

Class:- B.Sc- Sem-4 ,

Time: 3hrs.

Subject :- Physics, Code:- (_UPHTC-401)
:- 80

Max.Marks

Section – A

All questions are compulsory and each question carry '3' marks.

Q1. Distinguish between even and odd functions with examples.

Q2. Why there is a flick at free end of a whip of a string?

Q3. Newton's rings are formed by reflection in the air film between a plan surface and a spherical surface of radius 5.0cm and it is noticed that the centre of the ring system is bright if the diameter's of 3rd and 23rd bright rings are 0.18cm and 0.501cm respectively what is the wavelength of light used ?

Q4. Give the points of difference between Fresnel and Fraunhofer classes of diffraction.

Q5. What do you mean by positive and negative crystals ? Give an example of each.

Section – B

All questions are compulsory and each question carry '7' marks.

Q6. State "Dirichlet's Condition" and express the Fourier Series in its complex form.

Q7. Define and derive expression for the characteristic impedance of a vibrating string.

Q8. Explain the theory of interference fringes and drive the expression for fringe width.

Q9. What is a zone plate ? Show that in a zone plate $r_m \propto \sqrt{m}$ where $m : 1,2,3,\dots$

Q10. State and prove Brewster's Law ?

Section – C

Attempt any two questions and each question carry '15' marks.

Q11:

(a). Drive an expression for the reflection and transmission of energy and its coefficients at a boundary between two media. (10)

(b). Define Standing waves and briefly explain their formation and important characteristics. (5)

Q12:

(a). State Fourier theorem and describe how it can be applied to the analysis of a half wave rectifier ? (10)

(b). Obtain Fourier expansion of the function : -

$$f(x) = a \text{ for } -\pi < x < 0$$

$$f(x) = 0 \text{ for } 0 < x < \pi \quad (5)$$

Q13:

(a). Describe Fresnel's biprism method for producing interference fringes. How it can be used to determine the wavelength of monochromatic light ? (12)

(b). A Fresnel's biprism is used to form interference fringes. Find the fringe width of sodium light ($\lambda=5890 \text{ \AA}$), when the distance between the source and the prism is 25cm and between the prism and the screen is 85cm, given: $d = 0.022\text{cm}$? (3)

Q14:

(a). Discuss Fraunhofer diffraction at single slit and find width of central maxima. (10)

(b). State and explain Rayleigh's criterion of limit of resolution. (5)

Q15:

(a). Give the construction and working of Laurent's Half shade Polarimeter. (10)

(b). Explain the phenomenon of double refraction. (5)