

B.Tech. I Year I Mid-Term (II Semester) Examination, 2015-16
Engineering Physics (AHP-1001)

Time: 1:30 hours

M.M. 20

Section-A

Note: Attempt all questions.

(1×5=5)

1. Why the central fringe in Biprism experiment is obtained white? Explain.
2. If the source of monochromatic light in Young's double slit experiment is replaced by white light source, what would be the color of central spot?
3. What is meant by rotatory polarization?
4. If the plane polarized light is passed through a half wave plate, which type of polarized light would be obtained in the emergent light?
5. On which optical property of light the optical fibre works?

Section -B

Note: Attempt any three questions.

(2×3=6)

1. In Young's double slit experiment the 9th bright fringe is found at 8.80 mm from 2nd dark fringe on a screen placed at the distance of 1 meter from the coherent sources of separation 0.5 mm. Calculate the wavelength of light used in the experiment.
2. In a biprism experiment the micrometer readings for zero order and tenth order fringes are 1.25 mm and 2.50 mm, respectively when light of $\lambda = 6.0 \times 10^{-5}$ cm is used. What will be the position of zero order and tenth order fringes if λ is changed to 5000 Å?
3. Newton's rings are observed between a convex lens and a plane glass plate. The diameter of n^{th} and $(n+5)^{\text{th}}$ dark rings are 10.5 mm and 12.5 mm. Deduce the diameter of $(n-5)^{\text{th}}$ dark ring.
4. Plane polarised light of wavelength 5000Å is incident on a thin quartz plate cut with faces parallel to the optic axis. Calculate (i) the ratio of amplitude of the ordinary and extraordinary if the plane of vibration of the incident light makes an angle of 30° with optic axis, (ii) the minimum thickness of the plate for which the O and E waves will combine to produce plane polarised light. Given $\mu_o = 1.55$, $\mu_e = 1.53$.

(P.T.O.)

Section-C

Attempt any three questions.

(3×3=9)

1. Discuss the theory of interference fringes applicable in Young's double slit experiment and hence obtain the expression for fringe-width.
2. Show that the diameters of the bright rings obtained in Newton's rings experiment is proportional to the square root of odd natural numbers and for dark rings it is proportional to the square root of all natural numbers.
3. Discuss theoretically the superposition of two linearly polarized waves having perpendicular vibrations and propagating through a thin plate of calcite. Also discuss the special case of circularly polarized light.
4. Define the acceptance angle. Obtain the expression for acceptance angle in terms of refractive indices of core and cladding of the optical fibre.