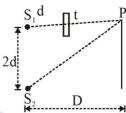**1.** In the Young's double slit experiment, the interference pattern is found to have an intensity ratio between bright and dark fringes, as 9. This implies that :-

(1) the intensities at the screen due to the two slits are 5 units and 1 unit respectively

(2) the intensities at the screen due to the two slits are 4 units and 1 unit respectively

(3) the amplitude ratio of sources is 4

(4) the amplitude ratio of sources is 2

2. In Young's double slit interference experiment, the distance between two sources is 0.1 mm. The distance of the screen from the sources is 20 cms. Wavelength of light used is 5460 Å. Then the angular position of the first dark fringe is :-

(1) 0.08º   (2) 0.16°

(3) 0.20°   (4) 0.32°

3. White light is used to illuminate the two slits in a Young's double slit experiment. The separation between slits is b and the screen is at a distance d (>>b) from the slits. At a point on the screen directly infront of one of the slits, certain wavelengths are missing. Some of these missing wavelengths are :-

(1) $\lambda = b^2/2d$ (2) $\lambda = 2b^2/d$

(3) $\lambda = b^2/3d$ (4) $\lambda = 2b^2/3d$

4. In two separate setup of the Young's double slit experiment, fringes of equal width are observed when lights of wavelengths in the ratio 1 : 2 are used. If the ratio of the slit separation in the two cases is 2 : 1, the ratio of the distances between the plane of the slits and the screen, in the two setup is :-

(1) 4 : 1   (2) 1 : 1

(3) 1 : 4   (4) 2 : 1

5. If a thin mica sheet of thickness t and refractive index $\mu = (5/3)$ is placed in the path of one of the interfering beams as shown in figure, then the displacement of the fringe system is :-

(1) $\dfrac{Dt}{3d}$ (2) $\dfrac{Dt}{5d}$
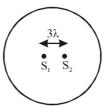
(3) $\dfrac{Dt}{4d}$ (4) $\dfrac{2Dt}{5d}$

6. A thin sheet of glass ($\mu = 1.5$) of thickness 6 microns introduced in the path of one of interfering beams in a double slit experiment shifts the central fringe to a position previously occupied by fifth bright fringe. Then the wavelength of light used is :-

(1) 6000 Å   (2) 3000 Å

(3) 4500 Å   (4) 7500 Å

7. When light wave travelling in air suffers reflection at the interface between air and glass, the change of phase of the reflected wave is equal to :-

(1) zero   (2) $\pi/2$

(3) π (4) 2π

8. In Young's double slit experiment, the intensity of light at a point on the screen where the path difference is λ is l_0. The intensity of light at a point where the path difference becomes $\dfrac{\lambda}{3}$ is:-

(1) l_0 (2) $\dfrac{l_0}{4}$ (3) $\dfrac{l_0}{3}$ (4) $\dfrac{l_0}{2}$

9. If two coherent sources are placed at a distance 3λ from each other symmetric to the centre of the circle shown in the figure, then number of maxima shown on the screen placed along the circumference is :-

(1) 16   (2) 12   (3) 8   (4) 4

10. Light of wavelength λ is incident on a slit of width d. The resulting diffraction pattern is observed on a screen at a distance D. The linear width of the central maxima equal to width of the slit if D equals

(1) d/λ　　　　　　(2) $2\lambda/d$

(3) $d^2/2\lambda$　　　　　(4) $2\lambda^2/d$

11. Light of wavelength 6328 Å is incident normally on a slit having a width of 0.2 mm. The width of the central maximum measured from minimum to minimum of diffraction pattern on a screen 9.0 metres away from slit will be about :-

(1) 0.36 degrees　　　(2) 0.18 degrees

(3) 0.72 degrees　　　(4) 0.09 degrees

12. The main difference in the phenomenon of interference and diffraction is that :-

(1) diffraction is due to interaction of light from the same wavefront whereas interference is the interaction of waves from two isolated sources.

(2) diffraction is due to interaction of light from wavefront, whereas the interference is the interaction of two waves derived from the same source.

(3) diffraction is due to interaction of waves derived from the same source, whereas the interference is the bending of light from the same wavelength.

(4) diffraction is caused by reflected waves from a source wheras interference caused is due to refraction of waves from a surface.

13. A ray of light strikes a glass plate at an angle of 60°. If the reflected and refracted rays are perpendicular to each other, the index of refraction of glass is :-

(1) $\sqrt{3}$　　(2) 3/2　　(3) $\sqrt{3/2}$　　(4) 1/2

14. Two coherent sources of equal intensities produce a maximum of 100 units. If the amplitude of one of the sources is reduced by 20%, then the maximum intensity produced will be :

(1) 100　　(2) 81　　(3) 89　　(4) 60

15. In an interference pattern the $(n+4)^{th}$ blue bright fringe and n^{th} red bright fringe are formed at the same spot. If red and blue light have the wavelength of 7800 Å and 5200 Å then value of n should be :

(1) 2　　(2) 4　　(3) 6　　(4) 8

16. The intensity of the central fringe obtained in the interference pattern due to two indentical slit sources is I. When one of the slits is closed then the intensity at the same point is I_0. Then the correct relation between I and I_0 is :

(1) $I = I_0$　　(2) $I = 2I_0$　　(3) $I = 4I_0$　　(4) $I = I_0/4$

17. A light has amplitude A and angle between analyser and polariser is 60°. Light is transmitted by analyser has amplitude.

(1) $A\sqrt{2}$　　　　　　(2) $\dfrac{A}{\sqrt{2}}$

(3) $\dfrac{\sqrt{3}A}{2}$　　　　　(4) $\dfrac{A}{2\sqrt{2}}$

18. Two Nicols are oriented with their principal planes making an angle of 60°. The percentage of incident unpolarized light which passes through the system is :

(1) 50%　　　　　　(2) 100%

(3) 12.5%　　　　　(4) 37.5%

19. Two waves $Y_1 = a\sin\omega t$ and $Y_2 = a\sin(\omega t+\delta)$ are producing interference, then resultent intensity is –

(1) $a^2\cos^2 \delta/2$　　　　(2) $2a^2\cos^2 \delta/2$

(3) $3a^2\cos^2 \delta/2$　　　　(4) $4a^2\cos^2 \delta/2$

20. In YDSE, the intensity of central bright fringe is 8 mW/m². What will be the intensity at $\lambda/6$ path difference?

(1) 8 mW/m²　　　　(2) 6 mW/m²

(3) 4 mW/m²　　　　(4) 2 mW/m²

21. Young's double slit experment is first performed in air and then in a medium other than air. It is found that 8th bright fringe in the medium lies where 5th dark fringe lies in air. The refractive index of the medium is nearly :-

(1) 1.59　　(2) 1.69　　(3) 1.78　　(4) 1.25

22. In YDSE distance between slits and screen is 1.5m. When light of wavelength 500 nm is used then 2nd bright fringe is obtained on screen at a distance of 10 mm from central bright fringe. What will be shift in position of 2nd bright fringe if light of wavelength 550 nm is used.

(1) 2 mm   (2) 1 mm

(3) 1.5 mm   (4) 1.1 mm

23. In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic light of wavelength 500 nm is used. What will be the width of each slit for obtaining ten maxima of double slit within the central maxima of single slit pattern ?

(1) 0.1 mm   (2) 0.5 mm

(3) 0.02 mm   (4) 0.2 mm

24. In a Young's double slit experiment with sodium light, slits are 0.589 m apart. The angular separation of the third maximum from the central maximum will be (given $\lambda = 589$ nm) :–

(1) $\sin^{-1} (0.33 \times 10^8)$ (2) $\sin^{-1} (0.33 \times 10^{-6})$

(3) $\sin^{-1} (3 \times 10^{-8})$ (4) $\sin^{-1} (3 \times 10^{-6})$

25. A beam of light of $\lambda = 600$ 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 first dark fringes on either side of the central bright fringe is :-

(1) 1.2 cm   (2) 1.2 mm

(3) 2.4 cm   (4) 2.4 mm

26. In Young's double slit experiment, the slits are 2mm apart and are illuminated by photons of two wavelengths $\lambda_1 = 12000$Å and $\lambda_2 = 10000$Å. At what minimum distance from the common central bright fringe on the screen 2m from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other ?

(1) 3 mm   (2) 8 mm   (3) 6 mm   (4) 4 mm

27. When the angle of incidence on a material is 60°, the reflected light is completely polarized. The velocity of the refracted ray inside the material is (in ms^{-1}) :

(1) 3×10^8 (2) $\left(\dfrac{3}{\sqrt{2}}\right) \times 10^8$

(3) $\sqrt{3} \times 10^8$ (4) 0.5×10^8

28. A light source of 5000Å wave length produces a single slit diffraction. The first minima in diffraction pattern is seen, at a distance of 5mm from central maxima. The distance between screen and slit is 2 metre. The width of slit in mm will be :

(1) 0.1   (2) 0.4   (3) 0.2   (4) 2

29. In Young's experiment, monochromatic light through a single slit S is used to illuminate the two slits S_1 and S_2. Interference fringes are obtained on a screen. The fringe width is found to be w. Now a thin sheet of mica (thickness t and refractive index μ) is placed near and in front of one of the two slits. Now the fringe width is found to be w', then :

(1) w' = w/μ (2) w' = wμ

(3) w' =(μ – 1) tw   (4) w' = w

30. In Young's experiment, light of wavelength 6000Å is used to produce fringes of width 0.8 mm at a distance of 2.5 m. If the whole experiment is deep in a liquid of refractive index 1.6, then fringe width will be :

(1) 0.5 mm   (2) 0.6 mm

(3) 0.4 mm   (4) 0.2 mm

ANSWER KEY   Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	2	2	3	1	1	1	3	2	2	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	1	2	1	2	4	3	4	3	4	2
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	3	2	4	4	4	3	3	3	4	1