Physics

Reg.No. :

I.Answer all the Questions.

II.Use blue pen only.

Time : 01:30:00 Hrs

Total Marks : 75

Section-A

5 x 1 = 5

1) The condition for getting dark due to intereference on thin films

   (a) $X_n = (2n+1)D\lambda/d$ (b) $2\mu t \quad cos \quad r = n\lambda$ (c) $2\mu t \quad cos \quad r = (2n-1)\lambda/2$ (d) $X_n = Dn\lambda/d$

2) The ratio of the radii of Newton's dark rings

   (a) 1:2:3   (b) $\sqrt{1} : \sqrt{2} : \sqrt{3}$ (c) 1:3:5   (d) $\sqrt{1} : \sqrt{3} : \sqrt{5}$

3) In Newton's rings, the radius of nth dark band in air is 'r_n' and in liquid is 'r_m', then the refractive index of liquid is given by

   (a) $\mu = \frac{r_m}{r_n}$ (b) $\mu = \frac{r_n}{r_m}$ (c) $\mu = \frac{r_n^2}{r_m^2}$ (d) $\mu = \frac{r_m^2}{r_n^2}$

4) Diffraction effect is pronounced more in sound than in light, because

   (a) Wavelength of sound is low   (b) Wavelength of sound is high   (c) Velocity of sound is low   (d) Velocity of sound is high

5) The property of light used to find its transverse nature

   (a) Interference effect   (b) diffraction effect   (c) photoelectric effect   (d) polarisation

Section-B

5 x 3 = 15

6) In Young's experiment, the width of the fringes obtained with light of wavelength 6000 $\overset{o}{A}$ is 2mm. Calculate the fringe width if the entire apparatus is immersed in a liquid of refractive index 1.33.

7) A plano-convex lens of radius 3m is placed on an optically flat glass plate and is illuminated by monochromatic light. The radius of the 8th dark ring is 3.6mm.Calculate the wavelength of light used.

8) Two slits 0.3mm apart are illuminated by light of wavelength $4500\overset{o}{A}$. The screen is placed at 1m distance from the slits. Find the separation between the second bright fringe on the both sides of the central maximum.

9) A 300mm long tube containing 60cc of sugar solution produce a rotation of 9° when placed in a polarimeter. If the specific rotation is 60°, Calculate the quantity of sugar contained in the solution.

10) An LC resonant circuit contains a capacitor 400pF and an inductor 100μH.It is sent into oscillations coupled to an antenna. Calculate the wavelength of the radiated electromagnetic wave.

Section-C

3 x 5 = 15

11) A soap film of refractive index 1.33,is illuminated by white light incident at an angle 30°.the reflected light is examined by spectroscope in which dark band corresponding to the wavelength $6000\overset{o}{A}$ is found.Calculate the smallest thickness of the film.

12) A monochromatic light of wavelength 5890 $\overset{o}{A}$ is incident on a water surface of refractive index 1.33.Find the velocity,frequency and wavelength of light in water.

13) In young's experiment a light of frequency 6×10^{14} Hz is used .Distance between the centres of adjacent fringes is 0.75mm. Calculate the distance between the slits, if the screen is 1.5m away.

Section-D

4 x 10 = 40

14) Discuss the theory of plane transmission grating.

15) Explain total internal reflection by wave theory.

16) Write a note on: (a) Nicol prism (b) Polaroid

17) a)   A Soap film of refractive index 4/3 and of thickness 1.5×10^{-4}cm is illuminated by white light incident at an angle60^o.The reflected light is examined by a spectroscope in which dark band corresponds to a wavelength of$5000\overset{o}{A}$.Calculate the order of the dark band.

   b)   In a newton's rings experiment the diameter of the 20^{th}dark ring was found to be 5.82mm and that of the 10th ring 3.36mm. If the radius of the plano-convex lens is 1m. Calculate the wavelength of light used.

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