? Explain its theory and focussing action. 4

   (b) Explain Fresnel diffraction at a small circular aperture. 4

7. (a) Explain Rectilinear propagation of light on the basis of half-period zones. 4

   (b) Discuss diffraction at a straight edge and find the positions of maxima and minima. 4

UNIT–IV

8. (a) What is dispersive power of a Grating ? Derive an expression for it and explain. 5

   (b) Distinguish between Prism and Grating spectra. 3

9. (a) Discuss Fraunhofer diffraction at double slit. Find the position of maxima and minima. 5

   (b) Derive an expression for resolving power of a Grating. 3