DPP
DAILY PRACTICE PROBLEMS

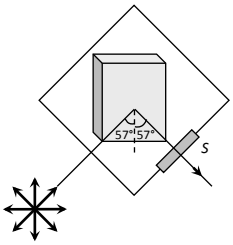
Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 9**

Topic :-WAVE OPTICS

1. A zone plate of focal length $60cm$, behaves as a convex lens, If wavelength of incident light is 6000 Å, then radius of first half period zone will be
   a) $36 \times 10^{-8}m$ b) $6 \times 10^{-8}m$ c) $\sqrt{6} \times 10^{-8}m$ d) $6 \times 10^{-4}m$
2. A 20 cm length of a certain solution causes right handed rotation of 38°. A 30 cm length of another solution causes left handed rotation of 24°. The optical rotation caused by 30 cm length of a mixture of the above solutions in the volume ratio 1 : 2 is
   a) Left handed rotation of 14° b) Right handed rotation of 14°
   c) Left handed rotation of 3° d) Right handed rotation of 3°
3. In an apparatus, the electric field was found to oscillate with an amplitude of 18 V/m. The magnitude of the oscillating magnetic field will be
   a) $4 \times 10^{-6}T$ b) $6 \times 10^{-8}T$ c) $9 \times 10^{-9}T$ d) $11 \times 10^{-11}T$
4. The dielectric constant of air is 1.006. The speed of electromagnetic wave travelling in air is $a \times 10^{8}ms^{-1}$, where a is about
   a) 3 b) 3.88 c) 2.5 d) 3.2
5. In Young's double slit experiment, the spacing between the slits is d and wavelength of light used is 6000Å. If the angular width of a fringe formed on a distance screen is 1°, then value of d is
   a) 1 mm b) 0.05 mm c) 0.03 mm d) 0.01 mm
6. In Young's double slit experiment, the aperture screen distance is 2 m. The slit width is 1 mm. Light of 600 nm is used. If a thin plate of glass $(\mu - 1.5)$ of thickness 0.06 mm is placed over one of the slits, then there will be a lateral displacement of the fringes by
   a) Zero b) 6 cm c) 10 cm d) 15 cm
7. Four independent waves are represented by equations
   I. $X_1 = a_1 \sin \omega t$
   II. $X_2 = a_1 \sin 2\,\omega t$
   III. $X_3 = a_1 \sin \omega_1 t$
   IV. $X_4 = a_1 \sin(\omega t + \delta)$
   Interference is possible between waves represented by equation
   a) 3 and 4 b) 1 and 2 c) 2 and 3 d) 1 and 4
8. In the Young's double slit experiment, the central maxima are observed to beI_0. If one of the slits is covered, then the intensity at the central maxima will become
   a) $\frac{I_0}{2}$ b) $\frac{I_0}{\sqrt{2}}$ c) $\frac{I_0}{4}$ d) I_0

9. Which of the following represents an infrared wavelength
   a) $10^{-4}\ cm$ b) $10^{-5}\ cm$ c) $10^{-6}\ cm$ d) $10^{-7}\ cm$
10. Two identical light sources S_1 and S_2 emit light of same wavelength λ. These light rays will exhibit interference if
    a) Their phase differences remain constant
    b) Their phases are distributed randomly
    c) Their light intensities remain constant
    d) Their light intensities change randomly
11. A beam of light of wavelength 600 nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringes on either side of the central bright fringe is
    a) 1.2 cm b) 1.2 mm c) 2.4 cm d) 2.4 mm
12. The electric field associated with an e.m. wave in vacuum is given by $\vec{E} = \hat{i}\,40\cos(kz - 6\times10^8 t)$, where E,z and t are in $volt/m$, meter and seconds respectively. The value of wave vector k is
    a) $2m^{-1}$ b) $0.5m^{-1}$ c) $6m^{-1}$ d) $3m^{-1}$
13. When one of the slits of Young's experiment is covered with a transparent sheet of thickness 4.8 mm, the central fringe shifts to a position originally occupied by the 30^{th} bright fringe. What should be the thickness of the sheet if the central fringe has to shift to the position occupied by 20^{th} bright fringe
    a) 3.8 mm b) 1.6 mm c) 7.6 mm d) 3.2 mm
14. How fast a person should drive his car so that the red signal of light appears green? (Wavelength for red colour $= 6200$Å and wavelength for green colour $= 5400$Å)
    a) $1.5\times10^8 m/s$ b) $7\times10^7 m/s$ c) $3.9\times10^7 m/s$ d) $2\times10^8 m/s$
15. Two light rays having the same wavelength λ in vacuum are in phase initially. Then the first ray travels a path L_1 through a medium of refractive index n_1 while the second ray travels a path of length L_2 through a medium of refractive index n_2. The two waves are then combined to produce interference. The two waves are then combined to produce interference. The phase difference between the two waves is
    a) $\frac{2\pi}{\lambda}(L_2 - L_1)$ b) $\frac{2\pi}{\lambda}(n_1L_1 - n_2L_2)$ c) $\frac{2\pi}{\lambda}(n_2L_1 - n_1L_2)$ d) $\frac{2\pi}{\lambda}\left(\frac{L_1 - L_2}{n_1 - n_2}\right)$
16. On introducing a thin film in the path of one of the two interfering beams, the central fringe will shift by one fringe width. If $\mu - 1.5$, the thickness of the film is (wavelength of monochromatic light is λ)
    a) 4λ b) 3λ c) 2λ d) λ
17. In Young's double slit experiment, the length if band is 1 mm. The ring width is 1.021 mm. The number of fringe is
    a) 45 b) 46 c) 47 d) 48

18. Figure represents a glass plate placed vertically on a horizontal table with a beam of unpolarised light falling on its surface at the polarizing angle of 57° with the normal. The electric vector in the reflected light on screen *S* will vibrate with respect to the plane of incidence in a



a) Vertical plane
b) Horizontal plane
c) Plane making an angle of 45° with the vertical
d) Plane making an angle of 57° with the horizontal

19. Huygen's conception of secondary waves
a) Allow us to find the focal length of a thick lens
b) Is a geometrical method to find a wavefront
c) Is used to determine the velocity of light
d) Is used to explain polarization

20. An electromagnetic wave propagating along north has its electric field vector upwards. Its magnetic field vector point towards
a) North b) East c) West d) Downwards