151500062

B.Tech, I-Year, I - Mid Term Examination, 2015-16

Subject: Engineering Physics (AHP-1001)

Time: 90 Minutes **M. M: 20**

Section-A

Attempt all five questions. **1× 5 = 5**

i. **Write two important properties of coherent sources.**

ii. **In an interference experiment, if the monochromatic source of light is replaced by white light source, what would be the color of the zeroth order fringe?**

iii. **Two identical light waves each of amplitude 2 units superimpose with path difference of λ, calculate the resultant intensity at the point of superposition.**

iv. **Distinguish O- ray and E- ray in the phenomenon of double refraction.**

v. **Write the relation between numerical aperture and acceptance angle for an optical fibre.**

Section B

Attempt any three questions. **2x3=6**

i. **Two coherent waves having amplitudes 3 units and 2 units respectively, produce interference pattern. Find the ratio of intensity at the center of bright fringe to the intensity at a point one half of the distance between two fringes from the centre.**

ii. **A monochromatic light of wavelength 5000Å from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 200cm away from the slit is 2.0cm, find the double slit separation.**

(P.T.O.)

iii. **In Fresnel's bi-prism experiment, the obtuse angle of the bi-prism is 174° and μ= 1.5. Interference fringes are found with source of wavelength 6000 Å located 10cm from the bi-prism and source to screen distance is 100cm. Find the maximum number of fringes that can be observed.**

iv. **A 30 cm long tube containing $72cm^3$ of sugar solution rotates the plane of polarization by 12° .If the specific rotation of sugar is 72 deg $(dm)^{-1}$ $(gm/cc)^{-1}$,calculate the mass of sugar in solution.**

Section C

Attempt any three questions from section C. **3x3= 9**

i. **Why the center of Newton's rings is found dark? Derive the expression for the diameter of the nth dark ring in the Newton's rings experiment.**

ii. **Define the fringe width as observed in the Young's double slit experiment. Derive the expression for fringe-width.**

iii. **Explain the phenomenon of optical rotation. Using Fresnel's theory of optical rotation, show that the optical rotation of the polarized plane through angle $\theta = \frac{\pi d}{\lambda}(\mu_L - \mu_R)$, where symbols have their usual meaning.**

iv. **Define the acceptance angle and the numerical aperture of an optical fibre. Derive the expression for acceptance angle in terms of refractive indices of core and cladding.**