Bankim Sardar College

Internal Examination 2020

Sem: II Course: Honours Paper: CCH4

Group-A

1. Answer all the Questions- 10x1=10
   - i) What do you mean by diffraction of light ?
   - ii) What is zone plate?
   - iii) What do you mean by polarization of light?
   - iv) What is optical activity?
   - v) Define specific rotation.
   - vi) Write down a one-dimensional Plane progressive wave equation.
   - vii) What do you mean by diffraction of light ?
   - viii) What is Fresnel's half period Zone ?
   - ix) What is the angle of polarization?
   - x) Can a sound wave show the phenomenon of polarization?

Group B

2. Answer all Questions 3x10=30
   - i) Write the formula employed in the Fresnel's biprism experiment to determine the wavelength of light used. Why do you need virtual sources in the experiment?
   - ii) Why do you get two images of the virtual sources on the screen for two different positions of the lens? If distance between virtual sources is 0.04 cm, λ=5893A and biprism to screen distance is 90 cm, calculate the fringe width.
   - iii) What is index error? How do you avoid index error in this experiment?

Group C

Answer Question No. 3 and any 6 from the rest.

3. Answer all the Questions 10x2=20
   - i) Define group velocity and phase velocity.
   - ii) Explain the terms a) amplitude resonance and b) velocity resonance
   - iii) Define bel, decibel and phon.
   - iv) Define temporal coherence and spatial coherence.
   - v) Why it is necessary to use extended source for Newton's ring and narrow source for Fresnel's bi-prism?
   - vi) What do you mean by spatial coherence and temporal coherence?
   - vii) What are the factors on which the amplitude of light waves from a half period zone at the point of observation depends?

viii) Distinguish between Fresnel and Fraunhofer class of diffractions.

ix) What do you mean by Resolving power?

x) State Brewster's law of polarization.

4. Set up the differential equation of motion of a simple harmonic oscillator subjected to a damping force and an external simple harmonic force. Obtain expression for the amplitude in the steady state.
5. Distinguish between velocity resonance and amplitude resonance in the case of forced damped harmonic motion. What is sharpness of resonance?
6. From the differential equation of one dimension for plane wave solve the simple harmonic solution for the wave equation in one dimension
7. Show that in forced vibration, the energy of the oscillator is constant.
8. Give the theory of Newton's ring and show how from their study the wavelength of monochromatic light can be determined.
9. Prove that in the fringe system formed in a Fabry-Perot interferometer, the ratio of the intensity of maxima to the intensity midway between the minima is given by $\frac{(1+r^2)^2}{(1-r^2)^2}$.
10. A soap film of thickness 55 x 10^{-5} cm. is viewed at an angle of 45^0 . Its index of refraction is 1.33. Find the wavelength of light in the visible spectrum which will be absent from the reflected light
11. The diameter of m^{th} dark ring is 8mm and that of $(m+5)^{th}$ is 12mm in a Newton's ring experiment. The radius of curvature of lower surface of the used lens is 10m. Find the wavelength of the used light.