1. In the Young's double slit experiment, the intensities at two points P_1 and P_2 on the screen are respectively I_1 and I_2. If P_1 is located at the centre of a bright fringe and P_2 is located at a distance equal to a quarter of fringe width from P_1 then $\frac{I_1}{I_2}$ is
   (a) 2
   (b) 3
   (c) 4
   (d) None of these
2. In Young's double slit experiment the 10th maximum of wavelength λ_1 is at a distance of y_1 from the central maximum. When the wavelength of the source is changed to λ_2, 5th maximum is at a distance of y_2 from its central maximum. The ratio $\left(\frac{y_1}{y_2}\right)$ is
   (a) $\frac{2\lambda_1}{\lambda_2}$ (b) $\frac{2\lambda_2}{\lambda_1}$
   (c) $\frac{\lambda_1}{2\lambda_2}$ (d) $\frac{\lambda_2}{2\lambda_1}$
3. 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 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) $\frac{2\pi}{\lambda}\left(\frac{L_1}{n_1} - \frac{L_2}{n_2}\right)$

4. In Young's double slit experiment the two slits acts as coherent sources of equal amplitude A and wavelength λ. In another experiment with the same set up the two slits are sources of equal amplitude A and wavelength λ but are incoherent. The ratio of the intensity of light at the mid point of the screen in the first case to that in the second case is
(a) 4 : 1 (b) 1 : 1
(c) 2 : 1 (d) 1 : 4

5. In the ideal double-slit experiment, when a glass-plate (refractive index 1.5) of thickness t is introduced in the path of one of the interfering beams (wavelength λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is
(a) 2λ (b) $\frac{2\lambda}{3}$
(c) $\frac{\lambda}{3}$ (d) λ

6. In the standard Young's double slit experiment the intensity on the screen at a point distant 1.25 fringe widths from the central maximum is (assuming slits to be identical)
(a) $\frac{1}{2} I_{max}$ (b) $\frac{1}{4} I_{max}$
(c) $\frac{1}{3} I_{max}$ (d) I_{max}

7. In a Young's double slit experiment D equals the distance of screen and d is the separation between the slits. The distance of the nearest point to the centre maximum where the intensity is same as that due to a single slit, is equal to
(a) $\frac{D\lambda}{d}$ (b) $\frac{D\lambda}{2d}$
(c) $\frac{D\lambda}{3d}$ (d) $\frac{2D\lambda}{d}$

8. Two waves of same frequency and same amplitude from two monochromatic sources are allowed to superpose at a certain point. If in one case the phase difference is 0° and in other case it is $\pi/2$, then the ratio of the intensities in the two cases will be
(a) 1 : 1 (b) 2 : 1
(c) 4 : 1 (d) None of these

9. It is found that when waves from two coherent sources superpose at a certain point, then the resultant intensity is equal to the intensity of one wave only. This means that the phase difference between the two waves at that point is
(a) zero (b) $\frac{\pi}{3}$
(c) $\frac{2\pi}{3}$ (d) π

10. An interference is observed due to two coherent sources separated by a distance 5λ along y-axis, where λ is the wavelength of light. A detector D is moved along the positive x-axis. The number of point on the x-axis excluding the points $x = 0$ and $x = \infty$ at which resultant intensity will be maximum, are
(a) 4 (b) 5
(c) ∞ (d) zero

11. In a Young's double slit experiment using unequal slit widths, the intensity at a point midway between a bright and dark fringes is $4I$. If one slit is covered by an opaque film, intensity at that point becomes $2I$. If the other is covered instead, the intensity at that point is
(a) $2I$ (b) $5I$
(c) $(5 + 2\sqrt{2})\ I$ (d) $(5 + 4\sqrt{2})\ I$

12. Two beams of light having intensities I and $4I$ interfere to produce a fringe pattern on a screen. The phase difference between the beams is $\pi/2$ at point A and π at point B. Then the difference between the resultant intensities at A and B is
(a) $2I$ (b) $4I$
(c) $5I$ (d) $7I$

13. Microwaves of frequency 3×10^4 MHz and ultrasonic waves of wavelength 1 cm are passed through a slit of width 2 cm. Then
(a) Diffraction will occur only in the microwaves
(b) Diffraction will occur only in the ultrasonic waves
(c) Diffraction will occur in both but the diffraction patterns will be different
(d) Diffraction will occur in both and the diffraction patterns will be identical

14. What is the minimum thickness of a soap bubble needed for constructive interference in reflected light, if the light incident on the film is 750 nm? Assume that the index for the film is $n = 1.33$.
(a) 282 nm (b) 70.5 nm
(c) 141 nm (d) 387 nm

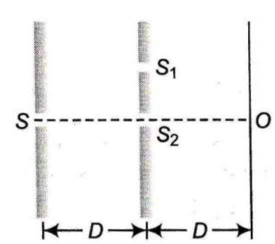
15. A thin mica sheet of thickness 2×10^{-6} m and refractive index ($\mu = 1.5$) is introduced in the path of the light from upper slit. The wavelength of the wave used is 5000 Å. The central bright maximum will shift
(a) 2 fringes upward
(b) 2 fringes downward
(c) 10 fringes upward
(d) None of the above

16. In Young's double slit experiment, white light is used. The separation between the slits is b. The screen is at a distance $d(d >> b)$ from the slits. Some wavelengths are missing exactly in front of one slit. These wavelengths are
(a) $\lambda = \frac{b^2}{d}$ (b) $\lambda = \frac{2b^2}{d}$
(c) $\lambda = \frac{b^2}{3d}$ (d) $\lambda = \frac{2b^2}{3d}$

17. In Young's double slit experiment the y-coordinates of central maxima and 10th maxima are 2 cm and 5 cm respectively. When the YDSE apparatus is immersed in a liquid of refractive index 1.5 the corresponding y-coordinates will be
(a) 2 cm, 7.5 cm (b) 3 cm, 6 cm
(c) 2 cm, 4 cm (d) 4/3 cm, 10/3 cm

18. In Young's double slit experiment how many maximas can be obtained on a screen (including the central maximum) on both sides of the central fringes if $\lambda = 2000$ Å and $d = 7000$ Å
(a) 12 (b) 7
(c) 18 (d) 4

19. Two ideal slits S_1 and S_2 are at a distance d apart and illuminated by light of wavelength λ passing through an ideal source slit S placed on the line through S_2 as shown. The distance between the planes of slits and the source slit is D.



A screen is held at a distance D from the plane of the slits. The minimum value of d for which there is darkness at O is

(a) $\sqrt{\frac{3\lambda D}{2}}$ (b) $\sqrt{\lambda D}$

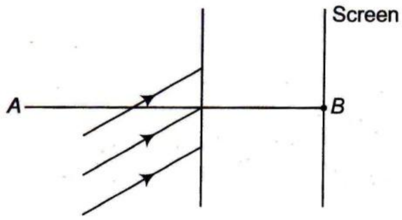
(c) $\sqrt{\frac{\lambda D}{2}}$ (d) $\sqrt{3\lambda D}$

20. Light of wavelength 589.3 nm is incident normally on two slits of separation 0.1 mm width 0.01 nm. The angular width of the central diffraction maximum at a distance of 1 m from the slits, is

(a) 0.68° (b) 0.34°

(c) 2.05° (d) None of these

21. A beam of light parallel to central line AB is incident on the plane of slits. The number of minima obtained on the large screen is n_1. Now if the beam is tilted by some angle ($\neq 90°$) as shown in figure, then the number of minima obtained is n_2. Then



(a) $n_1 = n_2$ (b) $n_1 > n_2$

(c) $n_2 > n_1$ (d) n_2 will be zero

22. The intensity of each of the two slits in Young's double slit experiment is I_0. Calculate the minimum separation between the two points on the screen where intensities are $2I_0$ and I_0. Given the fringe width equal to α

(a) $\frac{\alpha}{4}$ (b) $\frac{\alpha}{3}$

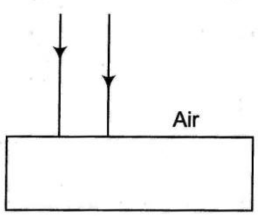
(c) $\frac{\alpha}{12}$ (d) None of these

23. Young's double slit experiment is made in a liquid. The tenth bright fringe in liquid lies in screen where 6th dark fringe lies in vacuum. The refractive index of the liquid is approximately

(a) 1.8 (b) 1.54

(c) 1.67 (d) 1.2

24. A parallel beam of light of intensity I is incident on a glass plae. 25% of light is reflected in any reflection by upper surface and 50% of light is reflected by any reflection from lower surface. Rest is refracted. The ratio of maximum to minimum intensity in interference region of reflected rays is



(a) $\left(\frac{\frac{1}{2}+\sqrt{\frac{3}{8}}}{\frac{1}{2}-\sqrt{\frac{3}{8}}}\right)^2$ (b) $\left(\frac{\frac{1}{4}+\sqrt{\frac{3}{8}}}{\frac{1}{2}-\sqrt{\frac{3}{8}}}\right)^2$

(c) $\frac{5}{8}$ (d) None of these

25. In a Young's experiment, one of the slits is covered with a transparent sheet of thickness 3.6×10^{-3} cm due to which position of central fringe shifts to a position originally occupied by 30th bright fringe. The refractive index of the sheet, if $\lambda = 6000$ Å is

(a) 1.5 (b) 1.2 (c) 1.4 (d) 1.6

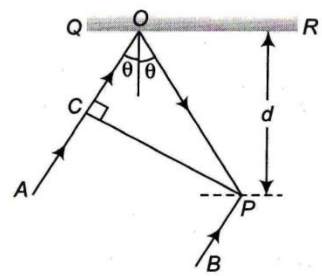
26. In an interference pattern the position of zeroth order maxima is 4.8 mm from a certain point P on the screen. The fringe width is 0.2 mm. The position of second minima from point P is

(a) 5.1 mm (b) 5 mm (c) 5.4 mm (d) 5.2 mm

27. One slit of a double slit experiment is covered by a thin glass plate of refractive index 1.4, and the other by a thin glass plate of the refractive index 1.7. The point on the screen where the central maximum fall before the glass plate was inserted, is now occupied by what had been the fifth bright fringe was seen before. Assume the plate have the same thickness t and wavelength of light 480 nm. Then the value of t is

(a) 2.4 μm (b) 4.8 μm (c) 8 μm (d) 16 μm

28. In the adjacent diagram, CP represents a wavefront and AO and BP, the corresponding two rays. Find the condition of θ for constructive interference at P between the rays BP and reflected ray AOP



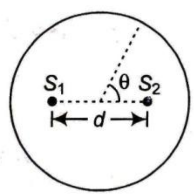
(a) $\cos\theta = 3\lambda/2d$

(b) $\cos\theta = \lambda/4d$

(c) $\sec\theta - \cos\theta = \lambda/d$

(d) $\sec\theta - \cos\theta = 4\lambda/d$

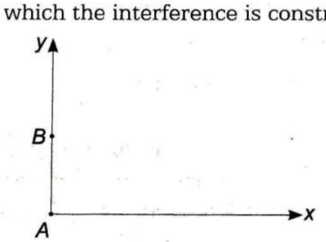
29. Two coherent sources separated by distance d are radiating in phase having wavelength λ. A detector moves in a big circle around the two sources in the plane of the two sources. The angular position of $n = 4$ interference maxima is given as



(a) $\sin^{-1}\frac{n\lambda}{d}$ (b) $\cos^{-1}\frac{4\lambda}{d}$

(c) $\tan^{-1}\frac{d}{4\lambda}$ (d) $\cos^{-1}\frac{\lambda}{4d}$

30. Two coherent light sources A and B are at a distance 3λ from each other (λ = wavelength). The distances from A on the x-axis at which the interference is constructive are



(a) 3λ (b) 4λ

(c) $5\lambda/4$ (d) 8.75λ