DPP

DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**

Date : **DPP No. : 8**

Topic :-WAVE OPTICS

1. In Young's double slit experiment, the fringes are displaced by a distance x when a glass plate of one refractive index 1.5 is introduced in the path of one of the beams. When this plate in replaced by another plate of the same thickness, the shift of fringes is $(3/2)x$. The refractive index of the second plate is

   a) 1.75 b) 1.50 c) 1.25 d) 1.00

2. Two waves are represented by the equations $y_1 = a\sin\omega t$ and $y_2 = a\cos\omega t$. The first wave

   a) Leads the second by π b) Lags the second by π

   c) Leads the second by $\frac{\pi}{2}$ d) Lags the second by $\frac{\pi}{2}$

3. In a Young' s double slit experiment, the intensity at a point where the path difference is $\frac{\lambda}{6}$ where(λ is wavelength of the light) is I. I f I_0denotes the maximum intensity, then $\frac{I}{I_0}$ is equal to

   a) $\frac{1}{2}$ b) $\frac{\sqrt{3}}{2}$ c) $\frac{1}{\sqrt{2}}$ d) $\frac{3}{4}$

4. A Young's double slit experiment uses a monochromatic source. The shape of the interference fringes formed on a screen is

   a) Hyperbola b) Circle c) Straight line d) Parabola

5. In a YDSE bi-chromatic light of wavelengths 400 nm and 560 nm are used. The distance between the slits is 0.1 mm and the distance between the plane of the slits and the screen is 1 m. The minimum distance between two successive regions of complete darkness is

   a) 4 mm b) 5.6 mm c) 14 mm d) 28 mm

6. Two waves $y_1 = A_1\sin(\omega t - \beta_1)$ and $y_2 = A_2\sin(\omega t - \beta_2)$ superimpose to form a resultant wave whose amplitude is

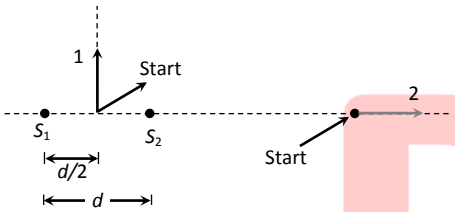
   a) $\sqrt{A_1^2 + A_2^2 + 2A_1A_2\cos(\beta_1 - \beta_2)}$ b) $\sqrt{A_1^2 + A_2^2 + 2A_1A_2\sin(\beta_1 - \beta_2)}$

   c) $A_1 + A_2$ d) $|A_1 + A_2|$

7. A Young's double slit experiment uses a monochromatic source. The shape of the interference fringes formed on a screen is

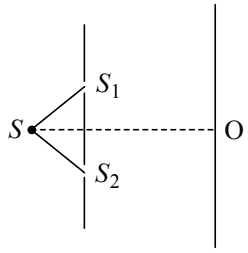
   a) Straight line b) Parabola c) Hyperbola d) Circle

8. A plane electromagnetic wave of wave intensity 6 W/m^2 strikes a small mirror area 40 cm^2, held perpendicular to the approaching wave. The momentum transferred by the wave to the mirror each second will be
   a) $6.4 \times 10^{-7} kg - m/s^2$ b) $4.8 \times 10^{-8} kg - m/s^2$
   c) $3.2 \times 10^{-9} kg - m/s^2$ d) $1.6 \times 10^{-10} kg - m/s^2$
9. The dual nature of light is exhibited by
   a) Photoelectric effect b) Refraction and interference
   c) Diffraction and reflection d) Diffraction and photoelectric effect
10. The wavelength of the light used in Young's double slit experiment is λ. The intensity at a point on the screen is I, where the path difference is $\frac{\lambda}{6}$. If I_0 denotes the maximum intensity, then the ratio of I and I_0 is
    a) 0.866 b) 0.5 c) 0.707 d) 0.75
11. Following figure shows sources S_1 and S_2 that emits light of wavelength λ in all directions. The sources are exactly in phase and are separated by a distance equal to 1.5λ. If we start at the indicated start point and travel along path 1 and 2, the interference produce a maxima all along



    a) Path 1 b) Path 2 c) Any path d) None of these
12. An electromagnetic wave in vacuum has the electric and magnetic field $\vec{E}$ and $\vec{B}$, which are always perpendicular to each other. The direction of polarization is given by $\vec{X}$ and that of wave propagation by $\vec{k}$. Then
    a) $\vec{X}||\vec{B}$ and $\vec{k}||\vec{B} \times \vec{E}$ b) $\vec{X}||\vec{E}$ and $\vec{k}||\vec{E} \times \vec{B}$ c) $\vec{X}||\vec{B}$ and $\vec{k}||\vec{E} \times \vec{B}$ d) $\vec{X}||\vec{E}$ and $\vec{k}||\vec{B} \times \vec{E}$
13. Two coherent sources of different intensities send waves which interfere. The ratio of maximum intensity to the minimum intensity is 25. The intensities of the sources are in the ratio
    a) 25 : 1 b) 5 : 1 c) 9 : 4 d) 25 : 16
14. Which of the following is not an essential condition for interference?
    a) The two interfering waves must be propagated in almost the same direction or the two interfering waves must intersect at very small angle
    b) The wave must have the same period and wavelength
    c) The amplitude of the two waves must be equal
    d) The two interfering beams of light must originate from the same source
15. Among the two interfering monochromatic sources A and B; A is ahead of B in phase by 66°. If the observation be taken from point P, such that $PB - PA = \lambda/4$. Then the phase difference between the waves from A and B reaching P is
    a) 156° b) 140° c) 136° d) 126°
16. Wave nature of light is verified by
    a) Interference b) Photoelectric effect c) Reflection d) Refraction

17. Heat radiations propagate with the speed of
    a) α-rays b) β-rays c) Light waves d) Sound waves
18. A new system of units is evolved in which the values of μ_0 and ϵ_0 are 2 and 8 respectively. Then the speed of light in this system will be
    a) 0.25 b) 0.5 c) 0.75 d) 1
19. In the set up shown in figure, the two slits $S_1$and S_2 are not equidistant from the slit S. The central fringe at O is, then



    a) Always bright
    b) Always dark
    c) Either dark or bright depending on the position of S
    d) Neither dark nor bright
20. Critical angle for certain medium is $\sin^{-1}(0.6)$. The polarizing angle of that medium is
    a) $\tan^{-1}[1.5]$ b) $\sin^{-1}[0.8]$ c) $\tan^{-1}[1.6667]$ d) $\tan^{-1}[0.6667]$