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G L A UNIVERSITY, Mathura
I MID Term Examination, 2012-2013

B.Tech: I Year Sem : I M.M. 20
Sub: Physics- I Sub Code : AHP-101 Time:1.30 hr

Section A

Q.1 This question contains twelve parts. Attempt all parts. 1/2x 12=6

(i) Formation of Newtons's ring is an example
- Both division of wave front and amplitude
- division of amplitude
- division of wave front
- none of these

(ii) The shape of interference fringes obtained on the screen due to superposition of waves in Fresnel biprism expt. is
- Circular
- Parabolic
- Hyperbolic
- Straight line

(iii) Centre of Newton's rings in reflected light is dark because at the point of contact path difference is equal to
- λ
- $\lambda/2$
- $3\lambda/2$
- $\lambda/4$

(iv) In biprism experiment, the two slits are at a distance d apart. Interference pattern is observed at a distance D from the slits. At a point on the screen directly opposite to one of the slits, a dark fringe is observed. Wavelength of the wave is nearly
- $\frac{D}{d^2}$
- $\frac{D}{d}$
- $\frac{d}{D}$
- $\frac{d^2}{D}$

(v) A drop of oil is spread on a water surface, it displays beautiful colours in daylight because of
- Interference
- Reflection
- Dispersion
- Polarisation

(vi) What happens, if monochromatic light used in Young's double slit experiment is replaced by white light?
- No fringes are observed
- All the fringes become coloured
- The central fringe is white and other are coloured in its surrounding
- All dark fringes become white

(vii) Intensity in biprism experiment set up at central bright fringe is I_0. If one of the two sources is covered then intensity at this point will be
- $I_0/2$
- $4I_0$
- $I_0/4$
- I_0

(viii) The fringe width in wedge shaped thin film is
- $\mu/2\lambda\theta$
- $\theta/2\mu\lambda$
- λ/θ
- $\lambda/2\mu\theta$

(ix) Condition for bright fringes for reflected light from a wedge shaped film
- $2\mu t\cos(r+\theta) = n\lambda$
- $2\mu t = n\lambda$
- $2\mu t\cos(r+\theta) = (2n-1)\lambda/2$
- none of these

(x) Bending of light round the corners of an obstacle is known as
- Dispersion
- Diffraction
- Interference
- Polarisation

(xi) To observe the diffraction pattern, size of obstacle should be
- of the same order as the wavelength of light
- exactly half the wavelength of light
- much larger than the wavelength of light
- None of these

(xii) Light of wavelength 5500 Å falls normally on a slit of width 22.0×10^{-5}cm. The angular position of first minima on either side of central maxima
- $28^0\ 18'$
- $14^0\ 29'$
- $30^0\ 16'$
- $26^0\ 14'$

Section B

Attempt any two questions. 2x2=4

Q.1 The inclined faces of a prism ($\mu = 1.5$) make an angle of 1^0 with the base of the prism. The slit is 10 cm from the biprism and is illuminated by light of $\lambda = 6000$ Å. Find the fringe width at a distance of 1 m from the biprism.

Q.2 Newton's rings are observed by keeping a spherical surface of 100 cm radius on a plane glass plate. If the diameter of the 15^{th} bright ring is 0.590 cm and the diameter of the 5^{th} bright ring is 0.336cm, what is the wavelength of light used?

Q.3 Show that energy is conserved in the phenomenon of interference.

Section C

Attempt any two questions. 2X5=10

Q.1 Derive an expression for the intensity distribution due to Fraunhofer diffraction at a single slit. Deduce the direction of central maximum and minima.

Q.2 Derive the expression of path difference and phase difference in a Young's double slit arrangement and deduce the position of dark and bright fringe also.

Q.3 Describe the formation of interference fringes in a thin wedge shaped film. Derive the condition of maxima and minima in a reflected light in thin wedge shaped film.