# PHYSICS

# FOR IIT JEE ASPIRANTS OF CLASS 12 FOR PHYSICS

# WAVE OPTICS

## Example

**1.** What speed should a galaxy move with respect to us so that the sodium line at $589.0nm$ is observed at $589.6nm$ ?

Watch Video Solution

**2.** Light waves form two coherent source having internsity ration $81:1$ produce interference. Then, the ratio of maxima and minima in the interference pattern will be

Watch Video Solution

**3.** Two slits are made one millimeter apart and the screen is placed one metre away. When blue-green light of wavelength 500 nm is used, the fringe separation is

Watch Video Solution

**4.** In YDSE, the two slits are separated by 0.1 mm and they are

0.5 m from the screen. The wavelength of light used is 5000 Å. Find the distance

between 7th maxima and 11 th mimima on the upper side of screen.

Watch Video Solution

**5.** In Young's double slit experiment interference fringes $1^\circ$ apart are produced on the screen, the slit separation is $(\lambda = 589 nm)$

Watch Video Solution

**6.** In Young's double slit experiment, the wavelength of red light is $5200\text{Å}$. The value of n for which nth bright band due to red light coincides with $(n+1)th$ bright band due to blue light, is

Watch Video Solution

**7.** 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

Watch Video Solution

**8.** 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 fringe if $\lambda = 2000\text{Å}$ and $d = 7000\text{Å}$ ?

Watch Video Solution

**9.** In a double slit experiment the angular width of a fringe is found to be $0.2^{\circ}$ on a screen placed I m away. The wavelength of light used in 600 nm. What will be the angular width of the fringe if the entire experimental apparatus is immersed in water ? Take refractive index of water to be $4/3$.

Watch Video Solution

**10.** In a Young's experiment, one of the slits is covered with a transparent sheet of thickness $3.6 \times 10^{-3} cm$ due to which position of central fringe shifts to a position orginally occupied by 30th fringe. If $\lambda = 6000 \text{Å}$, then find the refractive index of the sheet.

Watch Video Solution

**11.** The maximum intensity in the case of n identical waves each of intensity $2\frac{W}{m^2} is 32\frac{W}{m^2}$ the value of n is

Watch Video Solution

**12.** Compare the intesities of two points iocated at respective distance $\frac{\beta}{4}$ and $\frac{\beta}{3}$ from the central maxima in a interference of YDSE ($\beta$ is the fringe width)

Watch Video Solution

**13.** In Young's double slit experiment intensity at a point is $\left(\frac{1}{4}\right)$ of the maximum intersity. Angular position of this point is

Watch Video Solution

**14.** In Young's double-slit experiment, the y-coordinate of central maxima and 10th maxima are 2 cm and 5 cm, respectively, When the YDSE apparatus is immersed in a liquid of refreactive index 1.5, the corresponding y-coordinates will be

Watch Video Solution

**15.** In YDSE, bichromatic 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 1m. The minimum distance between two

successive regions of complete darkness is

Watch Video Solution

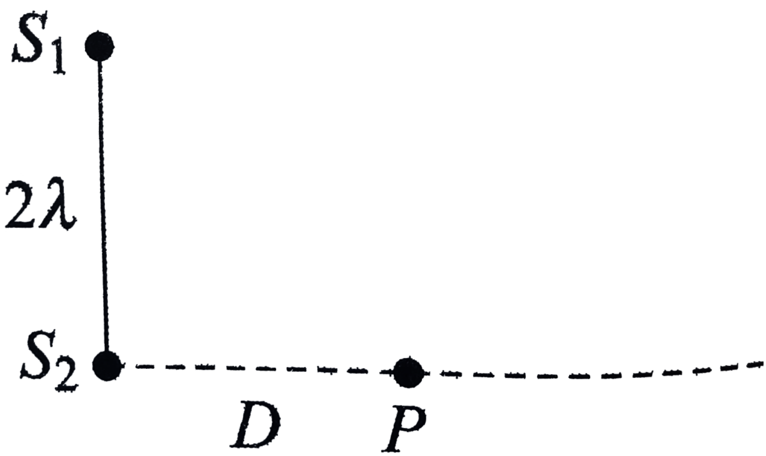
**16.** An interference is observed due to two coherent sources $S_1$ placed at origin and $S_2$ placed at $(0, 3\lambda, 0)$. Here, lambda is the wavelength of the sources. A detector D is moved along the positive x-axis. Find x-coordinates on the x-axis (excluding $x = 0 \text{ and } x = \infty$) where maximum intensity is observed.

Watch Video Solution

**17.** Two coherent light sources A and B with separation $2\lambda$ or placed on the x-axis symmetrically about the origin. They emit light of wavelength $\lambda$. Obtain the positions of maxima on a circle of large radius, lying in the x-y plane and centre at the origin.

Watch Video Solution

**18.** Two coherent point sources $S_1$ and $S_2$ vibrating in phase emit light of wavelength $\lambda$. The separation between the sources is $2\lambda$. Consider a line passing through $S_2$ and perpendicular to line $S_1S_2$. Find the position of farthest and nearest minima.




Watch Video Solution

Watch Video Solution

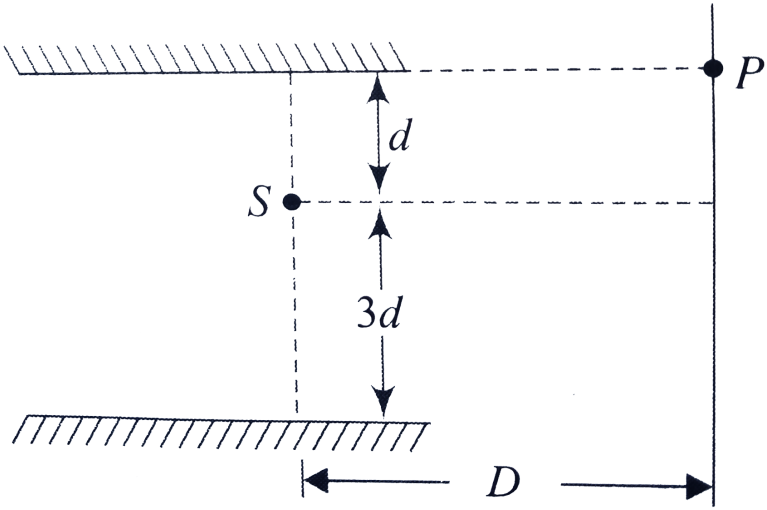
19. A ray of light of internsity I is incident on a parallel glass slab at a point A as shown. It undergoes partial reflection and refraction. At each reflection and refraction. At each rerflection $20\%$ of incident energy is reflectrd. The rasys AB and A' B' undergo interference. The ratio $I_{\max} / I_{\min}$ is

Watch Video Solution

20. In YDSE if a slab whose refractive index can be varied is placed in front of one of the slits. Then, the variation of resultant intensity at mid-point of screen with $\mu$ will be best represented by `(mu is greater than or equal to 1)

Watch Video Solution

**21.** Consider the optical system shown in figure. The point source of ligth S is having wavelength equal to $\lambda$. The light is reaching screen only after reflection. For point P to be socond maxima, the value of $\lambda$ would be ( $D > > d$ and $d > > \lambda$)




Watch Video Solution

**22.** Two coherent point source $S_1$ and $S_2$ vibrating in phase emit light of wavelength $\lambda$. The separation between them is $2\lambda$ as shown in figure. The first bright fringe is formed at 'P' due to interference on a screen placed at distance 'D' from $S_1 (D > > \lambda)$, then OP is

1) $\sqrt{3}D$, 2) $1.5D$, 3) $\sqrt{2}D$, 4) $2D$

Watch Video Solution

**23.** A parallel beam of light of wavelength 500 nm falls on a narrow slit and the resulting diffraction pattern is observe on screen 1 m away. It is observed that the first minimum is at a distance of $2.5 mm$ from the centre of the screen. Find the width of the slit.

Watch Video Solution

**24.** A screen is placed 50cm from a single slit, which is illuminated with 6000Å light. If distance between the first and third minima in the diffraction pattern is 3.0 mm, what is the width of the slit?

Watch Video Solution

**25.** In a single slit diffraction experiment first minima for $\lambda_1 = 660nm$ coincides with first maxima for wavelength $\lambda_2$. Calculate the value of $\lambda_2$.

Watch Video Solution

**26.** Two slits are one millimeter apart and the screen is placed one meter away. What should the width of each slit be to obtain 10 maxima of the double slit pattern within the central maximum of the single pattern.

Watch Video Solution

**27.** For what distance is ray optics a good approximation when the aperture is 3 mm wide and the wavelength is 500 nm ?

Watch Video Solution

**28.** Assume that light of wavelength $6000\text{Å}$ is coming from a star. What is the limit of resolution of a telescope whose objective has a diameter of 100 inch ?

Watch Video Solution

**29.** When light of a certain wavelength is incident on a plane surface of a material at a glancing angle $30^\circ$, the reflected light is found to be compleley plane polarized determine.

a) refractive index of given material and

b) angle of refraction.

Watch Video Solution

**30.** Unpolarized light falls on two polarizing sheets placed one on top of the other. What must be the angle between the characteristic directions of the sheets if the intesity of the transitted light is one third of intensity of the insident beam ?

Watch Video Solution

**31.** Unpolarized light of intensity 32 $Wm^{-3}$ passes through three polarizers such that the transmission axis of the last polarizer is crossed with the first. If the intensity of the emerging light is $3Wm^{-2}$, what is the angle between the transmission axes of the first two polarizers ? At what angle will the transmitted intensity be maximum ?

Watch Video Solution

**32.** Disuss the intensity of transmitted light when a polaroid sheet is rotated between two crossed polaroids ?

Watch Video Solution

**33.** A plane wavefront is incident at an angle of $37^{\circ}$ with horizontal a boundary of refractive medium from air $(\mu = 1)$ to a medium of refractive index $\mu = \frac{3}{2}$. Find the angle of refracted wavefront with horizontal

Watch Video Solution

**34.** Yellow light with wavefront 0.5$\mu m$ is air surface refraction in a medium in which velocity of light is $2 \times 10^{-8} m/s$. Then the wavelength of the light in the medium would be .

Watch Video Solution

**35.** With what speed should a star move with respect to us so that the beam at wavelength 460.0 nm is observed at 460.8 nm.

Watch Video Solution

**36.** A galaxy moving with speed 300km/s shows blue shift. At what wavelength sodium line at 589.0 nm will be observed ?

Watch Video Solution

**37.** What speed should a galaxy move with respect to us so that the sodium line at $589.0nm$ is observed at $589.6nm$ ?

Watch Video Solution

**38.** Light waves form two coherent source having intensity ration $81:1$ produce interference. Then, the ratio of maxima and minima in the interference pattern will be

Watch Video Solution

**39.** Two slits are made one millimeter apart and the screen is placed one metre away. When blue-green light of wavelength 500 nm is used, the fringe separation is

Watch Video Solution

**40.** In YDSE, the two slits are separated by 0 . 1 m m and they are 0.5 m from the screen . The wavelengh of light used is $5000 \AA$ . What is the distance between $7^{th}$ minima on screen ?

Watch Video Solution

**41.** In Young's double slit experiment interference fringes $1^{\circ}$ apart are produced on the screen, the slit separation is $(\lambda = 589 nm)$

Watch Video Solution

**42.** In young's double slit experiment 'the wavelength of red light is$7800 \AA$ and that of blur light is $5200 \AA$.the value of n of which $nth$ bright band due to red light coincides with (n+1) bright band due to blue light is:

Watch Video Solution

**43.** Young's double slit experiment is made in a liquid . The 10th bright fringe in liquid lies where 6th dark fringe lies in vacuum. The refractive index of the liquid is approximately .

View Text Solution

**44.** 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 fringe if $\lambda = 2000\text{Å}$ and $d = 7000\text{Å}$ ?

Watch Video Solution

**45.** In a double slit experiment the angular width of a fringe is found to be $0.2^{\circ}$ on a screen placed I m away. The wavelength of light used in 600 nm. What will be the angular width of the fringe if the entire experimental apparatus is immersed in water ? Take refractive index of water to be $4/3$.

Watch Video Solution

Watch Video Solution

**46.** In a Young's experiment, one of the slits is covered with a transparent sheet of thickness $3.6 \times 10^{-3} cm$ due to which position of central fringe shifts to a position originally occupied by 30th fringe. If $\lambda = 6000 \text{Å}$, then find the refractive index of the sheet.

Watch Video Solution

**47.** The maximum intensity in the case of n identical waves each of intensity $2\frac{W}{m^2}$ is $32\frac{W}{m^2}$ the value of n is

Watch Video Solution

**48.** Compare the intensities of two points located at respective distance $\frac{\beta}{4}$ and $\frac{\beta}{3}$ from the central maxima in a interference of YDSE ($\beta$ is the fringe width)

Watch Video Solution

**49.** In Young's double slit experiment intensity at a point is $\left(\frac{1}{4}\right)$ of the maximum intersity. Angular position of this point is

Watch Video Solution

**50.** In Young's double-slit experiment, the y-coordinate of central maxima and 10th maxima are 2 cm and 5 cm, respectively, When the YDSE apparatus is immersed in a liquid of refreactive index 1.5, the corresponding y-coordinates will be

Watch Video Solution

**51.** In YDSE, bichromatic 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 1m. The minimum distance between two

successive regions of complete darkness is

Watch Video Solution

**52.** An interference is observed due to two coherent sources $S_1$ placed at origin and $S_2$ placed at $(0, 3\lambda, 0)$. Here, lambda is the wavelength of the sources. A detector D is moved along the positive x-axis. Find x-coordinates on the x-axis (excluding $x = 0 \text{ and } x = \infty$) where maximum intensity is observed.

Watch Video Solution

**53.** Two coherent light sources A and B with separation $2\lambda$ or placed on the x-axis symmetrically about the origin. They emit light of wavelength $\lambda$. Obtain the positions of maxima on a circle of large radius, lying in the x-y plane and centre at the origin.

Watch Video Solution

**54.** Two coherent point sources $S_1$ and $S_2$ vibrating in phase emit light of wavelength $\lambda$ . The separation between the sources is $2\lambda$ . Consider a line passing through $S_2$ and perpendicular to the line $S_1 S_2$ . Find the position of farthest and nearest minima .

View Text Solution

**55.** A ray of light of intensity I is incident on a parallel glass slab at a point A as shown. It undergoes partial reflection and refraction . At each reflection 20% of incident energy is reflected . The rays AB and A'B' undergo interference . The ratio $I_{\max} / I_{\min}$ is

View Text Solution

**56.** In a YDSE experiment if a slab whose refractive index can be baried is placed in front of one of the slits, then the variation of resultant intensity at mid - point of screen with $'\mu'$ will be best respresented by $(\mu > 1)$ . [Assume slits of equal width and there is no absorption by slab]

View Text Solution

**57.** Consider the optical system whown in fig. the point source of light S is having wavelength equal to $\lambda$ . The light is reaching screen only after refection . For point P to be 2 nd maxima, the value of $\lambda$ would be $(S > > d \& d > > \lambda)$

1. $\frac{12d^2}{D}$ , 2. $\frac{6d^2}{D}$ ,
3. $\frac{3d^2}{D}$ , 4. $\frac{24d^2}{D}$

View Text Solution

**58.** Two coherent point sources $S_1$ and $S_2$ vibrating in phase emit light of wavelength $\lambda$ . The separation between them is $2\lambda$ as shown in figure. . The first bright fringe is formed at 'P' due to interference on a screen placed at distance 'D' from $(D > > \lambda)$ , then OP is

1 . $\sqrt{3}D$ , 2 . 1 . 5 D

3 . $\sqrt{2}D$ , 4. 2 D

View Text Solution

**59.** A parallel beam of light of wavelength 500 nm falls on a narrow slit and the resulting diffraction pattern is observe on screen 1 m away. It is observed that the first minimum is at a distance of $2.5mm$ from the centre of the screen. Find the width of the slit.

Watch Video Solution

**60.** A screen is placed $50cm$ from a single slit, which is illuminated with $6000\text{Å}$ light. If the distance between the first and third minima in the diffraction pattern is $3.00mm$, what is the width of the slit ?

Watch Video Solution

**61.** In a single slit diffraction experiment first minima for $\lambda_1 = 660nm$ coincides with first maxima for wavelength $\lambda_2$. Calculate the value of $\lambda_2$.

Watch Video Solution

**62.** Two slits are one millimeter apart and the screen is placed one meter away. What should the width of each slit be to obtain 10 maxima of the double slit pattern within the central maximum of the single pattern.

Watch Video Solution

**63.** For what distance is ray optics a good approximation when the aperture is 3 mm wide and the wavelength is 500 nm ?

Watch Video Solution

**64.** What is the approximate radius of the central bright differaction spot of light of wavelength $\lambda = 0.5 \mu m$, if focal length of the lens is 20 cm and radius of aperture of the lens is 5 cm ?

Watch Video Solution

**65.** Which light would produce more resolution the red light or the blue one ?

Watch Video Solution

**66.** Assume that light of wavelength $6000\text{Å}$ is coming from a star. What is the limit of resolution of a telescope whose objective has a diameter of 100 inch ?

Watch Video Solution

**67.** When light of a certain wavelength is incident on a plane surface of a material at a glancing angle $30^\circ$, the reflected light is found to be compleley plane polarized determine.

a) refractive index of given material and

b) angle of refraction.

Watch Video Solution

**68.** Unpolarized light falls on two polarizing sheets placed one on top of the other. What must be the angle between the characteristic directions of the sheets if the intensity of the transmitted light is one third of intensity of the incident beam ?

Watch Video Solution

**69.** Unpolarized light of intensity 32 $Wm^{-3}$ passes through three polarizers such that the transmission axis of the last polarizer is crossed with the first. If the intensity of the emerging light is $3Wm^{-2}$, what is the angle between the transmission axces of the first two polarizers ? At what angle will the transmitted intensity be maximum ?

Watch Video Solution

**70.** Discuss the intensity of transmitted light when a polaroid sheet is rotated between two crossed polaroids?

Watch Video Solution

## C.U.Q

**1.** A plane wave front falls on a convex lens. The emergent wave front is

A. Plane

B. Cylinderical

C. Spherical diverging

D. Spherical converging

**Answer: D**

Watch Video Solution

**2.** When two light waves meet at a palce

A. their displacement add up

B. their intensities add up

C. both will add up

D. Energy becomes zero

**Answer: B**

Watch Video Solution

**3.** The following phenomena which is not explained by Huygens' construction of wave front is

A. refraction

B. reflection

C. diffraction

D. origin of spectra

**Answer: D**

Watch Video Solution

**4.** A wavefront is an imaginary surface where

A. phase is same for all points

B. phase changes at constant rate at all points along the surface.

C. constant phase differece continuously changes between the points

D. phase changes all over the surface

**Answer: A**

Watch Video Solution

**5.** Huygen's priciple of secondary wavelets may be used to

A. to detrmine the velocity of light

B. to find the position of the wave front

C. to determine the wavelength of light

D. to find the focal length of a lens.

**Answer: B**

Watch Video Solution

**6.** In a Laser beam the photons emitted are

A. same wavelength

B. coherent

C. of same velocity

D. All the above

**Answer: D**

Watch Video Solution

**7.** The amplitudes of two interfering waves are 4 cm and 3 cm respectively. If the resutant amplitude is 1 am then the interference becomes

A. constructive

B. Destructive

C. Both constructive and destructive

D. given data is insufficient

**Answer: B**

Watch Video Solution

**8.** Two coherent waves are represented by $y_1 = a_1 \cos_\omega$ t and $y_2 = a_2 \sin_\omega$t. The resultant intensity due to interference will be

A. $\left(a_1^2 - a_2^2\right)$

B. $\left(a_1^2 + a_2^2\right)$

C. $(a_1 - a_2)$

D. $(a_1 + a_2)$

**Answer: B**

Watch Video Solution

**9.** Two light waves are represented by $y_1 = a \sin_\omega t$ and $y_2 = a \sin(\omega t + \delta)$. The phase of the resultant wave is

A. $2\delta$

B. $\frac{\delta}{2}$

C. $\frac{\delta}{3}$

D. $\frac{\delta}{4}$

**Answer: B**

Watch Video Solution

**10.** Laser light is considered to be coherent because it consists of

A. many wavelengths

B. uncoordinated wavelengths

C. coordinated waves of exactly the same wavelength

D. divergent beams

**Answer: C**

Watch Video Solution

**11.** Two waves having the same wave length and amplitude but having a constant phase difference but having a constant phase difference with time are known as

A. identical waves

B. incoherent waves

C. coherent waves

D. collateral waves

**Answer: C**

Watch Video Solution

**12.** Light waves spreading from two sources produces steady inteference only if they have

A. congruence

B. coherence

C. same intensity

D. same amplitude

**Answer: B**

Watch Video Solution

**13.** For different independent waves are represented by

a) $Y_1 = a_1 \sin \omega_1 t$ , b) $Y_2 = a_2 \sin \omega_2 t$

c) $Y_3 = a_3 \sin \omega_3 t$ , d) $Y_4 = a_4 \sin\left(\omega_4 t + \frac{\pi}{3}\right)$

The sustained interference is possible due to

A. $a \& c$

B. $a\&d$

C. $c\&d$

D. not possible with any combination

**Answer: D**

Watch Video Solution

**14.** Interference fringes in Young's double slit experiment with monochromatic light are

A. always equispaced

B. always unequally spaced

C. both equally and unequally spaced

D. formed by a portion of the wave front.

**Answer: A**

Watch Video Solution

**15.** The nessary condition for an interference by two sources of light is that:

A. two light sources must have same wavelength

B. two point sources must should have the same amplitude and same wavelength

C. two source should have the same wavelength, nearly the same amplitude and have a constant phase angle difference

D. the point sources should have a randomly varying difference

**Answer: C**

Watch Video Solution

**16.** For the sustained interference of light, the necessary condition is that the two sources should

A. have constant phase difference only

B. be narrow

C. be close to each other

D. of same amplitude with constant phase difference

**Answer: D**

Watch Video Solution

**17.** When interference of light takes place

A. Energy is created in the region of maximum intensity

B. Energy is denstroyed in the region of maximum intensity

C. Conservation of energy holds good and energy is redistributed

D. Conservation of energy doesn't hold good

**Answer: C**

Watch Video Solution

**18.** Which of the following is conserved when light waves interfere

A. momentum

B. amplitude

C. energy

D. intensity

**Answer: C**

Watch Video Solution

**19.** The path difference between two interfering waves at a point on screen is $70.5$ tomes the wave length. The point is

A. Dark

B. Bright

C. Not possible

D. Green in colour

**Answer: A**

Watch Video Solution

**20.** Interference is produced with two coherent sources of same intensity. If one of the sources is covered with a thin film so as to reduce the intensity of light coming out of it to half, then

A. Bright fringes will be les bright and dark fringes will be less dark

B. Bright fringes will be more bright asnd the dark fringes will be more dark

C. Brigthness of both types of the fringes will remain the same

D. Dark region will spread completely

**Answer: A**

Watch Video Solution

**21.** For constructive interference between two waves of equal wavelength, the phase angle $\delta$ should be such that

A. $\cos^2\left(\frac{\delta}{2}\right) = -1$

B. $\cos^2\left(\frac{\delta}{2}\right) = 0$

C. $\cos^2\left(\frac{\delta}{2}\right) = 1$

D. $\cos^2\left(\frac{\delta}{2}\right) = \text{infinite}$

**Answer: C**

Watch Video Solution

**22.** Two coherent waves each of asmplitude 'a' traveling with a phase difference $\delta$ when superpose with each other the resultant intensity at a given point on the screen is

A. $a^2(1 + \cos\delta)$

B. $4a^2(1 + \cos\delta)$

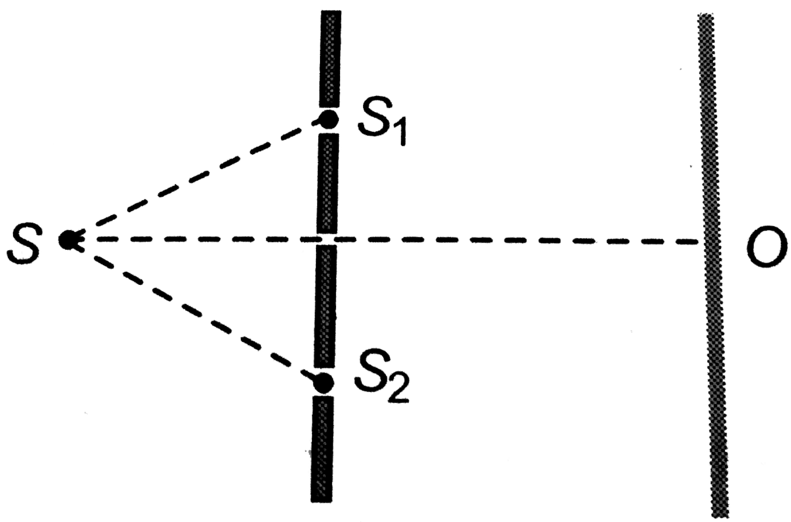
C. $2a^2(1 + \cos\delta)$

D. $(1 + \cos\delta)$

**Answer: C**

Watch Video Solution

**23.** 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

**Answer: C**

Watch Video Solution

**24.** In young's experiment of double slit, the number of times the intensity of the central bright band greater than the individual intensity of the interfering waves

A. 2

B. 4

C. 6

D. 16

**Answer: B**

Watch Video Solution

**25.** 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

**Answer: C**

Watch Video Solution

**26.** The contrast in the fringes in any interference pattern depends on:

A. fringe width

B. wave length

C. intensity ratio of the sources

D. distance between the sources.

**Answer: C**

Watch Video Solution

**27.** If monochromatic red light is replaced by green light the fringe width becomes

A. increase

B. remain same

C. we cannot say

D. decrease

**Answer: D**

Watch Video Solution

**28.** Interference was observed in interference chamber, when air was present. Now the chamber is evacuated, and if the same light is used, a careful observer will see

A. no interference

B. interference with central bright band

C. interference with central dark band

D. interference in which breadth of the fringe will be slightly increased.

**Answer: B**

Watch Video Solution

**29.** In young's experiment with white light central fringe is white. If now a transparent film is introduced in the upper beam coming from the top, slit, the white fringe

A. moves down ward

B. moves upward

C. remains at the same place

D. totally dissappears

**Answer: B**

Watch Video Solution

**30.** In young's double slit experiment the slits are of different length and widths. The amplitude of the light waves is directly proportional to the

A. length of the slit

B. distance between the slits

C. area of the slits

D. width of slits

**Answer: C**

Watch Video Solution

**31.** In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then, in the interference pattern

A. The intensities of both the maxima and the minima increase

B. The intensity of the maxima increases and the minima has zero intensity.

C. The intensity of the maxima decreases and that of the minima increases.

D. The intensity of the maxima decreases and the minima has zero intensity.

**Answer: A**

Watch Video Solution

**32.** When the width of slit aperture is increased by keeping 'd' as constant in Young's experiment

A. Fringe width will increase

B. Fringe width will decrease and then increase

C. Fringe width first increases then decreases

D. Gradually the fringes will be merge

**Answer: B**

View Text Solution

**33.** When viewed in white light, soap bubbles show colours because of

A. Interference

B. Scattering

C. Diffraction

D. Dispersion

**Answer: A**

Watch Video Solution

**34.** When a drop of oil is spread on a water surface, it displays beautiful colours in daylight because of

A. Dispersion of light

B. Interference of light

C. Scattering of light

D. Absorption of light

**Answer: B**

Watch Video Solution

**35.** Coherent light is incident on two fine parallel slits $S_1$ and $S_2$ as show in fig. If a dark fringe occurs at P, which of the following gives possible phase difference for the light waves arriving at P from $S_1$ and $S_2$ ?

A. $2\pi, 4\pi, 6\pi....$

B. $1/2\pi, 5/2\pi, 6/2\pi.....$

C. $\pi, 3\pi, 5\pi.....$

D. $1/2\pi, 3/2\pi, 5/2\pi......$

**Answer: C**

Watch Video Solution

**36.** In young's double slit experiment, the distance of the n-th dark fringe from the centre is

A. $n\left(\frac{\lambda D}{2d}\right)$

B. $n\left(\frac{2d}{\lambda D}\right)$

C. $(2n-1)\frac{\lambda D}{2d}$

D. $(2n-1)\frac{4d}{\lambda D}$

**Answer: C**

Watch Video Solution

**37.** When a transparent parallel plate of uniform thickness $t$ and refractive index $\mu$ is interposed normally in the path of a beam of light, the optical path is

A. $(\mu - 1)t$

B. $(\mu + 1)t$

C. $\mu t$

D. $\frac{\mu}{t}$

**Answer: A**

Watch Video Solution

**38.** A Young's double slit experiment is performed with white light, then

A. the central maximum will be dark

B. there will not be completely dark fringe

C. the fringe next to the central will be red

D. the fringe next to cenrtal will be violet

**Answer: C**

Watch Video Solution

**39.** The contrast in the fringes in any interference pattern depends on:

A. wavelength

B. distance between two coherent sources

C. fringe width

D. intensity ratio

**Answer: D**

Watch Video Solution

**40.** If a torch is used in place of monochromatic light in Young's experiment what will happen?

A. Fringe will occur as from monochromatic source

B. Fringe will appear for to a moment and then it will disappear

C. No fringes will appear

D. Only bright fringe will appear

**Answer: C**

Watch Video Solution

**41.** At a finite distance from the source, a point source of light produces

A. spherical wave front

B. plane wavefront

C. cylindrical wavefront

D. both sperical and plane wavefronts

**Answer: A**

Watch Video Solution

**42.** Nature of wave front depends on

A. shapes of source

B. distance of source

C. both 1 and 2

D. none of these

**Answer: C**

Watch Video Solution

**43.** A Young's double-slit set-up for interference shifted from air to within water. Then the

A. Fringe width decreases

B. Fringe width increases

C. Fringe width remains same

D. Fringe system disappears

**Answer: A**

Watch Video Solution

**44.** In Young's double slit experiment the phase difference between the waves reaching the central fringe and fourth bright fringe will be

A. zero

B. $4\pi$

C. $6\pi$

D. $8\pi$

**Answer: D**

Watch Video Solution

**45.** Instead of using two separate but identical sodium lamps, which of the following occur

a) uniform illuminations is observed

b) widely separate interference

c) very bright maximum

d) very minimum

A. a only

B. a, b only

C. c,d only

D. b,d only

**Answer: A**

Watch Video Solution

**46.** Alternate bright and dark fringes appear in Young's double slit experiment due to the phenomenon of

A. Polarisation

B. Diffraction

C. Interference

D. Dispersion

**Answer: C**

Watch Video Solution

**47.** The bending of light about corners of an obstacle is called

A. Dispersion

B. Refraction

C. Deviation

D. Diffraction

**Answer: D**

Watch Video Solution

**48.** To observe diffraction, the size of the obstacle

A. Should be of the same order as wave length

B. Should be much larger than the wave length

C. Has no relation to wave length

D. May be greater or smaller than the wave length

**Answer: A**

Watch Video Solution

**49.** In diffraction pattern

A. The fringe widths are equal

B. The fringe widths are not equal

C. The fringes can not be produced

D. The fringe width may or may not be equal

**Answer: B**

Watch Video Solution

**50.** Sun light filtering through a tree leaves often makes circular patches on the groung because

A. The sun is round

B. The space through which light penetrates is round

C. Light is transverse in nature

D. Of diffraction effects

**Answer: D**

Watch Video Solution

**51.** In studying diffraction pattern of different obstacles, the effect of

A. full wave front is studied

B. portion of a wave front is studied

C. waves from two coherent sources is studied

D. waves from one of the coherent source is studied.

**Answer: B**

Watch Video Solution

**52.** Diffraction effects are easier to notice in the case of sound waves than in the case of light waves because

A. Light wave do not require medium

B. Wavelength of light waves is far smaller

C. Light waves are transverse

D. Speed of light is far greater

**Answer: B**

Watch Video Solution

**53.** In Young's double slit experiment

A. only interference occurs

B. only diffraction occurs

C. both interference and diffraction occurs

D. polarisation occurs

**Answer: C**

Watch Video Solution

**54.** Light travels in a straight line because

A. it is not absorbed by atmosphere

B. its velocity is very high

C. differaction effect is negligible

D. due to interference

**Answer: C**

Watch Video Solution

**55.** One of the following statements is correct. Pick out the one

A. Diffraction can not take place without interfence

B. Intereference will not take place with out diffraction.

C. Interference and diffraction are the result of polarization

D. The fringe width in Young's double slit experiment does not depends on the wave length.

**Answer: A**

Watch Video Solution

**56.** Diffraction of light is

A. the bending of light at the surface of separation when it travels from rarer medium of denser medium

B. the bending of light at the surface of separation when it travels from denser medium to rarer medium

C. encroachment of light into the geometrical shadow of the obstancle placed in its path

D. emergence of a light ray grazing the surface of separation when it travels denser to rarer medium

**Answer: C**

Watch Video Solution

**57.** Pick out the correct statements

A. diffraction is exhibited by all electromagnetic waves but not by mechanical waves

B. diffraction cannot be observed with a plane polarized light

C. the limit of resolution of a microscope decreases with increases in the wavelength of light used

D. the width of central amximum in the diffraction pattern due to single slit increases as wavelength increases

**Answer: D**

Watch Video Solution

**58.** A lens of focal length f gives diffraction pattern of F raunhoffer type of a slit having width a. If wavelength of light is $\lambda$, the distance of first dark band and next bright band from axis is given by

A. $\frac{a}{\lambda}f$

B. $\frac{\lambda}{a}f$

C. $\frac{\lambda}{af}$

D. $a\lambda f$

**Answer: B**

Watch Video Solution

**59.** The class of diffraction in which incident and diffracted wave fronts are planar is called

A. Fresnel diffraction

B. Fraunhoffer diffraction

C. Huygen's diffraction

D. Newton's diffraction

**Answer: B**

Watch Video Solution

**60.** Neutron diffraction pattern is used to determine

A. Density of solids

B. Atomic number of elements

C. Crystal structure of solid

D. Refractive index of liquid

**Answer: C**

Watch Video Solution

**61.** The penetration of light into the region of geometrical shadow is called

A. Diffraction of light

B. Polarisation of light

C. Interference of light

D. Rectilinear propagation of light

**Answer: D**

Watch Video Solution

**62.** The surface of srystals can be studied using

A. diffraction of visible light

B. diffraction of x-rays

C. interference of sound waves

D. refraction of radio waves

**Answer: B**

Watch Video Solution

**63.** The diffraction bands observed in the case of straight edge producing diffraction effects are

A. equally spaced like the interference bands but with less contrast

B. unequally spaced with increasing width as we move away from the edge of geometric shadow

C. unequally spaced with decreasing width as we move away from the edge of geometric shadow

D. equally spaced like the interference bands but with more contrast

**Answer: C**

Watch Video Solution

**64.** A we move away from the edge into the geometrical shadow of a straight edge, the intensity of illumination

A. Decreases

B. Increases

C. Remains unchanged

D. Increase and decreases

**Answer: A**

Watch Video Solution

**65.** In Fresnel's diffraction, wavefront must be

A. spherical

B. cylindrical

C. plane

D. both 1 and 2

**Answer: D**

Watch Video Solution

**66.** The resolving lime of healthy eye is about

A. $\approx 1'$

B. $\approx 1^{\circ}$

C. $\approx 10'$

D. $\approx 5'$

**Answer: A**

Watch Video Solution

**67.** Resolving power of a telescope increases with

A. Increase in focal length of eye piece

B. Increase in focal length of objective

C. Increase in aperture of eye piece

D. Increase in aperture of objective

**Answer: D**

Watch Video Solution

**68.** To increase both the resolving power and magnifying power of a telecscope

A. Both the focal length and aperture of the objective has to be increased

B. The focal length of the objective has to be in creased

C. The aperture of the objective has to be increased

D. The wavelength of light has to be decreased

**Answer: D**

Watch Video Solution

**69.** Waves that cannot be polarised are

A. Longitudinal

B. Transverse

C. Electromagnetic

D. Light

**Answer: A**

Watch Video Solution

**70.** Human eye

A. Can detect polarised light

B. Can not detect polarisation of light

C. Can detect only circularly polarised light

D. Can detect only linearly polarised light

**Answer: B**

Watch Video Solution

**71.** Polarisation of light was first successfully explained by

A. Corpuscular theory

B. Huygens' wave theory

C. Electromagnetic wave theory

D. Planck's theory

**Answer: C**

Watch Video Solution

**72.** Plane of polarisation is

A. The plane in which vibrations of the electric vector takes place

B. A plane perpendicular to the plane in which vibrations of the electric vector takes place

C. Is perpendicular to the plane of vibration

D. Horizontal plane

**Answer: A**

Watch Video Solution

**73.** In the propagation of polarised light waves, the angle between the plane of vibration and the plane of polarization is

A. $0^\circ$

B. $90^\circ$

C. $45^\circ$

D. $180^\circ$

**Answer: B**

Watch Video Solution

**74.** Transverse wave nature is established by

A. Interference

B. Diffraction

C. Polarization

D. All the above

**Answer: C**

Watch Video Solution

**75.** Choose the correct statement.

A. the Brewster's angle is independent of wavelength of light.

B. the Brewster's angle is independent of the nature of reflecting surface

C. the Brewster's angle is different for different wavelengths

D. Brewster's angle depends on wavelength but not on the nature of reflecting surface.

**Answer: C**

Watch Video Solution

**76.** The polarising angle for glass is

A. same for different kinds of glass

B. different for different kinds of glass

C. same for light of all colours

D. varies with time

**Answer: B**

Watch Video Solution

**77.** When an unpolarised light is polarized, then the intensity of light of the polarized waves

A. remains same

B. doubled

C. halved

D. depends on the colour of the light.

**Answer: C**

Watch Video Solution

**78.** Unpolarising light on two polarizing sheets so oriented that is transmitted. If a third polarizing sheet is placed between them, not parallel to either of the above two sheets in question

A. no light is transmitted

B. some light is transmitted

C. light may or may not be transmitted

D. certrainly $50\%$ light is transmitted.

**Answer: B**

Watch Video Solution

**79.** When light falls on two polaroid sheets, one observes complex brightness then the two polaroids axes are

A. Mutually perpendicular

B. Mutually parallel

C. Angle between their two axes is $45^\circ$

D. None of the above

**Answer: B**

Watch Video Solution

**80.** Polaroid are used

A. to eliminate head light glare in automobile

B. in production of 3-D motion pictures

C. in sun glasses

D. all the above

**Answer: D**

Watch Video Solution

**81.** A diffraction pattern is obtained using a beam of redlight. What happens if the red light is replaced by blue light

A. no change

B. diffraction bands become narrower and crowded together

C. bands become broader and farther apart

D. bands disappear

**Answer: B**

Watch Video Solution

**82.** In a diffraction pattern the width of any fringe is

A. directly proportional to slit width

B. inversely proportional to slit width

C. Independent of the slit width

D. None of the above

**Answer: B**

Watch Video Solution

**83.** Yellow light is used in a single slit of diffraction experiment with slit width $0.6 mm$. If yellow light is replaced by X-rays then the observed pattern will reveal

A. that the central maximum is narrower

B. more number of fringes

C. less number of fringes

D. no diffraction patterns

**Answer: D**

Watch Video Solution

**84.** A beam of light AO is incident a glass slab $(\mu = 1.54)$ in the direction show. The reflected ray OB is passed through a Nicol prism. On viewing through a Nicol prism, we find on rotating the prism that

A. the intensity is reduceed down to zero and remains zero

B. the intensity reducees down somewhat and rises again

C. there is no change in intensity

D. the intensity gradually reduces to zero and then again increases

**Answer: D**

Watch Video Solution

**85.** A star is going away from the earth. An observer on the earth will see the wavelength of light coming from the star

A. decreased

B. increased

C. neither decreased nor increased

D. decreased or increased depending upon the velocity of the start

**Answer: B**

Watch Video Solution

**86.** Red shift is an illustration of

A. low temperature emission

B. high frequency absorption

C. Doppler effect

D. unknown phenomenon

**Answer: C**

Watch Video Solution

**87.** If the shift of wavelength of light emitted by a star is towards viloet, then this shows that star is

A. stationary

B. moving towards earth

C. moving away from earth

D. Information is incomplete

**Answer: B**

Watch Video Solution

**88.** When there is a relative motion of an observer from a source of light, the apparent change in its wavelength is termed as

A. Raman effect

B. Seebeck effect

C. Doppler's effect

D. Graviational effect

**Answer: C**

Watch Video Solution

**89.** In the context of Doppler effect in light, the term red shift signifies

A. decrease in frequency

B. increase in frequency

C. decrease in intensity

D. increase in intensity

**Answer: A**

Watch Video Solution

**90.** As we change the colour of light from Red to Blue, which of the following is correct for the polarizing angle and cririal angle of glass ?

A. the former increases, the latter decreases

B. the former decreases, the latter increases

C. the former increases, the latter increases

D. the former decreases, the latter decreases

**Answer: A**

Watch Video Solution

**91.** Atmospheric refraction is due to

A. changing pressure in the atmosphere

B. varying density of atmosphere

C. varying temperature of the atmosphere

D. both (2) and (3)

**Answer: D**

Watch Video Solution

**92.** Which of the following phenomenon is not common to sound and light waves

A. Interference

B. Diffraction

C. Polarisation

D. Reflection

**Answer: C**

Watch Video Solution

**93.** Polarisation can be produced by

A. Reflection

B. Refraction

C. Scattering

D. All of the above

**Answer: D**

Watch Video Solution

**94.** An unpolarised light is incident on a surface separating two transparent media of different optical densities at the polarizing angle. Then the reflected ray and refracted ray are

A. parallel to each other

B. perendicular to each other

C. inclined to each other making an angle $45^\circ$

D. None of the above

**Answer: B**

Watch Video Solution

**95.** The intensity of the polarized transmitted through the analyzer is given by

A. Brewster's law

B. Malus Law

C. Fresnel's assumptions

D. law of superopsition

**Answer: B**

Watch Video Solution

**96.** Statement A: In the interference pattern the intensity is same at all points in a brightband

Statement B: In Young's double slit experiment, as we move away from the central maximum, the third maximum always comes before the third minimum.

A. Both A and B are true

B. Both A and B are false

C. A is true but B is false

D. A is false and B is true

**Answer: A**

Watch Video Solution

**97.** A light of wavelength $\lambda$ is incident on an object of size b. If a screen is at a distance D from the object. Identify the correct condition for the observation of different phenomenon

a) if $b^2 = D\lambda$, Fresnel diffraction is observed

b) if $b^2 > \; > D\lambda$, Fraunhoffer diffeaction is observed

c) $b^2 < \; < D\lambda$, Fraunhoffer diffraction is observed

d) $b^2 > \; > Dalmbad$, the approximation of geometrical optics is applicable

A. a,b and d are true

B. a,c and d are true

C. a and c are true

D. a and d are true

**Answer: B**

Watch Video Solution

**98.** Assertion (A) : In Young's double slit experiment the band width for red colour is more

Reason (R ): Wavelength of red is small

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

**99.** Assertion (A) : Thin films such as soap bubble or a thin layer of oil on water show beautiful colours when illuminated by white light.

Reason (R ): The colours are obtained by dispersion of light

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

**100.** Assertion (A) : When tiny circular obstacle is placed in the path of light from some distance, a bright spot is seen at the centra of the shadow of the obstacle.

Reason (R ) : Destructive interference occurs at the centre of the shadow.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**



**101.** Assertion (A) : Coloured spectrum is seen when we look through a cloth

Reason (R ) : Diffraction of light takes place when light is travelling throught the pores of cloth

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**102.** Statement - I : Diffraction of sound waves is evident in daily experince than that of light waves

Statement- II : The wave length of sound waves is comparitively higher than that of light waves.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

**103.** Assertion (A) : We cannot observe diffraction pattern from a wide slit illuminated by monochromatic light

Reason (R ) : In diffraction pattern, all the bright bands arenot of the same intensity.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: B**

Watch Video Solution

**104.** Assertion (A) : Transverse wave nature of light is proved by polarisation

Reason (R ) : According to Maxwell, light is an electromagnetic wave but not mechanical wave

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: B**

Watch Video Solution

**105.** Assertion (A) : Coloured spectrum is seen when we look through a cloth

Reason (R ) : Diffraction of light takes place when light is travelling throught the pores of cloth

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**106.** Assertion (A) : Young's double slit experiment can be performed using a source of white light.

Reason (R ) : The wavelength of red light is less than wavelength of other colors in white light.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

**107.** Assertion (A) : The unpolarised light and polarized light can be distinguished from each other by using Polaroid.

Reason (R ) : A Polaroid is capable of producing plane polarized beams of light.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**108.** Assertion (A) : Illumination of the sun at noon ius maximum because

Reason (R ) : The sun rays are incident a almost normally

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**109.** Assertion (A) : The phase difference between any two points on a wave front is zero

Reason (R ) : Light from the source reaches every point of the wave front at the same time

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**110.** Assertion (A) : In Young's double slit experiemnt white light is used and slits are covered with red and blue filters respectively. The phase difference at any point on the screen will continuously change and uniform illumination is produced on the screen

reason (R ) : Two independent sources of light would no longer act as coherent sources

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**111.** Assertion (A) : In interfrence pattern intensity of successive fringes due to achromatic light is not same

Reason (R ) : In interferance, only redistribution of energy takes place

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**112.** Assertion (A) : Light from two coherent sources is reaching the screen. If the path difference at a point on the screen for yellow light is $3\lambda / 2$, then the fringe at the point will be coloured.

Reason (R ) : Two coherent sources always have constant phase relationship

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: D**

Watch Video Solution

**113.** Assertion (A) : No interfrence pattern is detected when two coherent sources are very closer to each other. (i.e separation almost zero)

Reason (R ) : The fringe width is inversely proportional to the distance between the two slits

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**114.** Statement-I : In Young's double slit experiment interference pattern dissappears when one of the slits is closed

Statement-II : Interference is observed due to superposition of light waves from two coherent source

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**115.** Assertion (A) : The maximum intensity in interference pattern is four times the intensity in interference pattern is four times the intensity due to each slit of equal width.

Reason (R ) : Intensity is directly proportinal to square of amplitude.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: B**

Watch Video Solution

**116.** Assertion (A) : The fringe obtained at the centre of screen in known as zeroth order fringe, or the central fringe

Reason (R ) : Path difference between the waves from $S_1$ and $S_2$ , reaching the central fringe (or zero order fringe) is zero

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**117.** Assertion (A) : If the phase difference between the light waves emerging from the slits of the Young's experment is $\pi$ - radian, the central fringe will be dark

Reason (R ) : Phase differrence is equal to $(2\pi / \lambda)$ times the path difference.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: B**

Watch Video Solution

**118.** Assertion (A) : At sunrise or at sunset the sun appears to be reddish while at mid-day the sun looks white

Reason (R ) : Scattering due to dust particles and air molecules

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**119.** Assertion (A) : If the whole apparatus of YDSE is immersed in a liquid, then the fringe width will decrease

Reason (R ) : The wavelength of light in water is more than that of air.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

**120.** Assertion (A) : The soap film in sun light is colourful

Reason (R ) : Thin films produce interference of light

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**121.** Assertion (A) : Coloured spectrum is seen when we look through a cloth

Reason (R ) : Diffraction of light takes place when light is travelling throught the pores of cloth

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**122.** Assertion (A) : Radio waves diffract pronouncedly around the sharp edges of the buildings than visible light waves.

Reason (R ) : Wave length of radio waves in comparable to the dimension of the edges of the building.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**123.** Assertion (A) : When an unpolarised light is incident on a glass plate at Brewster angle, the reflected ray and refracted ray mutually perpendicular

Reason (R ) : The refractive index of glass is equal to sine of the angle of polarisation.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

**124.** Assertion (A) : If two waves of same amplitude produce a resultant wave of same amplitude produce a resultant wave of same of same amplitude, then the phase difference between them may br $120^\circ$ .

Reason (R ) : The resultant amplitude of two waves is equal to algebraic sum of amplitude of two waves.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

**125.** Assertion : Although the surfaces of a goggle lens are curved, it does not have any power.

Reason: In case of goggles, both the curved surfaces have equal radii of curvature.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: A**

Watch Video Solution

**126.** Assertion (A) : For best contrast between maxima and minima in the interference pattern of Young's double slit experiment the intensity of light emerging out of the two slits should be equal.

Reasson (R ) : The intensity of interference pattern is proportional to the square of the amplitude.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: B**

Watch Video Solution

**127.** Assertion (A) : In YDSE, the fringes become indistinct if one of the slits is covered wityh cellophane paper.

Reason (R ) : The cellophane paper decreases the wavelength of light.

A. Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

B. Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

C. A' is true and 'R' is false

D. A' is false and 'R' is true

**Answer: C**

Watch Video Solution

## LEVEL - I (C.W)

**1.** The displacements of two intering lightwaves are $y_1 = 4 \sin \omega t$ and $y_2 = 3 \cos(\omega t)$. The amplitude of the resultant wave is ($y_1$ and $y_2$ are in CGS system)

A. 5 cm

B. 7 cm

C. 1 cm

D. zero

**Answer: A**

Watch Video Solution

**2.** 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. $625:1$

**Answer: B**

Watch Video Solution

**3.** Two sources of intensity 2I and 8I are used in an interference experiment. The intensity at a point where the waves from two sources superimpose with a phase difference of (a) zero (b) $\pi/2$ and $(c)\pi$ is

A. $18I, 10I, 2I$

B. $5I, 4I, I$

C. $2I, I, \frac{I}{2}$

D. $2I, 10I, 18I$

**Answer: A**

Watch Video Solution

**4.** The intensity of interference waves in an interference pattern is same as $I_0$. The resultant intensity at the point of observation will be

A. $I = 2I_0[1 + \cos\phi]$

B. $I = I_0[1 + \cos\phi]$

C. $I = \frac{[1 + \cos\phi]}{I_0}$

D. $I = \frac{[1 + \cos\phi]}{2I_0}$

**Answer: D**

Watch Video Solution

**5.** In Young's double slit experiment, the constant phase difference between two source is $\frac{\pi}{2}$ . The intensity at a point equidistant from theslits in terms of maximum intensity $I_0$ is

A. $I_0$

B. $I_0 / 2$

C. $3I_0 / 4$

D. $3I_0$

**Answer: A**

Watch Video Solution

**6.** The path difference between two interfering waves at a point on the screen is $\lambda / 6$, The ratio of intensity at this point and that at the central bright fringe will be (assume that intensity due to each slit is same)

A. $0.75$

B. $7.5$

C. $85.3$

D. $853$

**Answer: C**

Watch Video Solution

**7.** In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600nm is used. If the wavelength of light is changed to 400nm, number of fringes observed in the same segment of the screen is given by

A. 12

B. 18

C. 24

D. 8

**Answer: B**

Watch Video Solution

**8.** A double slit apparatus is immersed in a liquid of refractive index 1.33. It has slit and the screen 1 mm. The slits are illuminated by a parallel beam of light whose wavelength in air is $6300\text{Å}$

a. calculate the fringe width.

b. One of the slits of the apparatus is covered by a thin glass sheet of refractive index 1.53. Find the smallest thickness of the sheet to bring athe adjacent minima on the axis.

A. $(1.33 \times 0.63)mm$

B. $\frac{0.63}{1.33}mm$

C. $\frac{0.63}{(1.33)^2}mm$

D. $0.63mm$

**Answer: D**

Watch Video Solution

**9.** The fringe width at a distance of 50 cm from the slits in young's experiment for light of wavelength $6000 \text{Å}$ is $0.048 cm$. The fringe width at the samedistance for $\lambda = 5000 \text{Å}$ will be

A. $0.04 cm$

B. $0.4 cm$

C. $0.14 cm$

D. $0.45 cm$

**Answer: A**

Watch Video Solution

**10.** In young's double slit experiment the slits are illumated by light of wavelength $5890^{\circ}$ A and the distance between the fringes obtained on the screen is $0.2^{\circ}$. If the whole apparatus is immersed in water then the angular fringe width will be, if the refractive index of water is $4/3$

A. $0.30^\circ$

B. $0.15^\circ$

C. $15^\circ$

D. $30^\circ$

**Answer: B**

Watch Video Solution

**11.** A plate of thickness t made of a material of refractive index $\mu$ is placed in front of one of the slits in a double slit experiment. (a) Find the changes in he optical path due to introduction of the plate. (b) Wht should be the minimum thickness t which will make the intensity at the centre of the fringe pattern zero ? Wavelength of the light used is $\lambda$. Neglect any absorption of light in the plate.

A. $(\mu - 1)\frac{\lambda}{2}$

B. $(\mu - 1)\lambda$

C. $\frac{\lambda}{2(\mu - 1)}$

D. $\frac{\lambda}{(\mu - 1)}$

**Answer: C**

Watch Video Solution

**12.** In Young's double-slit experiment, the separation between the slits is halved and the distance between the slits and the screen in doubled. The fringe width is

A. unchanged

B. halved

C. doubled

D. quadrupled

**Answer: D**

Watch Video Solution

**13.** The maximum number of possible interference maxima for slit-separation equal to twice the wavelength in Young's double-slit experiment is

A. infinite

B. five

C. three

D. zero

**Answer: B**

Watch Video Solution

**14.** Two identical coherent sources produce a zero order bright fringe on a screen. If $\beta$ is the band width, the minimum distance between two points on either side of the bright where the intensity is half that of maximum intensity is half of maximum intensity is

A. $\beta/2$

B. $\beta/4$

C. $\beta/3$

D. $\beta/6$

**Answer: B**

Watch Video Solution

**15.** In Young's double slit experiment, the 8th maximum with wavelength $\lambda_1$ is at a distance $d_1$ from the central maximum and the 6th maximum with a wavelength $\lambda_2$ is at a distance $d_2$. Then $(d_1/d_2)$ is equal to

A. $\frac{4}{3}\left(\frac{\lambda_2}{\lambda_1}\right)$

B. $\frac{4}{3}\left(\frac{\lambda_1}{\lambda_2}\right)$

C. $\frac{3}{4}\left(\frac{\lambda_2}{\lambda_1}\right)$

D. $\frac{3}{4}\left(\frac{\lambda_1}{\lambda_2}\right)$

**Answer: B**

Watch Video Solution

16. Statement-I : In Young's double slit experiment interference pattern dissapears when one of the slits is closed

Statement-II : Interference is observed due to superposition of light waves from two coherent source

A. Statement-I is true and Statement-II is true and Statement-II is the correct explanation of Statement-I.

B. Statement-I asnd Statement-II are true but Statement-II is not the correct explanation of Statement-I

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

**Answer: A**

Watch Video Solution

**17.** Statement I: In Young's double-slit experiment, the two slits are at distance d apart. Interference pattern is observed on a screen at distance D from the slits. At a point on the screen which is directly opposite to one of the slits, a dark fringe is observed. Then, the wavelength of wave is proportional to the squar of distance between two slits.

Statement II: For a dark fringe, intensity is zero

A. Statement-I is true and Statement-II is true and Statement-II is the correct explanation of Statement-I.

B. Statement-I asnd Statement-II are true but Statement-II is not the correct explanation of Statement-I

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

**Answer: B**

Watch Video Solution

**18.** Statement I: Fringe width depends upon refractive index of the medium.

Statement II: Refractive index changes optical path of ray of light forming fringe pattern.

A. Statement-I is true and Statement-II is true and Statement-II is the correct explanation of Statement-I.

B. Statement-I asnd Statement-II are true but Statement-II is not the correct explanation of Statement-I

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

**Answer: B**

Watch Video Solution

**19.** Assertion (A) : For best contrast between maxima and minima in the interference patten of Young's double slit experiment the intensity of light emerging out of the two slits should be equal.

Reasson (R ) : The intensity of interference pattern is proportional to the square of the amplitude.

A. A is true and R is true and R is the correct explanation of A.

B. A and R are true but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true.

**Answer: B**

Watch Video Solution

**20.** Assertion (A) : Thin films such as soap bubble or a thin layer of oil on water show beautiful colours when illuminated by white light.

Reason (R ): The colours are obtained by dispersion of light

A. A is true and R is true and R is the correct explanation of A.

B. A and R are true but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true.

**Answer: C**

Watch Video Solution

**21.** Assertion (A) : The flim which appears bright in reflected system will appear dark in the transmitted system and vice-versa.

Reason (R ) : The condittions for film to appear bright of dark in the reflected light are just revese to those in the transmitted light

A. A is true and R is true and R is the correct explanation of A.

B. A and R are true but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true.

**Answer: A**

Watch Video Solution

**22.** Frist diffraction minima due to of a single slit diffraction is at $\theta = 30^\circ$ for a light of wavelength $6000\text{Å}$. The width of slits is

A. $1 \times 10^{-6} cm$

B. $1.2 \times 10^{-6} m$

C. $2 \times 10^{-6} cm$

D. $2.4 \times 10^{-6} m$

**Answer: B**

Watch Video Solution

**23.** In a single slit diffraction, the width of slits is $0.5 cm$, focal length of lens is 40 cm and of first dark fringe is

Watch Video Solution

**24.** Angular width of central maxima is $\pi/2$, when a slit of width 'a' is illuminated by a light of wavelength $7000\text{Å}$ then a =

A. $9 \times 10^{-9}m$

B. $8.0 \times 10^{-7}m$

C. $9 \times 10^{-7}m$

D. $9.8 \times 10^{-7}m$

**Answer: D**

Watch Video Solution

**25.** The sun subtends asn angle of $(1/2)^{\circ}$ on earth. The image of sun is obtained on the screen with the help of a convex lens of focal length 100 cm the diameter of the image obtained on the screen will be

A. $18cm$

B. $1mm$

C. $50cm$

D. $8.73mm$

**Answer: D**

Watch Video Solution

**26.** The limit of resolution of microscope, if the numerical aperture of microscope is $0.12$, and the wavelength of light used is 600 nm, is

A. $0.3\nu m$

B. $1.2\mu m$

C. $2.5\mu m$

D. $3\mu m$

**Answer: D**

Watch Video Solution

**27.** The least resolvable angle by a telescope using objective of aperture 5 m is nearly $(\lambda = 400 \text{Å})$

A. $\frac{1}{50^{\circ}}$

B. $\frac{1}{50}$ minute

C. $\frac{1}{50}$sec

D. $\frac{1}{500}$sec

**Answer: C**

Watch Video Solution

**28.** Wavelength of light used in an optical instrument are $\lambda_1 = 4000 \text{Å}$ and $\lambda_2 = 5000 \text{Å}$ then ratio of their respective resolving resolving powers (corresponding to $\lambda_1$ and $\lambda_2$) is

A. $16:25$

B. $9:1$

C. $4:5$

D. $5:4$

**Answer: D**

Watch Video Solution

**29.** The angle of incidence at which reflected light is totally polarized for reflection from air to glass (refractive index n),

A. $\sin^{-1}(n)$

B. $\sin^{-1}(1/n)$

C. $\tan^{-1}(1/n)$

D. $\tan^{-1}(n)$

**Answer: D**

Watch Video Solution

**30.** A light is incident on a transparent medium of $\mu = 1.732$ at the polarising angle. The angle of reaction is

A. $60^\circ$

B. $30^\circ$

C. $45^\circ$

D. $90^\circ$

**Answer: B**

Watch Video Solution

**31.** A ray of light in air is incident on a glass plate at polarising angle of incidence. It suffers a deviation of $22^\circ$ on entering glass. The angle of polarization is

A. $90^\circ$

B. $56^\circ$

C. $68^\circ$

D. zero

**Answer: B**

Watch Video Solution

**32.** The cirtical angle for total internal reflection for a substance is $45^\circ$. The polarizing angle for this substance is $\left(\tan 54^\circ 44' = \sqrt{2}\right)$

A. $46^\circ 16^1$

B. $54^\circ 44^1$

C. $46^\circ 44^1$

D. $54^\circ 16^1$

**Answer: B**

Watch Video Solution

**33.** Unpolarized light of intensity $I_0$is incident on a polarizer and the emerging light strikes a second polarizing filter with its axis at $45^\circ$ to that of the first. The intensity of the emerging beam

A. $\frac{I_0}{2}$

B. $\frac{I_0}{4}$

C. $I_0$

D. $\frac{I_0}{3}$

**Answer: B**

Watch Video Solution

**34.** The axes of the polariser and analyser are inclined to each other at $60^\circ$. If the amplitude of polarised light emergent through analyser is A. The amplitude of unplorised light incident polariser is

A. $\frac{A}{2}$

B. $A$

C. $2A$

D. $2\sqrt{2}A$

**Answer: D**

Watch Video Solution

**35.** Unpolarised light of intensity I is iniedent on a polarizer and the emerging light strikes a second polarizing filter with its axist at $45^\circ$ to that of the first. Determine

a) the intensity of the emerging beam and

b) its state of polarization

A. $\frac{1}{4}$ and parallel to second filter

B. $\frac{1}{4}$ and porpendicular to second filter

C. $\frac{1}{8}$ and parallel to second filter

D. $\frac{1}{8}$ and perpendicular to second filter

**Answer: A**

Watch Video Solution

**36.** A parallel beam of width 'a' is incident on the surface of glass slab $(\mu = 3/2)$ at an angle 'I' and the angle of refraction in glass is 'r'. The width of the refracted parallel beam will be

A. equal to a

B. less than a

C. more than a

D. exactly $2a/3$

**Answer: C**

Watch Video Solution

**37.** When a parallel beam of monochormatic light suffers refraction while going from a rarer medium into a denser medium, which of the following are correct ?

a) the width of the beam decreases

b) the width of the beam increases

c) the refracted beam makes more angle with the interface

d) the refracted beam makes less angle with the interface

A. a, c true

B. b,d true

C. a,d true

D. b,c true

**Answer: D**

Watch Video Solution

**38.** A parallel beam of light in incident on a liquid surface such that the wave front makes an angle $30^{\circ}$ with of the surface and has a width of

$\sqrt{3}m$ , the width of the refracted beam is ____

$(\cdot_a \mu_L = \sqrt{3})$

A. $3m$

B. $\sqrt{3}m$

C. $\frac{\sqrt{11}}{3}m$

D. $\sqrt{\frac{11}{3}}m$

**Answer: D**

Watch Video Solution

## LEVEL - II (C.W)

**1.** In Young's double slit experiment, the intensity of light at a point on the screen where the path difference is $\lambda = l$. The intensity of light at a point where the path difference becomes $\lambda / 3$ is

A. $K / 4$

B. $K/3$

C. $K/2$

D. $K$

**Answer: A**

Watch Video Solution

**2.** In YDSE, having slits of equal width, let $\beta$ be the fringe width and $I_0$ be the maximum intensity. At a distance x from the central brigth fringe, the intensity will be

A. $I_0 \cos\left(\frac{x}{\beta}\right)$

B. $I_0 \cos^2\left(\frac{x}{\beta}\right)$

C. $I_0 \cos^2\left(\frac{\pi x}{\beta}\right)$

D. $\frac{I_0}{4} \cos^2\left(\frac{\pi x}{\beta}\right)$

**Answer: C**

Watch Video Solution

**3.** In a Young's double slit interference experiment the fringe pattern is observed on a screen placed at a distance D from the slits. The slits are separated by a distance d and are illuminated by monochromatic light of wavelength $\lambda$. Find the distance from the central point where the intensity falls to (a) half the maximum, (b) one fourth of the maximum.

A. $\frac{\lambda D}{3d}$

B. $\frac{\lambda D}{2d}$

C. $\frac{\lambda D}{d}$

D. $\frac{\lambda D}{4d}$

**Answer: D**

Watch Video Solution

**4.** In a double slit experiment , the slit separation is $0.20$ cm and the slit to screen distance is 100 cm. The positions of the first three minima, if wavelength of the source is 500 nm is

A. $\pm 0.125nm, \pm 0.375cm, \pm 0.625cm$

B. $\pm 0.025cm, \pm 0.075cm, \pm 0.125cm$

C. $\pm 12.5cm, \pm 37.5cm, \pm 62.5cm$

D. $\pm 1.25cm, \pm 3.75cm, \pm 6.25cm$

**Answer: A**

Watch Video Solution

**5.** In Young's double slit experiment, the fringes are displaced 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. $2.25$

B. $2.0$

C. $1.75$

D. $1.25$

**Answer: C**

Watch Video Solution

**6.** A double slit experiment is performed with light of wavelength $500nm$. A thin film of thickness $2\mu m$ and refractive index $1.5$ is introduced in the path of the upper beam. The location of the central maximum will

A. reamain unshifted

B. shift downward by nearly two fringes

C. shift upward by nearly two fringes

D. shift downward by 10 fringes

**Answer: C**

Watch Video Solution

**7.** In Young's double slit experiment, an interference pattern is obtained on a screen by a light of wavelength $6000 \text{Å}$, coming from the coherent sources $S_1$ and $S_2$. At certain point P on the screen third dark fringe is formed. Then the path difference $S_1P - S_2P$ in microns is

A. $0.75$

B. $1.5$

C. $3.0$

D. $4.5$

**Answer: B**

Watch Video Solution

**8.** In double slit experiment fringes are obtained using light of wavelength $4800\text{Å}$ One slit is covered with a thin glass film of refractive index. $1.4$ and another slit is covered by a film of same thickness but refractive index $1.7$. By doing so, the central fringe is shifted to fifth bright fringe in the original pattern. The thickness of glass film is

A. $2 \times 10^{-3} mm$

B. $4 \times 10^{-3} mm$

C. $6 \times 10^{-3} mm$

D. $8 \times 10^{-3} mm$

**Answer: D**

Watch Video Solution

**9.** In Young's double slit experiment, $5th$ dark fringe is obtained at a point. If a thin transparent film is placed in the path of one of waves, then

7th bright is obtained at the same point. The thickness of the film in terms of wavelength $\lambda$ and refractive index $\mu$ will be

A. $\frac{1.5\lambda}{(\mu-1)}$

B. $1.5(\mu-1)\lambda$

C. $2.5(\mu-1)\lambda$

D. $\frac{2.5\lambda}{(\mu-1)}$

**Answer: D**

Watch Video Solution

**10.** The Young's double slit experiment is performed with blue light and green light of wavelength $4360\text{Å}$ and $5460\text{Å}$ respectively. If y is the distance of $4th$ maxima from the central one, then

A. $y_b = y_g$

B. $y_b > y_g$

C. $y_b < y_g$

D. $\frac{y_b}{y_g} = \frac{5460}{4360}$

**Answer: C**

Watch Video Solution

**11.** In double slit experiment , the distance between two slits is $0.6mm$ and these are illuminated with light of wavelength $4800\text{Å}$. The angular width of dark fringe on the screen at a distance 120 cm from slits will be

A. $8 \times 10^{-4}$ radian

B. $6 \times 10^{-4}$ radian

C. $4 \times 10^{-4}$ radian

D. $16 \times 10^{-4}$ radian

**Answer: A**

Watch Video Solution

**12.** Fig show a double slit experiment, P and Q are the two coherent source. The path lengths PY and QY are $n\lambda$ and $(n+4)\lambda$ respectively where n is whole number and $\lambda$ is wavelength. Taking the central bright fringe as zero, what is fromed at Y ?

A. First Bright

B. First Dark

C. Fourth Bright

D. Second Dark

**Answer: C**

Watch Video Solution

**13.** White light is used to illuminate the two slits in a Young's double slit experiment. The separation between the slits is b and the screen is at a distance d`(gtb) from the slits. At a point on the screen directly in front of one of the slits, certain wavelength are missing. Some of these missing wavelength are

A. $\frac{b^2}{d}, \frac{b^2}{3d}$

B. $\frac{b^2}{d}, \frac{b^2}{4d}$

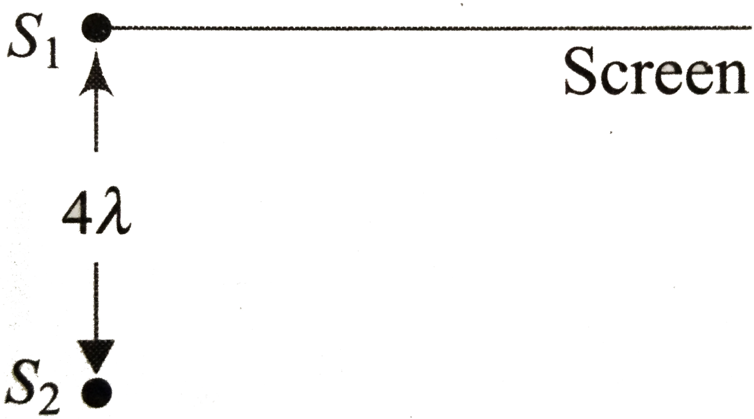
C. $\frac{b^2}{2d}, \frac{b^2}{3d}$

D. $\frac{b^2}{2d}, \frac{b^2}{4d}$

**Answer: A**

Watch Video Solution

**14.** Statement I: For the situation shown in figure two identecal coherent light sources produce interference pattern on the screen. The intensity of minima nearest to $S_1$ is not exactly zero.




Statement II: Minimum intensity is zero, when interfering waves have same intensity at the location of superposition.

A. A is true and R is true and R is the correct explanation of A.

B. A and R are true but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true.

**Answer: A**

Watch Video Solution

**15.** Assertion (A) : Interference pattern is made by using blue light instead of red light, the fringes becomes narrower.

Reason (R ) : In Young's double slit experiment, fringe width is given by the relation $\beta = \frac{\lambda D}{d}$

A. A is true and R is true and R is the correct explanation of A.

B. A and R are true but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true.

**Answer: A**

Watch Video Solution

**16.** Assertion (A) : In YDSE, the fringes become indistinct if one of the slits is covered wityh cellophane paper.

Reason (R ) : The cellophane paper decreases the wavelength of light.

A. A is true and R is true and R is the correct explanation of A.

B. A and R are true but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true.

**Answer: C**

Watch Video Solution

**17.** Assertion (A) : If the whole apparatus of YDSE is immersed in a liquid, then the fringe width will decrease

Reason (R ) : The wavelength of light in water is more than that of air.

A. A is true and R is true and R is the correct explanation of A.

B. A and R are true but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true.

**Answer: C**

Watch Video Solution

18. Statement I: In YDSE, if separation between the slits is less than wavelength of light, then no interference pattern can be observed.

Statement II: For interference pattern to be observed, light sources have to be coherent.

A. Statement-I is true and Statement-II is true and Statement-II is the correct explanation of Statement-I.

B. Statement-I asnd Statement-II are true but Statement-II is not the correct explanation of Statement-I

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

**Answer: B**

Watch Video Solution

**19.** Statement-I : In YDSE, if intensity of each source is $I_0$ then minimum and maximum intensity is zero and $4I_0$ respectively.

Statement-II : In YDSE, energy conservation is not followed.

A. Statement-I is true and Statement-II is true and Statement-II is the correct explanation of Statement-I.

B. Statement-I asnd Statement-II are true but Statement-II is not the correct explanation of Statement-I

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

**Answer: C**

Watch Video Solution

**20.** The $I^{st}$ different minimum due to single slit diffraction is $\theta$, for a light of wave length $5000Å$ . If the width of the slit si $1 \times 10^{-4} cm$ then the value of $\theta$

A. $30^\circ$

B. $45^\circ$

C. $60^\circ$

D. $15^\circ$

**Answer: A**

Watch Video Solution

**21.** Light of wavelength $5000 \times 10^{-10} m$ is incident normally on a slit. The first minimum of the diffraction pattern is observed to lie at a distance of 5 mm from the central maximum on a screen placed at a distance of 3m from the slit. Then the width of the slits is

A. $3cm$

B. $0.3cm$

C. $0.03cm$

D. $0.01cm$

**Answer: C**

Watch Video Solution

**22.** A small aperture is illuminated with a parallel beam of $\lambda = 628nm$. The emergent beam has an anglur divergence of $2^{\circ}$. The size of the aperture is

A. $9\mu m$

B. $18\mu m$

C. $27\mu m$

D. $36\mu m$

**Answer: D**

Watch Video Solution

**23.** A beam of light of wavelength 600 nm from a distant source

falls on a single slit 1.0 mm wide and the resulting diffraction pattern is

observed on a screen 2m away. What is the distance between the first

dark

fringe on either side of the central bright fringe?

A. $1.2mm$

B. $2.4mm$

C. $3.6mm$

D. $2.4cm$

**Answer: B**

Watch Video Solution

**24.** Two parallel pillars are $11km$ away from an observer. The minimum distance between the pillars so that they can be seen separately will be

A. $3m$

B. $1m$

C. $0.25m$

D. $0.5m$

**Answer: A**

Watch Video Solution

**25.** Two point white dots are 1mm apart on a black paper. They are viewed by eye of pupil diameter 3mm. Approximately, what is the maximum distance at which these dits can be resolved by the eye? [Take wavelelngth of light =500nm]

A. $6m$

B. $3m$

C. $5m$

D. $1m$

**Answer: C**

Watch Video Solution

**26.** A horizontal beam of vertically polarized light of intensity $43W/m^2$ is sent through two polarizing sheets. The polarizing direaction of the first is $60^\circ$ to the vertical, and that of the second is horizontal. The intensity of the light transmitted b y the pair of sheets is (nearly)

A. $8.1W/m^2$

B. $7.3W/m^2$

C. $6.4W/m^2$

D. $3.8W/m^2$

**Answer: A**

Watch Video Solution

**27.** Unpolarized light of intensity 32 $Wm^{-3}$ passes through three polarizers such that the transmission axis of the last polarizer is crossed with the first. If the intensity of the emerging light is $3Wm^{-2}$, what is the angle between the transmission axces of the first two polarizers ? At what angle will the transmitted intensity be maximum ?

A. $45^{\circ}$

B. $60^{\circ}$

C. $30^{\circ}$

D. zero

**Answer: C**

Watch Video Solution

**28.** Two polariods are oriented with their transmision axes making angle of $30^{\circ}$ with each other. The fraction of incident un polarised light is transmitted

A. $37\%$

B. $37.5\%$

C. $3.36\%$

D. $36.5\%$

**Answer: B**

Watch Video Solution

**29.** The polaroids $P_1, P_2 \& P_3$ are arranged coaxially. The angle between $P_1$ and $P_2$ is $37^{\circ}$. The angle between $P_2$ and $P_3$ is, if intensity of emerging light is a quarter of intensity of unploarized light

A. $\theta = \cos^{-1}\left(\frac{5}{4}\right)$

B. $\theta = \cos^{-1}\left(\frac{4}{5}\right)$

C. $\theta = \cos^{-1}\left(\frac{4}{5\sqrt{2}}\right)$

D. $\theta = \cos^{-1}\left(\frac{5}{4\sqrt{2}}\right)$

**Answer: D**

Watch Video Solution

**30.** A ray of light is going from air to glass such that the reflected light is found to be completely plane polarized. Also the angle of refraction inside the glass is found exactly equal to the angle of deviation suffered by the ray. The refractive index of the glass is

A. $1.5$

B. $\sqrt{2}$

C. $\sqrt{3}$

D. $4/3$

**Answer: C**

Watch Video Solution

**31.** A plane polarized beam of intensity I is incident on a polariser with the electric vector inclined at $30^\circ$ to the optical axis of the polariser passes through an analyzer whose optic axis is inclined at $30^\circ$ to that of polariser. Intensity of light coming out of the analyzer is

A. $(9/16)I$

B. $(3/4)I$

C. $(1/4)I$

D. $(\sqrt{3}/2)I$

**Answer: A**

Watch Video Solution

## LEVEL - III

**1.** A ray of light of intensity I is incident on a parallel glass slab at a point A as show. It undergoes partial reflection and refraction. At each reflaction $25\%$ of incident energy is reflected. The rays AB and A'B' undergo interference. The ratio $I_{\max} / I_{\min}$ is

A. $4:1$

B. $8:1$

C. $7:1$

D. $49:1$

**Answer: D**

Watch Video Solution

**2.** Two coherent sources of intensity ratio $\beta$ interfere, then $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}}$ is

A. $\frac{\beta}{1+\beta}$

B. $\frac{2\sqrt{\beta}}{1+\beta}$

C. $\frac{2\sqrt{\beta}}{1+\sqrt{\beta}}$

D. $\frac{2\beta}{1+\sqrt{\beta}}$

**Answer: B**

Watch Video Solution

**3.** Monochromatic green light of wavelength 550 nm illuminates two parallel narrow slits $7.7 \mu m$ apart. The angular deviation $\theta$ of third order (for m =3) bright fringe in radian and in degree

A. $21.6, 12.4^{\circ}$

B. $0.216, 1.24^{\circ}$

C. $0.216, 12.4^{\circ}$

D. $216, 1.24^{\circ}$

**Answer: C**

Watch Video Solution

**4.** A source emitting light of wavelengths 480 nm and 600 nm is used in a double slit interference experiment. The separation between the slits is 0.25 mm and the interference is observed on a screen placed at 150 cm from the slits. Find the linear separation between the first maximum (next to the central maximum) corresponding to the two wavelengths.

A. $0.72mm$

B. $0.72cm$

C. $7.2cm$

D. $7.2mm$

**Answer: A**

Watch Video Solution

**5.** In the Young's double slit experiment, maximum of bright bands observed (inclusive of the central bright band) is found to be 11. If $\lambda$ is the wavelength of the monochromatic light used, the distance between the slits is

A. $5\lambda$

B. $6\lambda$

C. $10\lambda$

D. $11\lambda$

**Answer: A**

Watch Video Solution

**6.** In a double slit experiment, interference is obtained from electron waves produced in an electron gun supplied with voltage V. If $\lambda$ is wavelength of the beam, D is the distance of screen, d is the spacing between coherent source, h is Planck's constant, e is charge on electron and m is mass of electron, then fringe width is given as

A. $\frac{hD}{\sqrt{2meVd}}$

B. $\frac{2hD}{\sqrt{meVd}}$

C. $\frac{hd}{\sqrt{2meVD}}$

D. $\frac{2hd}{\sqrt{meVD}}$

**Answer: A**

Watch Video Solution

**7.** Two identical narrow slits $S_1$ and $S_2$ are illuminated by light of wavelength $\lambda$ from a point source P. If, as shown in the diagtam above the light is then allowed to fall on a scree, and if n is a positive integer, the condition for destructive interference at Q is that

A. $(l_1 - l_2) = (2n+1)\lambda/2$

B. $(l_3 - l_4) = (2n+1)\lambda/2$

C. $(l_3 + l_3) - (l_2 + l_4) = n\lambda$

D. $(l_1 + l_3) - (l_2 + l_4) = (2n+1)\lambda/2$

**Answer: D**

Watch Video Solution

**8.** Fig, here shows P and Q as two equally intense coherent sources emitting radiations of wavelength 20m. The separation PQ si 5m, and phase of P is ahead of the phase Q by $90^\circ$. A, B and C are three distant points ofobservation equidistant from the mid - point of PQ. The intensity of radiations of A, B, C will beasr the ratio

A. $0:1:4$

B. $4:1:0$

C. $0 : 1 : 2$

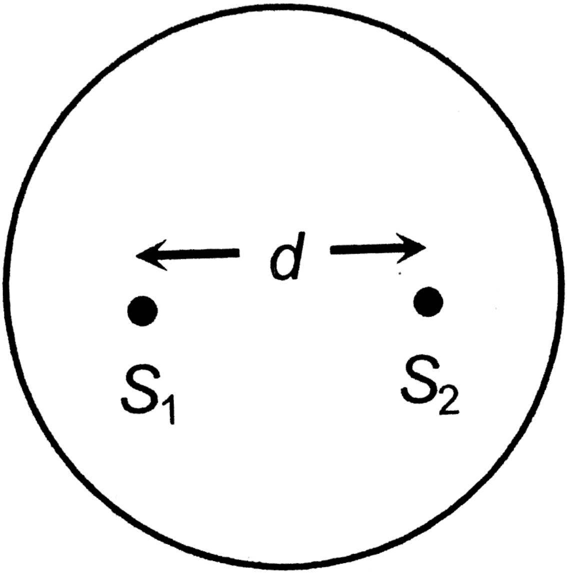
D. $2 : 1 : 0$

**Answer: D**

Watch Video Solution

**9.** Two coherent sources separated by distance d are radiating in phase having wavelength $\lambda$. 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. $\frac{\sin^{-1}(n\lambda)}{d}$

B. $\frac{\cos^{-1}(4\lambda)}{d}$

C. $\frac{\tan^{-1}(d)}{4\lambda}$

D. $\frac{\cos^{-1}(\lambda)}{4d}$

**Answer: B**

Watch Video Solution

**10.** In a double slit experiment, the separation between the slits is d and distance of the screen from slits is D. If the wavelength of light used is $\lambda$ and I is theintensity of central bright fringe, then intensity at distance from central maximum is

A. $I\cos^2\left(\frac{\pi^2 xd}{\lambda D}\right)$

B. $I^2\sin^2\left(\frac{\pi xd}{2\lambda D}\right)$

C. $I\cos^2\left(\frac{\pi xd}{\lambda D}\right)$

D. $I\sin^2\left(\frac{\pi xd}{\lambda D}\right)$

**Answer: C**

Watch Video Solution

**11.** The polaroids are placed in the path of unpolarized beam of intensity $I_0$ such that no light is emitted fromthesecond polarid. If a third polaroid whose polarization axis makes an angle $\theta$ with the polarization axis of first polaroid, is placed between these4 polariods then the intensity of light emerging from the last polariod will be

A. $\left(\frac{I_0}{8}\right)\sin^2 2\theta$

B. $\left(\frac{I_0}{4}\right)\sin^2 2\theta$

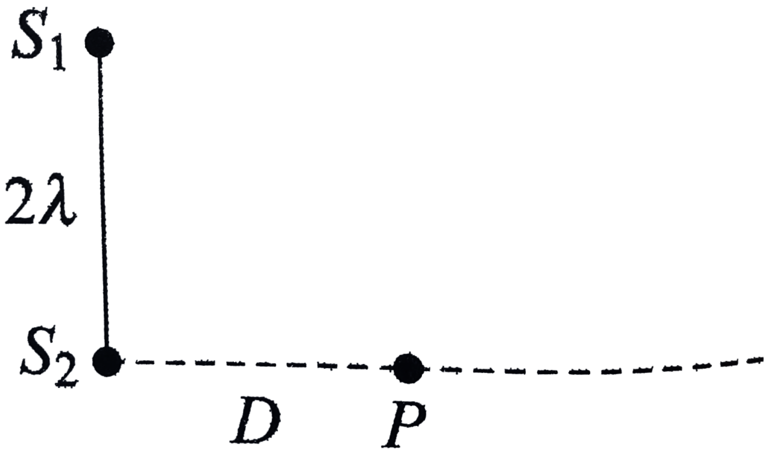
C. $\left(\frac{I_0}{2}\right)\cos^2 \theta$

D. $I_0 \cos^4 \theta$

**Answer: A**

Watch Video Solution

**12.** Two coherent point sources $S_1$ and $S_2$ vibrating in phase emit light of wavelength $\lambda$. The separation between the sources is $2\lambda$. Consider a line passing through $S_2$ and perpendicular to line $S_1S_2$. Find the position of farthest and nearest minima.




A. $\frac{7\lambda}{12}$

B. $\frac{15\lambda}{4}$

C. $\frac{\lambda}{2}$

D. $\frac{3\lambda}{4}$

**Answer: A**

Watch Video Solution

**13.** In YDSE, let A and B be two slits. Films of thickness $t_A$ and $t_B$ and refractive $\mu_A$ and $\mu_B$ are placed in front of A and B, respectively. If $\mu_A t_A = \mu_A t_B$, then the central maxima will

A. Not shift

B. Shift towards $S_2$ irrespective of amounts of $t_1$ and $t_2$

C. Shift towards $S_2$ irrespective of amounts of $t_1$ and $t_2$

D. Shift towards $S_1$ if $t_2 > t_1$ and towards $S_2$ if $t_2 < t_1$

**Answer: D**

Watch Video Solution

**14.** A monochromatic beam of light is used for the formation of fringes on a screen by illuminating the twoslits in the Young,s double slit interfrence experiment. When a thin film of mic is interposed in the path of one of the interfering beams

A. the fringe-width increases

B. the fringe-width decreases

C. the fringe pattern disappears

D. fringe-width remains the same but the pattern shifts

**Answer: D**

Watch Video Solution

**15.** What happens to the fringe pattern when the Young's double slit experiment is performed in water intesed of air ?

A. Shrinks

B. Disappears

C. Unchanged

D. Enlarged

**Answer: A**

Watch Video Solution

16. Two periodic waves of intensities $I_1$ and $I_2$ pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is:

A. $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$

B. $2(I_1 + I_2)$

C. $I_1 + I_2$

D. $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$

**Answer: B**

Watch Video Solution

17. What is the minimum thickness of thin film required for constructive interference in the reflected light through it ?

(Given, the refractive index of the film $= 1.5,$ wavelength of the lilght incident on the film $= 600$ nm.

A. $100nm$

B. $150nm$

C. $200nm$

D. $250nm$

**Answer: B**

Watch Video Solution

**18.** Two identical coherent sources are placed on a diameter of a circle of radius R at separation x $( < \, < R)$ symmetrical about the center of the circle. The sources emit identical wavelength $\lambda$ each. The number of points on the circle of maximum intensity is $(x = 5\lambda)$

A. 20

B. 22

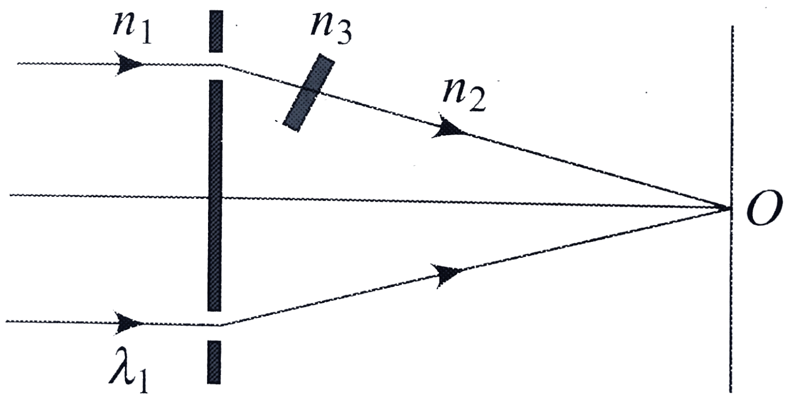
C. 24

D. 26

**Answer: A**

Watch Video Solution

**19.** In YDSE shown in figure a parallel beam of light is incident on the slits from a medium of refractive index $n_1$. The wavelength of light in this medium is $\lambda_1$. A transparent of thickness t and refractive index $n_3$ is put in front of one slit. The medium between the screen and the plane of the slits is $n_2$. The phase difference between the light waves reaching point O (symmetrical, relative to the slits) is




A. $\frac{2\pi}{n_1\lambda_1}(n_3 - n_2)t$

B. $\frac{2\pi}{\lambda_1}(n_3 - n_2)t$

C. $\frac{2\pi n_1}{n_2\lambda_1}\left(\frac{n_3}{n_2} - 1\right)t$

D. $\frac{2\pi n_1}{\lambda_1}(n_3 - n_2)t$

**Answer: A**

Watch Video Solution

**20.** In Young's double slit experiment, the 10th bright fringe is at a distance x from the central fringe. Then

a) the 10th dark fringe is at a distance of $19x/20$ from the central fringe

b) the 10th dark fringe is at a distance of $21x/20$ from the central fringe

c) the 5th dark fringe is at a distance of $x/2$ from the central fringe.

d) the 5th dark fringe is at a distance of $9x/20$ from the central fringe.

A. a,b,c only

B. b,c,d only

C. a,d only

D. a,b,c,d only

**Answer: C**

Watch Video Solution

**21.** If $I_0$ is the intensity of the principal maximum in the single slit diffraction pattern. Then what will be its intensity when the slit width is doubled?

A. $I_0$

B. $I_0 / 2$

C. $\frac{1}{2} I_0$

D. $4I_0$

**Answer: A**

Watch Video Solution

**22.** Light of wavelength $6000\text{Å}$ from a distance source falls on a slit $0.5$ mm wide. The distance between two dark bands on each side of the central bright band of the diffraction pattern observed on a screen placed at a distance 2m from the slit is

A. $1.2nm$

B. $2.4nm$

C. $3.6nm$

D. $4.8mm$

**Answer: D**

Watch Video Solution

**23.** A parallel beam of wavelength $\lambda = 450 \times 10^{9} m$ passes through a long slit of width $2 \times 10^{-4} m$. The angular divergence for which most of light is diffracted is

A. $\frac{2\pi}{3}$

B. $\frac{5\pi}{4}$

C. $\frac{3\pi}{4}$

D. $\frac{\pi}{3}$

**Answer: B**

Watch Video Solution

**24.** Assuming human pupil to have a radius of 0.25 cm and a comfortable viewing distance of 25 cm, the minimum separation between two objects than human eye can resolve at 500nm wavelength is :

A. $1\mu m$

B. $30\mu m$

C. $100\mu m$

D. $300\mu m$

**Answer: B**

Watch Video Solution

**25.** The box of a pin hole camera, of length L, has a hole of radius a . It is assumed that when the hole is illuminated by a parallel beam of light of wavelength $\lambda$ the spread of the spot (obtained on the opposite wall of the camera) is the sum of its geometrical spread and the spread due to diffraction. The spot would then have its minimum size (say b_(min)) when:

A. $a=\frac{\lambda^2}{L}$ and $b_{\min}=\left(\frac{2\lambda^2}{L}\right)$

B. $a=\sqrt{\lambda L}$ and $b_{\min}=\left(\frac{2\lambda^2}{L}\right)$

C. $a=\sqrt{\lambda L}$ and $b_{\min}=\sqrt{4\lambda L}$

D. $\frac{\lambda^2}{L}$ and $b_{\min}=\sqrt{4\lambda L}$

**Answer: C**

Watch Video Solution

**26.** A polariser and an analyser are oriented so that the maximum amount of lights is transmmitted. Fraction of its maximum value is the intensity of the transmitted through reduced when the analyzer is rotated through (intensity of incident light $=I_o$) , a) $30^\circ$ , b) $45^\circ$ , c) $60^\circ$

A. $0.375I_0, 0.25I_0, 0.125I_0$

B. $0.25I_0, 0.375I_0, 0.125I_0$

C. $0.125I_0, 0.25I_0, 0.0375I_0$

D. $0.125I_0, 0.375I_0, 0.25I_0$

**Answer: A**

Watch Video Solution

**27.** As polaroid examines two adjacent plane polarised beam A and B whose planes of polarisation are mutually perpendicular. In the first position of the analyser, beam B shows zero intensity. From this position a rotation $30^\circ$ shows that thebeams have same intensity. The ratio of intensity of the two beam $I_Z \& I_B$

A. $1:3$

B. $3:1$

C. $\sqrt{3}:1$

D. $1:\sqrt{3}$

**Answer: A**

Watch Video Solution

**28.** An analyser is inclined to a polariser at an angle of $30^{\circ}$. The intensity of light emerging on the polariser. Then n is equal to

A. $4$

B. $4/3$

C. $8/3$

D. $1/4$

**Answer: C**

Watch Video Solution

**29.** When a beam of light wavelength $\lambda$ is incident on the surface of a liquid at an angle $\phi$ , the reflected ray in completely polarized. The wavelength og light in the liquid medium is

A. $\lambda Tan\phi$

B. $\frac{\lambda}{Tan\phi}$

C. $\frac{\lambda}{\cos\phi}$

D. $\frac{\lambda}{\sin\phi}$

**Answer: B**

Watch Video Solution

**30.** The YDSE apparatus is modified by palcing an isotropic transperent plate of $\mu = 1.5$ and thinkness $t = 2\mu m$ with tempatature coeffcient $2 \times 10^{-6} .^{\circ} C^{-1}$ . A light of $6000\text{Å}$ units is incident. If the palte heated through a temperature $10^{\circ} C$ then number of fringes will cross a particular point on the screen ? $(D = 2m, d = 2mm)$ .

A. $1000$

B. $5000$

C. $\frac{1000}{3}$

D. $10^{-4}$

**Answer: D**

Watch Video Solution

## NCERT Based Questions

**1.** Consider a light beam incident from air to a glass slab at Brewster's angle as shown in Figure.

A polaroid is placed in the path of the emergent ray at point P and rotated an axis passing through the centre and perpendicular to the plane of the polaroid.

A. For a particular orientation there shall be darkness as observed through the polaroid.

B. The intensity of light as seen through the polariod shall be independent of the rotation.

C. The intensity of light as seen through the Polaroid shall go through a minimum but not zero for two orientations of the polaroid.

D. The intensity of light as seen through the polaroid shall go through a minimum for four orientations of the polaroid

**Answer: C**

Watch Video Solution

**2.** Consider sunlight incident on a pinhole of width $10^3 \text{Å}$. The image of the pinhole seen on a screen shall be

A. be a fine sharp slit white in colour ast the center.

B. a bright slit white at the center diffusing to zero intesities at the edges.

C. a bright slit white at the center diffusing to regions of different colours.

D. only be diffused slit white in colour

**Answer: A**

Watch Video Solution

**3.** Consider a ray of light incident from air onto a slab of glass (refr active index n) of width d, at an angle $\theta$ . The phase difference between the ray reflected by the top surface of the glass and the bottom surface is

A. $\frac{4\pi d}{\lambda}\left(1-\frac{1}{n^2}\sin^2\theta\right)^{1/2}+\pi$

B. $\frac{4\pi d}{\lambda}\left(1-\frac{1}{n^2}\sin^2\theta\right)^{1/2}$

C. $\frac{4\pi d}{\lambda}\left(1-\frac{1}{n^2}\sin^2\theta\right)^{1/2}+\frac{\pi}{2}$

D. $\frac{4\pi d}{\lambda}\left(1-\frac{1}{n^2}\sin^2\theta\right)^{1/2}+2\pi$

**Answer: A**

Watch Video Solution

4. In a Young's double slit experiment, the source is white light. One of the holes is covered by a red filter and another by a blue filter. In this case

A. there shall be alternate interference patterns of red and blue.

B. three shall be an interference patterns for red distinct from that for blue.

C. there shall be no interference fringes.

D. there shall be an interference pattern for red mixing with one for blue.

**Answer: C**

Watch Video Solution

**5.** Figure shows a standard two slit arrangement with slits $S_1, S_2$. $P_1, P_2$ are the two minima points on either side of P (Figure). At $P_2$ on the screen, there is a hole and behind $P_2$ is a second 2-slit arrangement with slits $S_3, S_4$ and a second screen behind them.

A. There would be no interfrence pattern on the second screen but it would be lighted.

B. The second screen would be totally dark.

C. There would be a single bright point on the second screen.

D. Therewould be a regular two slit pattern on the second screen.

**Answer: D**

Watch Video Solution

**6.** Choose the correct statement

A. Huygen's principle is valid only for transverse waves

B. Hugen's Princple is valid only for Longitudinal waves

C. Huygen's principle is valid for both transverse waves and longitudinal waves

D. The shape of wavelength on earth for sunlight is cylindrical

**Answer: C**

Watch Video Solution

**7.** Consider a point at the focal point of a convex lens. Another convex lens of short focal length is placed on the other side. Then the nature of wavefront emerging from the final image.

A. plane wavefront

B. spherical wavefront

C. cylindrical wavefront

D. depends on distance between two lenses

**Answer: B**

Watch Video Solution

**8.** The human eye has an approximate angular resolution of $\phi = 5.8 \times 10^{-4}$ rad and a typical photo printer prints a minimum of 300 dpi (dots per inch, $= 2.54cm$). Aminimum distance 'z' should a printed page be held so that one doesnot see the indivdual dots is _____ .

A. $14.5cm$

B. $145cm$

C. $14.5m$

D. $145m$

**Answer: A**

Watch Video Solution

**9.** For the same objective, the ratio of least separation between two points to be distigiuised by a microscope for light of $5000\text{Å}$ and electrons acclerated through 100V used as illuminating substance is ________ (neraly)

A. $2$

B. $4 \times 10^{-2}$

C. $2 \times 10^{-6}$

D. $2 \times 10^{-4}$

**Answer: D**

Watch Video Solution

**10.** In a YDSE arrangement, the distance of screen from the slits is half the distance between the slits. If $'\lambda'$ is the wavelength of then the value of D such that first minima on the screen falls at a distance D from then centre

'O' is

A. $D = \dfrac{\lambda}{\sqrt{5}}$

B. $D = \dfrac{\lambda}{2}$

C. $D = \dfrac{\lambda}{5\sqrt{2}}$

D. $D = \dfrac{\lambda}{2\sqrt{5}}$

**Answer: D**

Watch Video Solution

**11.** Two source $S_1$ and $S_2$ of intensity $I_1$ and $I_2$ are placed in front of a screen [Figure a]. The pattern of intensity distribution see in the central portion is given by Figure b. In this case which of the following statement are true.

A. $S_1$ and $S_2$ have the same intensities.

B. $S_1$ and $S_2$ have a constant phase difference

C. $S_1$ and $S_2$ have thesamephase.

D. $S_1$ and $S_2$ have the same wavelength.

**Answer: A::B::D**

Watch Video Solution

**12.** Consider sunlight incident on a pinhole of width $10^3 \text{Å}$. The image of the pinhole seen on a screen shall be

A. a sharp white ring.

B. different from a geometrical image.

C. a diffused central spot, white in colour.

D. diffused coloured region around a sharp central white spot.

**Answer: B::D**

Watch Video Solution

**13.** Consider the diffraction patern for a small pinhole. As the size of the hole is increased

A. the size decreases.

B. the intensity increases

C. the size increases

D. the intensity decreases.

**Answer: A::B**

Watch Video Solution

**14.** For light diverging from a point source

A. the wavefront in spherical.

B. the intensity decreases in proportion to the distance squared.

C. the wavefront is parabolic.

D. the intensity at the wavefront does not depend on the distance.

**Answer: A::B**

Watch Video Solution

**15.** A polariod (I) is placed in front of a monochromatic source. Another polariod (II) is placed in front of this polariod (I) and rotated till no light passes. A third polariod (III) is now placed in between (I) and (II), then

A. when axis of (I) and (III) are parallel then no light emers out of (II)

B. when axis of (II) and (III) are parallel then no light emerges out of (II)

C. When axis of (I), (III) and (II) are non-parallel then light emerges out of (III)

D. For any position of (III) no light emergens out of (II)

**Answer: A::C**

Watch Video Solution

**16.** As shown in figure a two slit arrangement with a source (S) which emits unpolarised light. $I_0$ is the intensity of principle maxima when no polariseer is present. Now a polarised 'P' is placed as shown with its axis whose direstion is not given. Then

A. the intensity principal maxima is $\frac{5}{8}I_0$

B. the intensity of principal maxima is $\frac{I_0}{2}$

C. the intensity of first minima is zero

D. the intensity of first minima is $\frac{I_0}{8}$

**Answer: A::D**

View Text Solution

**17.** Four identical monochromatic source A, B, C, D as shown in figure produce waves of the same wavelength $\lambda$ and are coherent. Two receivers $R_1$ and $R_2$ are at great but equal distance from B. The choose the correct statements.

A. the reciver $R_2$ picks up the larger singal

B. two receiver $R_!$ and $R_2$ picks up singals of equal intensity when B is turned off

C. when source D is turned off $R_2$ picksup larger singal

D. when source B is turned off the singal recevied by $R_1$ changes

**Answer: A::B::C::D**

Watch Video Solution

**18.** To ensure almost $100\%$ transmittivity, photographic lenses are often coated with a thin layer of dielectric maerial, like $MgF_2(\mu = 1.38)$ . The minimum thickness of the film to be used so that at the centre of visible spectrum $(\lambda = 5500\text{Å})$ there is maximum transmission.

A. $1000\text{Å}$

B. $2000\text{Å}$

C. $4000\text{Å}$

D. 500Å`

**Answer: A**

Watch Video Solution

**19.** A small transparent slab $(\mu = 1.5)$ is placed along $AS_2$ as shown.

$AC = CO = D, S_1C = S_2S = d < \ < D$

The distance of princpal maxima front 'O' is

A. $\frac{D}{4}$

B. $\frac{D}{16}$

C. $\frac{D}{8}$

D. $D$

**Answer: B**

Watch Video Solution

**20.** A small transparent slab $(\mu = 1.5)$ is placed along $AS_2$ as shown.

$AC = CO = D$, $S_1C = S_2S = d < \; < D$

The distance of first minima above O is

A. $\frac{3D}{\sqrt{43}}$

B. $\frac{D}{\sqrt{247}}$

C. $\frac{3D}{\sqrt{247}}$

D. $\frac{5D}{\sqrt{247}}$

**Answer: C**

Watch Video Solution

**21.** A small transparent slab $(\mu = 1.5)$ is placed along $AS_2$ as shown.

$AC = CO = D, S_1C = S_2S = d < < D$

The distance of first minima below the point O is

A. $\frac{D}{\sqrt{231}}$

B. $\frac{3D}{\sqrt{231}}$

C. $\frac{2D}{\sqrt{231}}$

D. $\frac{5D}{\sqrt{231}}$

**Answer: D**

Watch Video Solution

**22.** The optical properties of a medium are governed by the relative permitivity $(\varepsilon_r)$ and relative permeability $(\mu_r)$. The refractive index is defined as $\sqrt{\mu_1 \varepsilon_r} = n$ . For ordinary sing is taken for the square root. In 1964, a Russian scientist V. Veselago postulated the existence of material with $\varepsilon_r < 0$ and $\mu_r < 0$ . Since then such 'meta materials' have been produced in the laboratorised and their optical properties studied. For such materials $n = -\sqrt{\mu_r \varepsilon_r}$. As light entes a medium of such refractive index the phases traval away front the direction ofpropagation.

Consider following statements

i) Snall's slaw valid for these mater ials

ii) Snell's slaw is not valid for these mater ials

iii) Speed of light in these mater ial is $v = \frac{c}{|n|}$

iv) Speed of light in these material is $v = c$

A. I, iii are correct

B. I, iv are correct

C. ii, iv are correct

D. ii, iii are correct

**Answer: A**

View Text Solution

**23.** The optical properties of a medium are governed by the relative permitivity $(\varepsilon_r)$ and relative permeability $(\mu_r)$. The refractive index is defined as $\sqrt{\mu_1 \varepsilon_r} = n$ . For ordinary sing is taken for the square root. In 1964, a Russian scientist V. Veselago postulated the existence of material with $\varepsilon_r < 0$ and $\mu_r < 0$ . Since then such 'meta materials' have been produced in the laboratorised and their optical properties studied. For such materials $n = \; - \sqrt{\mu_r \varepsilon_r}$. As light entes a medium of such refractive index the phases traval away front the direction ofpropagation.

For light incident from air on the meta materials, then appropriate ray diagram is

A.

B.

C.

D.

**Answer: C**

View Text Solution

**24.** Statement - I : Diffraction of sound waves is evident in daily experince than that of light waves

Statement- II : The wave length of sound waves is comparitively than that of light waves.

A. Statement-I is true and Statement-II is true and Statement-II is the correct explanation of Statement-I.

B. Statement-I asnd Statement-II are true but Statement-II is not the correct explanation of Statement-I

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

**Answer: A**

Watch Video Solution

**25.** Statement - I : Reflection results in plane front the side with higher refractive index.

Statement - II : Brewster's angle is less than critical angle.

A. Statement-I is true and Statement-II is true and Statement-II is the correct explanation of Statement-I.

B. Statement-I asnd Statement-II are true but Statement-II is not the correct explanation of Statement-I

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true.

**Answer: A**

Watch Video Solution

## LEVEL - V

**1.** Two beam of light having intensities I and 4I interfere to produce a fringe pattern on a screen. The phase difference between the beams is $\frac{\pi}{2}$ at point A and $\pi$ at point B. Then the difference between resultant intensities at A and B is : $(2001, 2M)$

A. $2I$

B. $4I$

C. $5I$

D. $7I$

**Answer: B**

Watch Video Solution

**2.** In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then, in the interference pattern

A. the intensities of both the maxima and the minima increases

B. the intensity of the maxima increases and the minima has zero intensity

C. the intensity of maxima decreases and that of minima increases

D. the intensity of maxima decreases and the minima has zero intensity

**Answer: A**

Watch Video Solution

**3.** In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600nm is used. If the wavelength of light is changed to 400nm, number of fringes observed in the same segment of the screen is given by

A. 12

B. 18

C. 24

D. 30

**Answer: B**

Watch Video Solution

**4.** In a Young's double slit experiment, the separation between the two slits is d and the wavelength of the light is $\lambda$. The intensity of light falling on slit 1 is four times the intensity of light falling on slit 2. Choose the correct choice (s).

A. if $d = \lambda$, the screen will contain only one maximum

B. if $\frac{\lambda}{2} < d < \lambda$, at least one more maximum (besides the central maximum) will be observed on the screen

C. if the intensity of light falling on slit is reduced so that it becomes equal to that of slit 2, the intensities of the observed dark and bright fringes will increases

D. if the intensity of light falling on slit 2 is reduced so that it becomes equal to that of slit 1, the intensikties of the observed dark and bright fringes will increase.

**Answer: A**

Watch Video Solution

**5.** In Young's double slit experiment intensity at a point is $\left(\frac{1}{4}\right)$ of the maximum intersity. Angular position of this point is

A. $\sin^{-1}\left(\frac{\lambda}{d}\right)$

B. $\sin^{-1}\left(\frac{\lambda}{2d}\right)$

C. $\sin^{-1}\left(\frac{\lambda}{3d}\right)$

D. $\sin^{-1}\left(\frac{\lambda}{4d}\right)$

**Answer: C**

Watch Video Solution

**6.** In the Young's double slit experiment using a monochromatic light of wavelength $\lambda$, the path difference (in terms of an integer n) corresponding to any point having half the peak

A. $(2n+1)\frac{\lambda}{2}$

B. $(2n+1)\frac{\lambda}{4}$

C. $(2n+1)\frac{\lambda}{8}$

D. $(2n+1)\frac{\lambda}{16}$

**Answer: B**

Watch Video Solution

**7.** Two identical sources each of intensity $I_0$ have a separation $d=\lambda/8$, where $\lambda$ is the wavelength of the waves emitted by either source. The phase difference of the sources is $\pi/4$ The intensity distribution $I(\theta)$ in the radiation field as a function of $\theta$ Which specifies the direction from the sources to the distant observation point P is given by

A. $I(\theta) = I_0 \cos^2 \theta$

B. $I(\theta) = \frac{(I)_0}{4} \cos^2\left(\frac{\pi\theta}{8}\right)$

C. $I(\theta) = 4I_0 \cos^2\left(\frac{\pi}{8}(\sin\theta + 1)\right)$

D. $I(\theta) = I_0 \sin^2 \theta$

**Answer: C**

Watch Video Solution

**8.** A screen is at distance $D = 80$ cm form a diaphragm having two narrow slits $S_1$ and $S_2$ which are $d = 2$ mm apart.

Slit $S_1$ is covered by a transparent sheet of thickness

$t_1 = 2.5\mu m$ slit $S_2$ is covered by another sheet of thikness

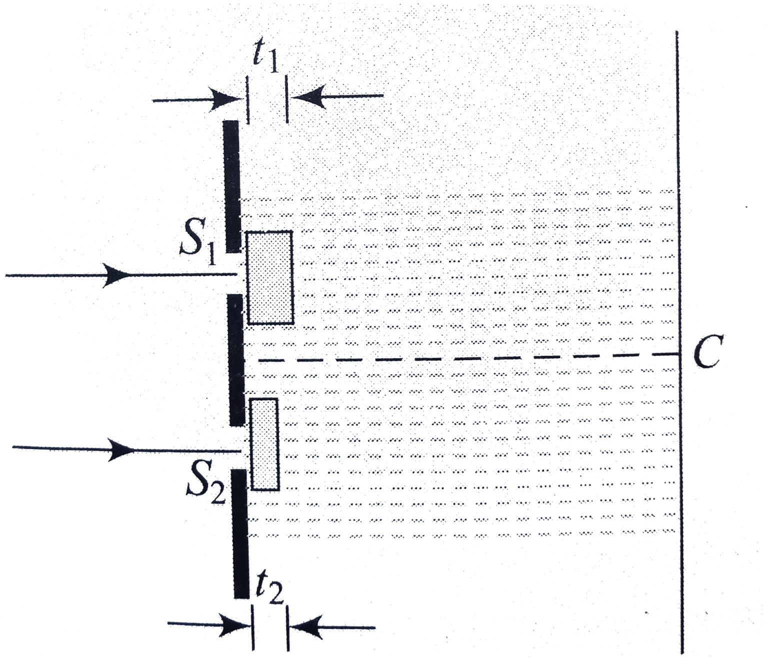
$t_2 = 1.25\mu m$ as shown if Fig. 2.52.

Both sheets are made of same material having refractive index $\mu = 1.40$

Water is filled in the space between diaphragm and screen.

Amondichromatic light beam of wavelength $\lambda = 5000\text{Å}$ is incident normally on the diaphragm.

Assuming intensity of beam to be uniform, calculate ratio of intensity of C to maximum intensity of interference pattern obtained on the screen $(\mu_w = 4/3)$




A. $\frac{3}{4}$

B. $\frac{2}{3}$

C. $\frac{8}{9}$

D. $\frac{5}{7}$

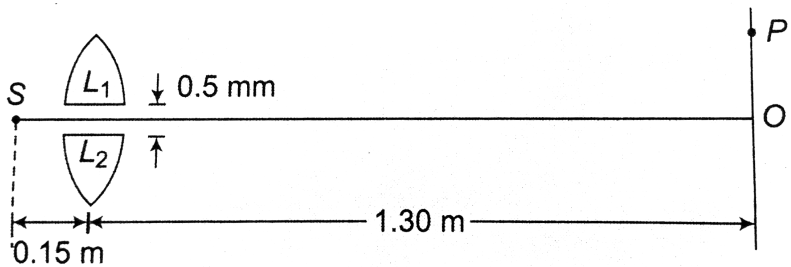
**Answer: A**

Watch Video Solution

**9.** In figure S is a monochromatic point source emitting light of wavelength $\lambda = 500nm$. A thin lens of circular shape and focal length $0.10m$ is cut into two identical halves $L_1$ and $L_2$ by a plane passing through a doameter. The two halves are placed symmetrically about the central axis $SO$ with a gap of $0.5mm$. The distance along the axis from $A$ to $L_1$ and $L_2$ is $0.15m$, while that from $L_1$ and $L_2$ to $O$ is $1.30m$. The screen at $O$ is normal to $SO$.

(a) If the $3^{rd}$ intensity maximum occurs at point $P$ on screen, find distance $OP$.

(b) If the gap between $L_1$ and $L_2$ is reduced from its original value of $0.5mm$, will the distance $OP$ increases, devreases or remain the same?



A. $1mm$

B. $2mm$

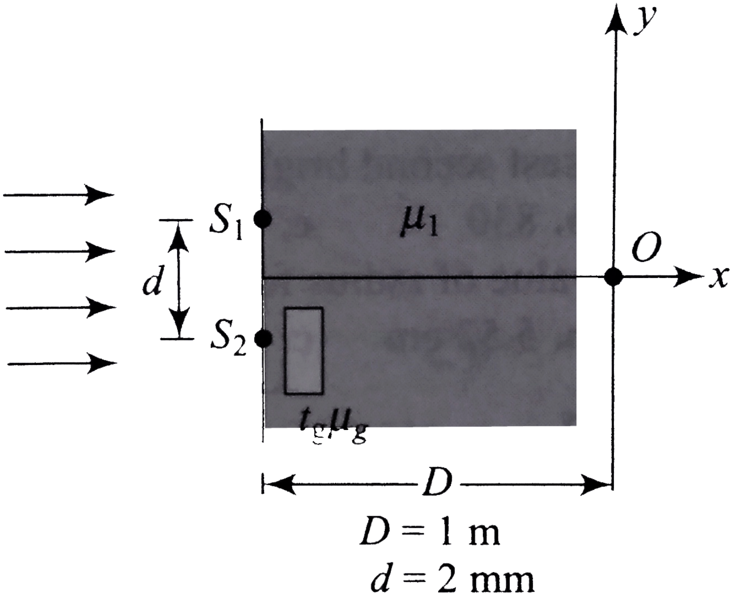
C. $1.5mm$

D. $2.5mm$

**Answer: A**

Watch Video Solution

**10.** In a modified YDSE, the region between the screen and slits is immersed in a liquid whose refractive index varies with time as $\mu_1 = (5/2) - (T/4)$ until it reaches s steady state value of $5/4$. A glass plate of thickness 36 $\mu m$ and refractive index $3/2$ is introduced in front of one of the slits.




Find the time when central maxima is at point O. located symmetrically on the x-asix.

A. $2 \times 10^{-3} ms^{-1}$

B. $3 \times 10^{-3} ms^{-1}$

C. $4 \times 10^{-3} ms^{-1}$

D. $5 \times 10^{-3} ms^{-1}$

**Answer: B**

Watch Video Solution

**11.** 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 $\lambda$), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is

A. $2\lambda$

B. $\frac{2\lambda}{3}$

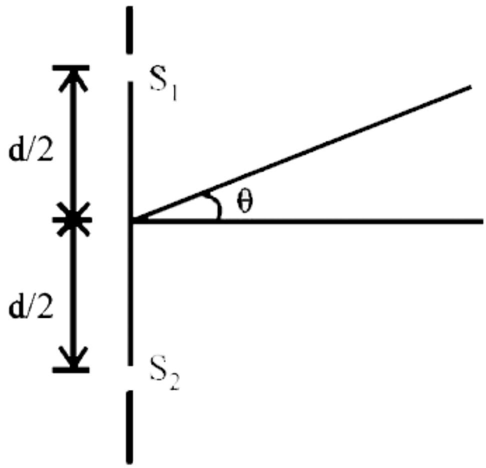
C. $\frac{\lambda}{3}$

D. $\lambda$

**Answer: A**

Watch Video Solution

**12.** In an interference arrangement similar to Young's double-slit experiment, the slits S_1 and S_2 are illuminated with coherent microwave sources, each of frequency 10^6 Hz. The sources are synchronized to have zero phase difference. The slits are separated by a distance d=150.0 m. The intensity I (theta) is measured as a function of theta, where theta is defined as shown. If I_0 is the maximum intensity, then I (theta) for 0lethetale90degree is given by




A. $I(\theta) = I_0 / 2f \text{ or } \theta = 45^\circ$

B. $I(\theta) = I_0 / 4f \text{ or } \theta = 90^\circ$

C. $I(\theta) = I_0 f \text{ or } \theta = 0^\circ$

D. $I(\theta)$ is constant for all values of $\theta$

**Answer: C**

Watch Video Solution

**13.** In YDSE, bichromatic 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 1m. The minimum distance between

two

successive regions of complete darkness is

A. $4mm$

B. $5.6mm$

C. $14mm$

D. $28mm$

**Answer: D**

Watch Video Solution

**14.** Intensity obseverd in an interferecne pattern is $I = I_0 \sin^2 \theta$. At $\theta = 30^\circ$, Intensity $I = 5 \pm 0.002$. The pecentage error in angle is

A. $4\sqrt{3} \times 10^{-2} \%$

B. $\frac{4}{\pi} \times 10^{-2} \%$

C. $\frac{4\sqrt{3}}{\pi} \times 10^{-2} \%$

D. $\sqrt{3} \times 10^{-2} \%$

**Answer: C**

Watch Video Solution

**15.** White light is used to illuminate the two slits in a Young's double slit experiment. The separation between the slits is b and the screen is at a distance d`(gtb) from the slits. At a point on the screen directly in front of one of the slits, certain wavelength are missing. Some of these missing wavelength are

A. $\lambda = \frac{b^2}{d}$

B. $\lambda = \frac{2b^2}{d}$

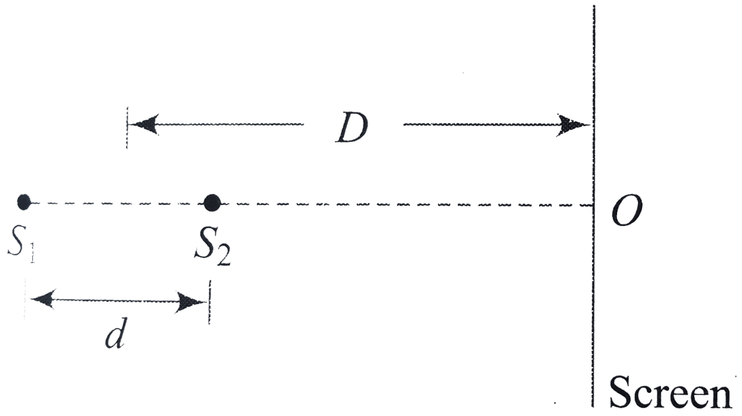
C. $\lambda = \frac{b^2}{3d}$

D. $\lambda = \frac{2b^2}{3d}$

**Answer: A::C**

Watch Video Solution

**16.** Two points nonochromatic and coherent sources of light of wavelength $\lambda$ each are placed as shown in figure. The initial phase difference between the sources is zero O. $(d > > d)$. Mark the correct statement(s).




A. If $d=\frac{7\lambda}{2}$, the point 'O' will be minima.

B. If $d=\lambda$, only one maxima can be observed on screen

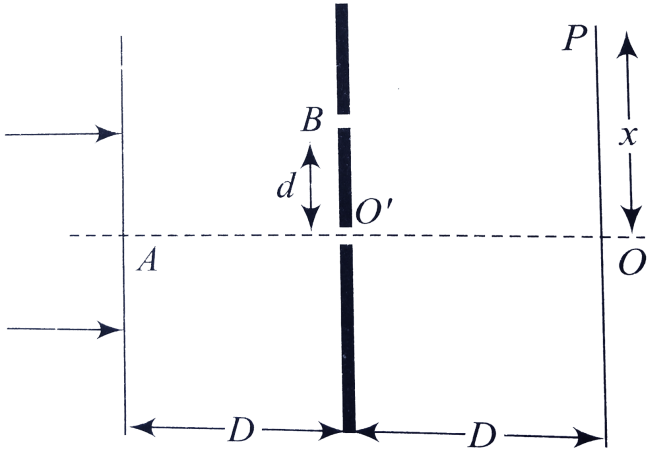
C. If $d=4.8\lambda$, then a total 10 minimas would be there on screen.

D. If $d=\frac{5\lambda}{2}$, then Intensity at 'O' would be minimum.

**Answer: A::B::C::D**

Watch Video Solution

**17.** The minimum value of d os that there is a dark fringe at O is $d_{\min}$. For the value of $d_{\min}$, the distance at which the next bright fringe is formed is x. Then




A. $d_{\min} = \sqrt{\lambda D}$

B. $d_{\min} = \sqrt{\dfrac{\lambda D}{2}}$

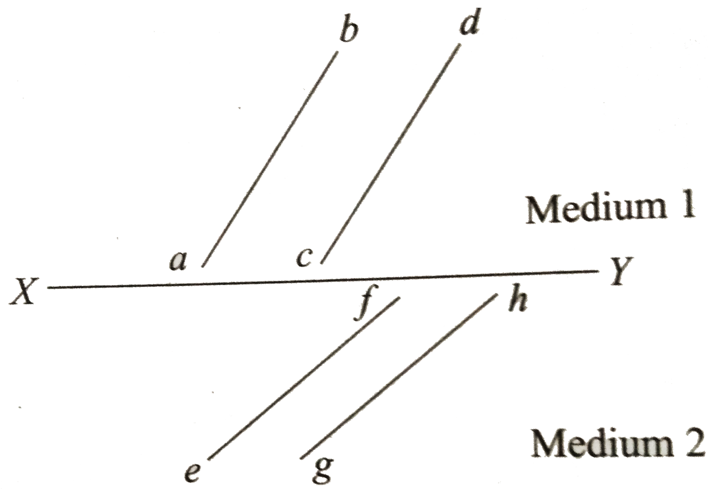
C. $x = \dfrac{d_{\min}}{2}$

D. $x = d_{\min}$

**Answer: B::D**

Watch Video Solution

**18.** Fig. shows a surface XY separating two transparent media, medium 1 and medium 2. Lines ab and cd represent wavefronts of a light wave travelling in medium 1 and incident on XY. Line ef and gh represent wavefront of the light wave in medium 2 after rafraciton.




Light travel as a

A. Parallel beam in each medium

B. Convergent beam in each medium

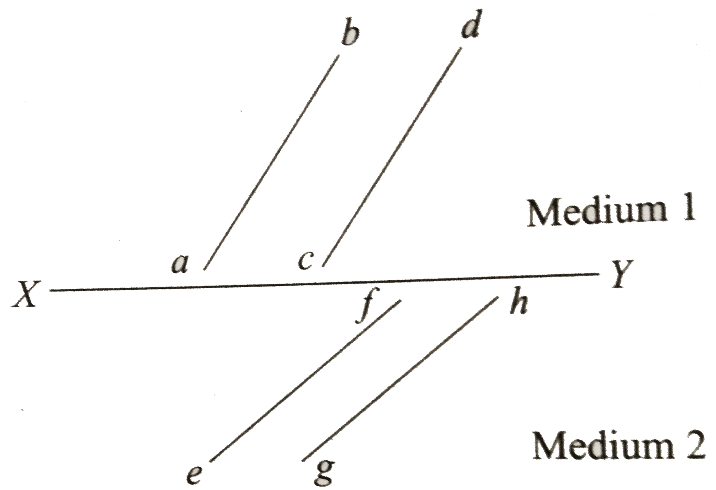
C. divergent beam in each medium

D. divergent beam in one medium and convergent beam in other medium.

**Answer: A**

Watch Video Solution

**19.** Fig. shows a surface XY separating two transparent media, medium 1 and medium 2. Lines ab and cd represent wavefronts of a light wave travelling in medium 1 and incident on XY. Line ef and gh represent wavefront of the light wave in medium 2 after rafraciton.



The phase of the ligth wave at c, d, e, and f are $\phi_c$, phi_(d), $\phi_e$ and $\phi_f$, respectively. It is given that $\phi_c \neq \phi_f$. Then

A. $\phi_c$ can not be equal to $\phi_d$

B. $\phi_d$ can not be equal to $\phi_e$

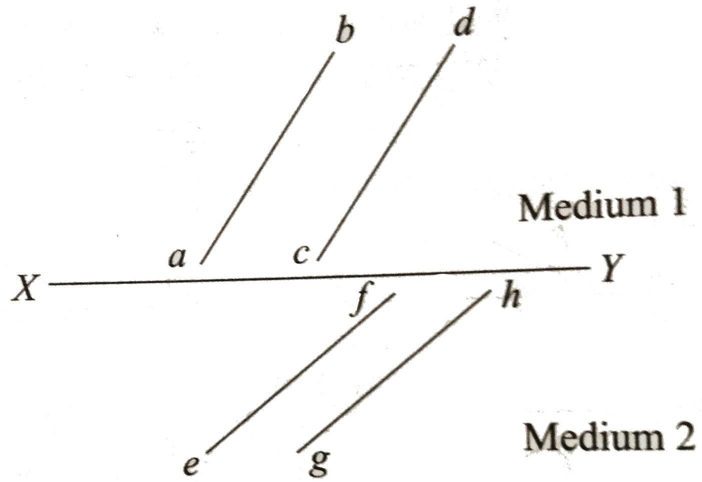
C. $(\phi_d - \phi_f)$ is equal to $(\phi_c - \phi_e)$

D. $(\phi_d - \phi_c)$ is not equal to $(\phi_f - \phi_e)$

**Answer: C**

Watch Video Solution

**20.** Fig. shows a surface XY separating two transparent media, medium 1 and medium 2. Lines ab and cd represent wavefronts of a light wave travelling in medium 1 and incident on XY. Line ef and gh represent wavefront of the light wave in medium 2 after rafraciton.




Speed of light is

A. same in medium - I and medium - II

B. Larger in medium - I than medium - II

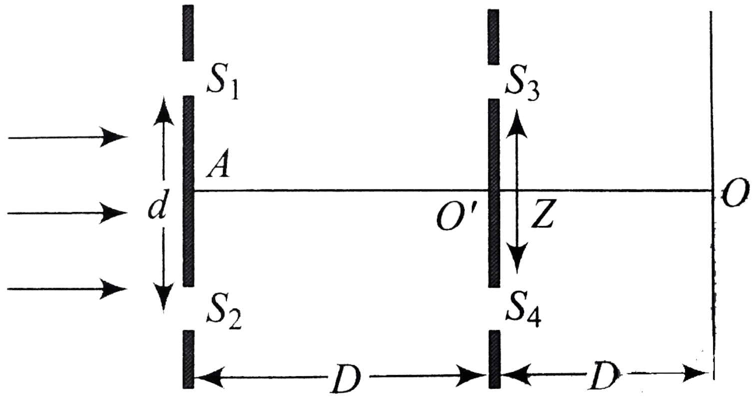
C. Larger in medium - II than in medium - I

D. Different at b and d

**Answer: B**

Watch Video Solution

**21.** In the arrangement shown in Fig., slits $S_1$ and $S_4$are having a variable separation Z. Point O on the screen is at the common perpendicular bisector of $S_1S_2$ and $S_3S_4$.




When $Z = \frac{\lambda D}{2d}$, the intensity measured at O is $I_0$. The intensity at O When $Z = \frac{2\lambda D}{d}$ is

A. $I_0$

B. $2I_0$

C. $3I_0$

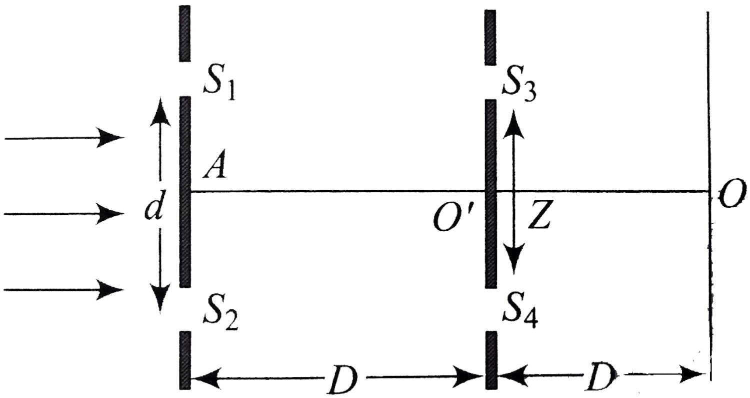
D. $4I_0$

**Answer: B**

Watch Video Solution

Watch Video Solution

**22.** In the arrangement shown in Fig., slits $S_1$ and $S_4$ are having a variable separation Z. Point O on the screen is at the common perpendicular bisector of $S_1S_2$ and $S_3S_4$.




The minimum value of Z for which the intensity at O is zero is

A. $\frac{3\lambda D}{2d}$

B. $\frac{\lambda D}{2d}$

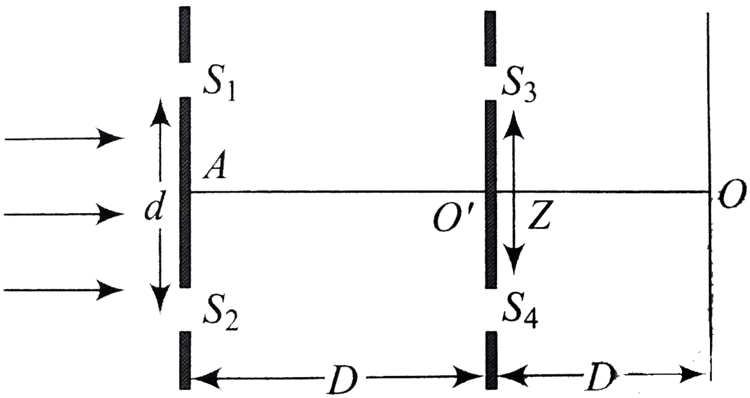
C. $\frac{\lambda D}{3d}$

D. $\frac{\lambda D}{d}$

**Answer: D**

Watch Video Solution

**23.** In the arrangement shown in Fig., slits $S_1$ and $S_4$are having a variable separation Z. Point O on the screen is at the common perpendicular bisector of $S_1S_2$ and $S_3S_4$.




If a hole is made at O' on AO' O and the slit $S_4$ is closed, then the ratio of the maximum to minimum observed on screen at O , if $O'S_3$ is equal to $\frac{\lambda D}{4d}$, is

A. 1

B. Infinity

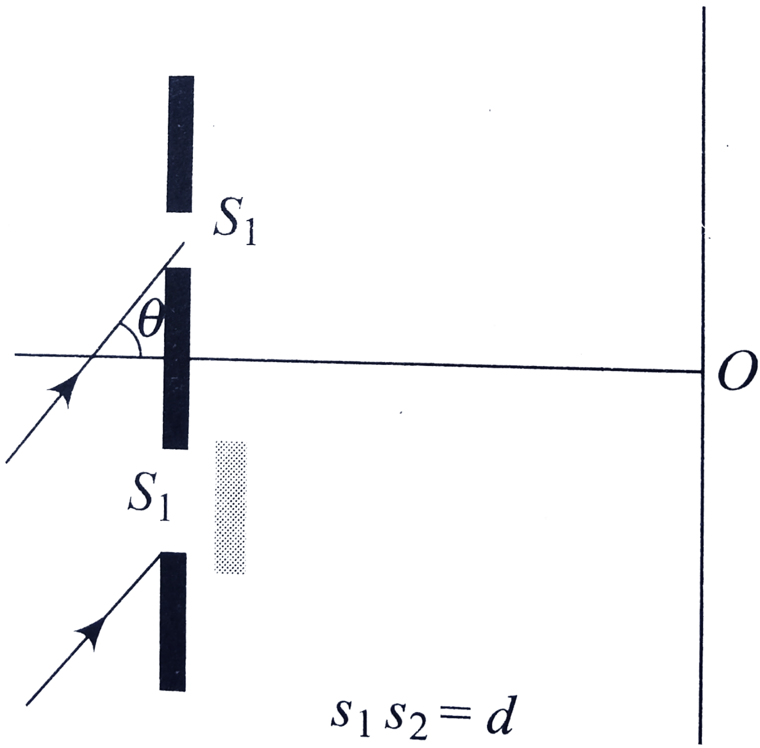
C. 34

D. 4

Answer: C

Watch Video Solution

**24.** A monochromatic beam of light fall on YDSE apparatus at some angle (say $\theta$) as shown in figure. A thin sheet of glass is inserted in front of the lower slit $s_2$. The central bright fringe (path difference $= 0$) will be obtained



A. At 'O'

B. At 'O' or below 'O'

C. at 'O' or above 'O'

D. Anywhere on the screen

**Answer: D**

Watch Video Solution

**25.** A monochromatic beam of light falls on Young's double slit experiment apparatus as shown in figure. A thin sheet of glass is inserted in front of lower slit $S_2 (\lambda = 600 nm$ is wavelength of source)

If central bright fringe is obtained on screen at 'O' then

A. $(\mu - 1)t = d \sin \theta$

B. $(\mu - 1)t = d \cos \theta$

C. $(\mu t) = d\theta$

D. $\frac{t}{(\mu - 1)} = \frac{d}{\sin\theta}$

**Answer: A**

Watch Video Solution

**26.** A monochromatic beam of light falls on Young's double slit experiment apparatus as shown in figure. A thin sheet of glass is inserted in front of lower slit $S_2 (\lambda = 600 nm$ is wavelength of source)

The phase difference between central masxima and 5th minima is

A. $\frac{\pi}{6}$

B. $9\pi$

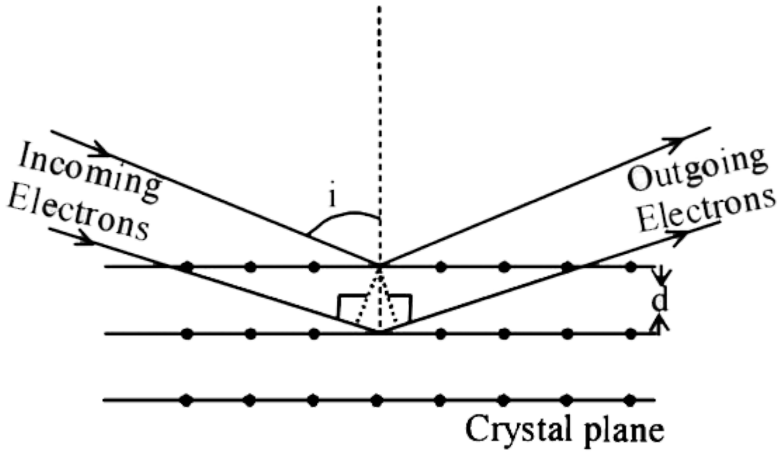
C. $\frac{3\pi}{2}$

D. $8\pi \pm \frac{\pi}{6}$

**Answer: B**

Watch Video Solution

**27.** Wave property of electron implies that they will show diffraction effected . Davisson and Germer demonstrated this by diffracting electron from crystals . The law governing the diffraction from a crystals is obtained by requiring that electron waves reflected from the planes of atoms in a crystal interfere constructiely




Electron accelerated by potential $V$ are diffracted from a crystal if $d = 1Å$ and $i = 30°$, $V$ should be about $(h = 6.6 \times 10^{-34} Js, m_e = 9.1 \times 10^{-31} kg, e = 1.6 \times 10^{-19} C)$

A. $2000V$

B. $50V$

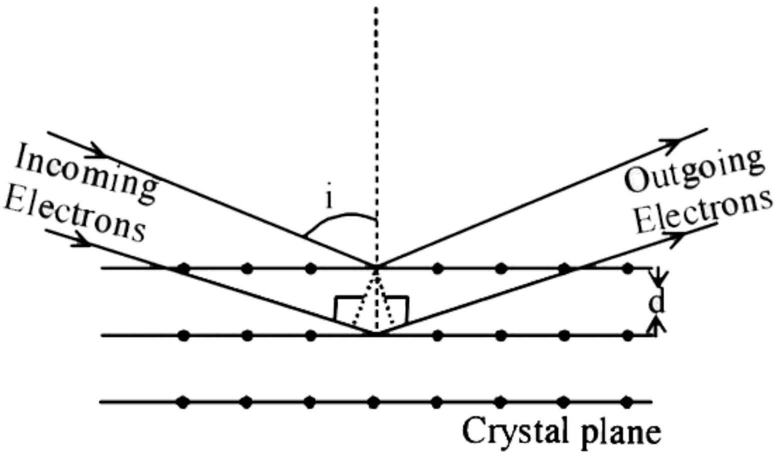
C. $500V$

D. $1000V$

**Answer: B**

Watch Video Solution

**28.** Wave property of electron implies that they will show diffraction effected . Davisson and Germer demonstrated this by diffracting electron from crystals . The law governing the diffraction from a crystals is obtained by requiring that electron waves reflected from the planes of atoms in a crystal inter fere constructiely



If a strong diffraction peak is observed when electrons are incident at an angle $i$ from the normal to the crystal planes with distance $d$ between them (see fig) de Brogle wavelength $\lambda_{dB}$ of electrons can be calculated by the relationship (n is an intenger)

A. $d \sin I = n\lambda_{dB}$

B. $2d \cos I = n\lambda_{dB}$

C. $2d \sin I = n\lambda_{dB}$

D. $d \cos I = n\lambda_{dB}$

**Answer: B**

Watch Video Solution

**29.** Wave property of electrons implies that they will show diffraction effects. Davission and Germer demonstrated this by diffracting electrons from crystals. The law governing the diffraction from a crystal is obtained by requiring that electron waves reflected from the planes of atoms in a crystal interfere constructively (see figure)

In an experiment, electrons are made to pass through a narrow slit of width 'd' comparable to either de-Broglie wavelength. They are detected on a screen at a distance 'D' from the slit

The following graphs that can be expected to represent the number of electrons 'N' detected as a function of the detector position 'y' ($y = 0$ corresponds to the middle of the slit) is

A.

B.

C.

D.

**Answer: D**

**30.** A Young's double slit experiment is conducted with slit separation 10mm, where the screen is 2m away from the slits. If wavelength of light used is $6000 \mathring{A}$ , answer the following

Fringe width in mm is

A. $0.12$

B. $0.24$

C. $0.36$

D. $0.48$

**Answer: A**

Watch Video Solution

**31.** A Young's double slit experiment is conducted with slit separation 10mm, where the screen is 2m away from the slits. If wavelength of light used is $6000 \mathring{A}$ , answer the following

distance of 4th dark band from central fringe in mm is

A. $0.14$

B. $0.28$

C. $0.42$

D. $0.56$

**Answer: C**

Watch Video Solution

**32.** A Young's double slit experiment is conducted with slit separation 10mm, where the screen is 2m away from the slits. If wavelength of light used is $6000\text{Å}$, answer the following

If the wavelength is increased by $1000\text{Å}$, and the whole apparatus is placed in water of refractive index $4/3$, the new fringe width in mm is

A. $0.210$

B. $0.105$

C. $0.315$

D. $0.420$

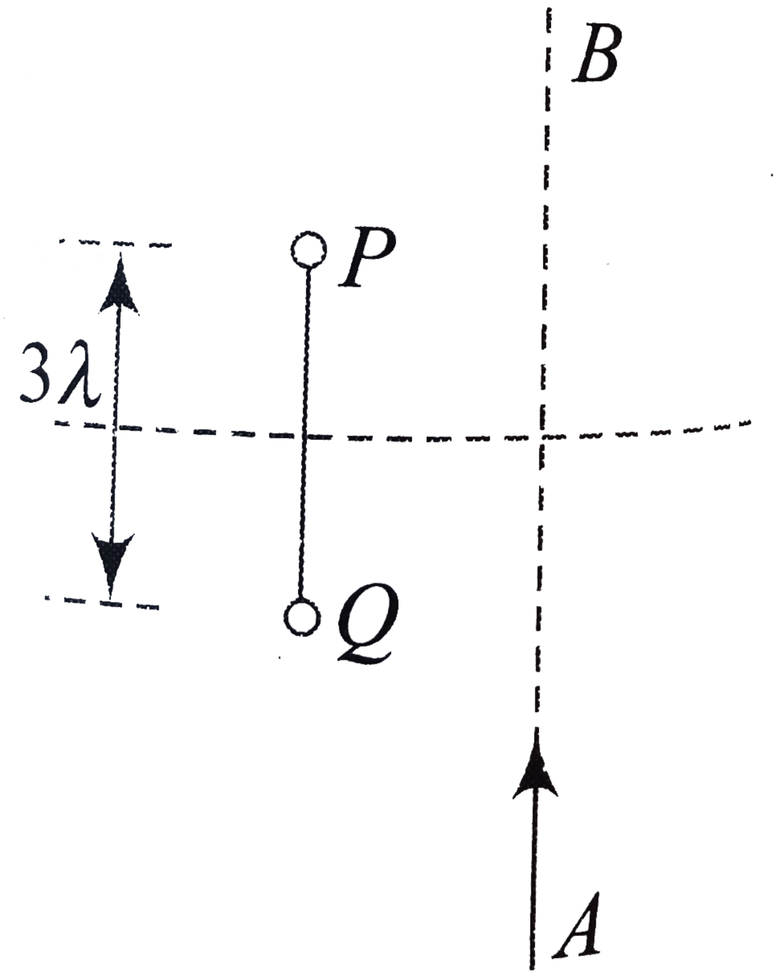
**Answer: B**

Watch Video Solution

**33.** An inteference is observed due to two coherent sources A and B separated by a distance $4\lambda$ along Y-axis, where $\lambda$ is the wavelength of light. A detector 'D' is moved alog the positive X-axis. Find the totla number of maxima observe on the X-axis excluding the points $x = 0$ and $x = \infty$ ?

Watch Video Solution

**34.** Two coherent light sources, each of wavelength $\lambda$, are separated by a distance $3\lambda$, The maximum number of minima formed on line AB, which funs from $-\infty$ to $+\infty$, is




Watch Video Solution

**35.** In Young's experiment inteference bands are produced on the screen placed at $1.5m$ from the slits $0.15mm$ apart and illuminated by light of wavelength $6000\text{Å}$. If the scren is now taken away from the slit by 50 cm the change in the fringe width will be

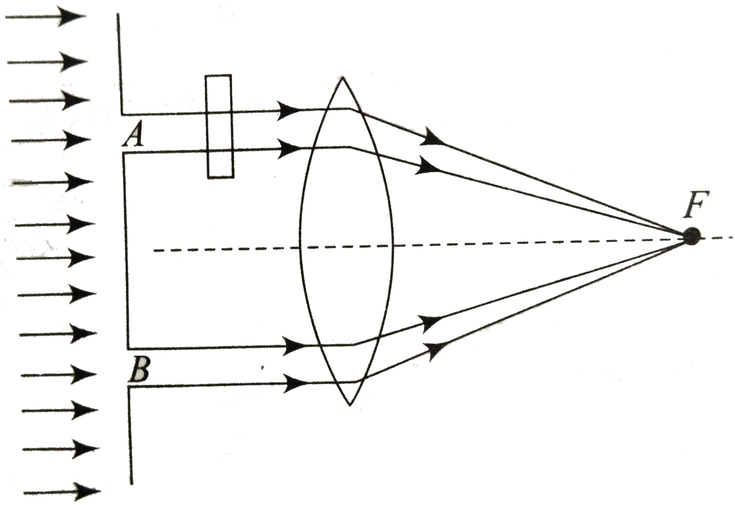
Watch Video Solution

**36.** In YDSE, the sources is red ligth of wavelength $7 \times 10^{-7} m$. When a thin glass plate of refractive index 1.5 is put in the path of one of the interfering beams, the central bright fringe shifts by $10^{-3}$ m to the position previously occupied by the 5th bright fringe.

What is the thickness of the plate?

Watch Video Solution

**37.** In a modified Young's double-slit experiment, a monochromatic uniform and parallel beam of light of wavelength $6000\text{Å}$ and intensity $(10/\pi)$ W $m^{-2}$ is incident normally on two circular apertures A and B of radii 0.001 m and 0.002 m, respectively. A perfectly transparent film of thickness $2000\text{Å}$ and refractive index 1.5 for the wavelength of $6000\text{Å}$ is placed in front of aperture A (see the figure). Calculate the power (in mW) received at the focal spot F of the lens. Then lens is symmetrically placed with respect to the aperture. Assume that 10% of the power received by each aperture goes in the original direction and is brought to the focal spot.




Watch Video Solution

## LEVEL - VI

**1.** If two coherent source are placed at a distance $3\lambda$ from each other, symmetric to the centre of the circel as shown in figure, Find thenumber of fringes shown on the screen, placed along the circumference ?

A. 16

B. 12

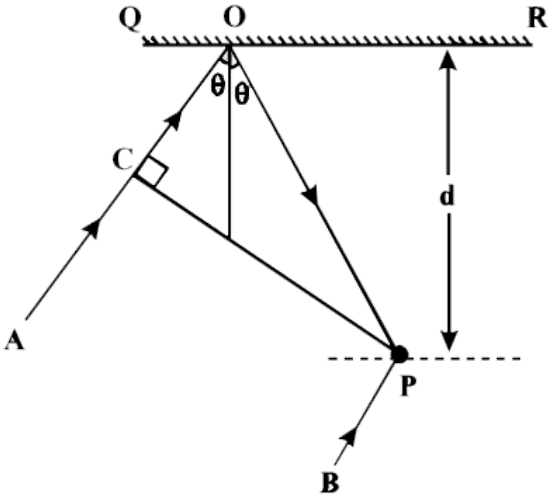
C. 8

D. 4

**Answer: B**

Watch Video Solution

**2.** In the adjacent diagram, CP represents a wavefront and AO & BP, the corresponding two rays. Find the condition on $\theta$ for constructive interference at P between the ray BP and reflected ray OP.




A. $\cos\theta = \frac{3\lambda}{2d}$

B. $\cos\theta = \frac{\lambda}{4d}$

C. $\sec\theta - \cos\theta = \frac{\lambda}{d}$

D. $\sec\theta - \cos\theta = \frac{4\lambda}{d}$

**Answer: B**

Watch Video Solution

**3.** In standard YDSE slits were moved apart symmetrically with relative velocity v, calculate the rate at which fringes pass a point at a distance x from the centre of the fringe system formed on a screen at 'y' distance away from the double slits if wavelength of light is $\lambda$ , and distance between the slits is 'b' . Assuming $y > > b \& b > > \lambda$

A. $\frac{2xv}{\lambda y}$

B. $\frac{xv}{2\lambda y}$

C. $\frac{xv}{\lambda y}$

D. Zero

**Answer: C**

Watch Video Solution

**4.** ABC is a spherical wavefront centred at 'O' symmetric about BE is incident on slits $S_1$ and $S_2$ . $BS_1 = 3\lambda, S_1S_2 = 4\lambda, BO = 6\lambda, S_1E = 128\lambda$ and $\lambda$ is the wavelength of incident light wave. A mica sheet of refractive index $1.5$ is pated on $S_2$. Find the minimum value of thickness of mica sheet for whhich central fringe forms at E ?

A. $\frac{31\lambda}{8}$

B. $\frac{15\lambda}{8}$

C. $\frac{5\lambda}{8}$

D. $\frac{7\lambda}{8}$

**Answer: A**

View Text Solution

**5.** A glass of refractive index 1.5 is coated with a thin layer of thickness t and refractive index 1.8 . Light of wavelength $\lambda$ travelling in air is incident normally on the layer. It is partly reflected at the upper and the lower surfaces of the layer. It is partly reflected at the upper and the lower surfaces of the layer ant the two reflected rays interface . If $\lambda = 648nm$, obtain the least value of $t(\text{in}10^{-8}m)$ which the rays interface constructively.

A. $30nm$

B. $60nm$

C. $90nm$

D. $120nm$

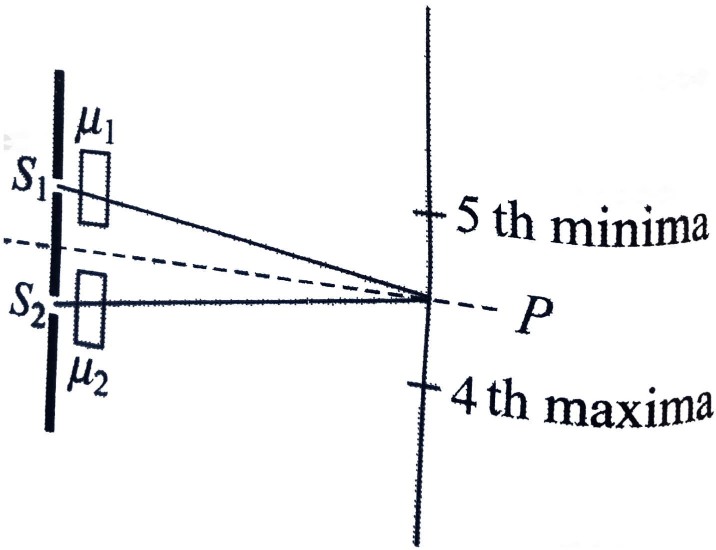
**Answer: C**

Watch Video Solution

**6.** In Young's experiment the upper slit is covered by a thin glass plate of refractive index $1.4$ while the lower slit is covered by another glass plate, having the same thickness as the first one but having refractive index $1.7$ interference pattern is observed using light of wavelength $5400\text{Å}$

It is found that point P on the screen where the central maximum $(n = 0)$ fell before the glass plates were inserted now has $3/4$ the original intensity. It is further observed that what used to be the fourth maximum earlier, lies below point P while the fifth minimum lies above P.

Calculate the thickness of glass plate. (Absorption of light by glass plate may be neglected.




A. $9.3\mu m$

B. $6.2\mu m$

C. $8.5\mu m$

D. $5.8\mu m$

**Answer: A**

Watch Video Solution

**7.** In a young's double slit experiment, two wavelength of 500 nm and 700 nm were used. What is the minimum distance from the central maximum where their maximas coincide again ? Take $D/d = 10^3$ . Symbols have their usual meanings.

A. $6.5mm$

B. $3.5mm$

C. $10.2mm$

D. $5.9mm$

**Answer: B**

Watch Video Solution

**8.** In a standard YDSE setup if the screen is kept tilted as shown, find the distance OA if first maximum is formed at A. Wavelength of light emitted by source is $\lambda$

A. $\dfrac{D\lambda\sec\theta}{d+\lambda\tan\theta}$

B. $\dfrac{D\lambda\sec\theta}{d+\lambda\sin\theta}$

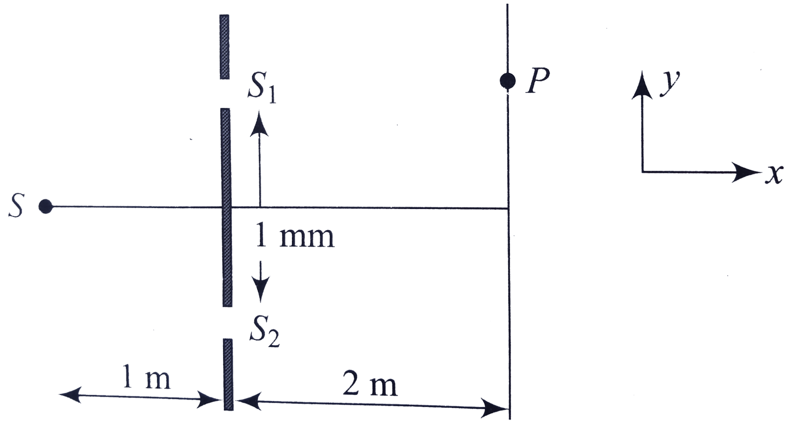
C. $\dfrac{D\lambda\cos\theta}{d+\lambda\tan\theta}$

D. $\dfrac{D\lambda\sec\theta\tan\theta}{d+\lambda\tan\theta}$

**Answer: B**

View Text Solution

**9.** In young's double-slit experiment set up, sources S of wavelength 50 nm illumiantes two slits $S_1$ and $S_2$ which act as two coherent sources. The sources S oscillates about its own position according to the equation $y = 0.5\sin\pi t$, where y is in nm and t in seconds. The minimum value of time t for which the intensity at point P on the screen exaclty in front of the upper slit becomes minimum is




A. 1s

B. 2s

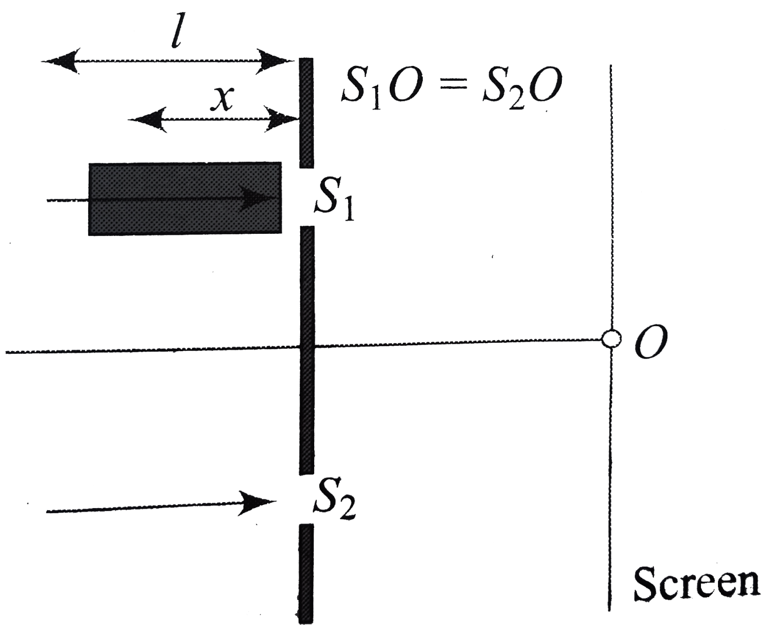
C. $0.5s$

D. $1.5s$

**Answer: C**

Watch Video Solution

**10.** In figure, parallel beam of light is incident on the plane of the slits of a Young's double-slit experiment. Light incident on the slit $S_1$ passes through a medium of variable refractive index $\mu = 1 + ax$ (where 'x' is the distance from the plane of slits as shown), up to distance 'l' before falling on $S_1$. Rest of the space is filled with air. If at 'O' a minima is formed. then the minimum value of the positive constant a (in terms of l and wavelength $\lambda$ in air) is




A. $\frac{\lambda}{l}$

B. $\frac{\lambda s}{l^2}$

C. $\frac{l^2}{\lambda}$

D. $\frac{l^2}{2\lambda}$

**Answer: B**

Watch Video Solution

**11.** Two identical beam A and B of plane coherent waves of the sasme intensity and wavelength $\lambda$ fall on a plane screen. The direction of the beam propagations make angles $\theta_1$ and $\theta_2$ with the normal to the screen and lie in the same plane as shown in the figure. Find the distance $\beta$ between adject interfrence fringes on the screen.

A. $\dfrac{\lambda}{\sin\theta - \sin\theta_2}$

B. $\dfrac{\lambda}{\sin\theta_1 + \sin\theta_2}$

C. $\dfrac{\lambda(\sin\theta_1 - \sin\theta_2)}{\sin\theta_1 + \sin\theta_2}$

D. $\dfrac{\lambda(\sin\theta_1 + \sin\theta_2)}{\sin\theta_1 - \sin\theta_2}$

**Answer: A**

View Text Solution

**12.** Two identical beam A and B of wavelength $\lambda$ fall cylindeical screen. The angle between the directions a point P on the screen at angular position $\phi$ from the beam A as shown in the figure. Find the distance between adjacent interference fringes on the screen near the point P. Asume that the distance $\beta$ between adjacent fringes is much less than the radius of the cylinder.

A. $\dfrac{\lambda}{2\sin\left(\frac{\phi}{2}\right)\cos\left(\theta-\frac{\phi}{2}\right)}$

B. $\dfrac{\lambda}{2\sin\left(\frac{\phi}{2}\right)\cos\left(\theta+\frac{\phi}{2}\right)}$

C. $\dfrac{\lambda}{2\sin\left(\frac{\theta}{2}\right)\cos\left(\theta+\frac{\phi}{2}\right)}$

D. $\dfrac{\lambda}{2\sin\left(\frac{\theta}{2}\right)\cos\left(\phi+\frac{\theta}{2}\right)}$

**Answer: B**

View Text Solution

**13.** Monochromatic light waves of wavelength $\lambda$ from two coherent source fall on a larger plane screen. One of the waves is emanated from a point source S located at distance L from the screen and the other one is a broad plasne wave as shown in the figure. The spacing between the $n^{th}$ and $(n-1)^{th}$ bright fringe is

A. $\sqrt{2\lambda L}\left(\sqrt{n}-\sqrt{n-1}\right)$

B. $\sqrt{\lambda L}\left(\sqrt{n}-\sqrt{n-1}\right)$

C. $\dfrac{\lambda^2}{2L}\left(\sqrt{n}-\sqrt{n-1}\right)$

D. $\dfrac{2\lambda^2}{L}\left(\sqrt{n}-\sqrt{n-1}\right)$

**Answer: A**

View Text Solution

**14.** A transparent slab of thickness t and refractive index $\mu$ is inserted in front of upper of YDSE apparauts. The wavelength of ligth used. is $\lambda$.

Assume that there is no absorption of light by the slab. Mark the correct statement(s).

A. The intensity of dark fringes will be zero, if slits are identical.

B. The change in optical path due to insertion o9f palte is $\mu t$ .

C. The change in optical path due to insertion of plate is $(\mu - 1)t$ .

D. For making intensity zero at centre of screen the thickness can be $\frac{5\lambda}{2(\mu - 1)}$.

**Answer: A::C::D**

Watch Video Solution

**15.** In a YDSE with two identical slits, when the upper slit is covered with a thin, perfectly tranparent sheet of mica, the intensity at the centre of screen reduces ro $75\%$ of the initial value second minima is observed to the above this point and third maxima below it which of the following can not be a possible value of phase difference caused by the mica sheet

A. $\frac{\pi}{3}$

B. $\frac{13\pi}{3}$

C. $\frac{5\pi}{3}$

D. $\frac{11\pi}{3}$

**Answer: A::C**

Watch Video Solution

**16.** In Young's double slit experiment, the two slits are covered by slabs of same thickness but refractive index $1.4$ and $1.7$ . The distance between slits and screen is 1 m and distance between slits is 1mm and wavelength of coherent source used is $4000\overset{\circ}{\Delta}$ and the central fringe shifts to the 3rd bright fringe positions, then

A. Shift will be toward slab of $R.\ I.\ -1.7by1.2mm$

B. Shift will be towards slab of $R.\ I.\ -1.4by1.2mm$

C. Slabs are of thickness $4\mu m$

D. slabs are of thickness $\text{Å}$

**Answer: A::C**

Watch Video Solution

**17.** In a Young's double slit experiment, the separation between the two slits is d and the wavelength of the light is $\lambda$. The intensity of light falling on slit 1 is four times the intensity of light falling on slit 2. Choose the correct choice (s).

A. If $d = \lambda$ , the screen will contain only one maximum

B. If $\lambda < d < 2\lambda$, at least one more maxcimum (besides the central masximum) will be obsetved on the screen

C. If the intensity of light falling on slit is reduced so that it becomes equal to that of slit 2, the intensities of the observed dark and bright fringes will increase

D. If the intensity of light falling on slit 2 is increased so that it becomes equal to that of slit 1, the intensitites of the observed dark and bright fringes will increases.

**Answer: A::B**

Watch Video Solution

**18.** A light source, which emits two wavelength $\lambda_1 = 400 nm$ and $\lambda_2 = 600 nm$, is used in a Young's double slit experiment. If recorded fringe width for $\lambda_1$ and $\lambda_2$ are $\beta_1$ and $\beta_2$ and the number of fringes for them within a distance y on one side of the central maximum are $m_1$ and $m_2$ respectively, then

A. $\beta_2 > \beta_1$

B. $m_1 > m_2$

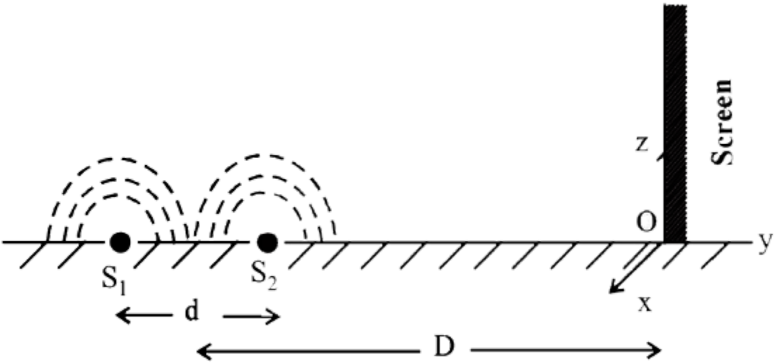
C. From the central maximum, 3rd maximum of $\lambda_2$ overlaps with $5^{th}$ minimum of $\lambda_1$

D. The angular separation of fringes for $\lambda_1$ isd greater than $\lambda s_2$

**Answer: A::B::C**

Watch Video Solution

**19.** While conduction the Young's double slit experiment, a student replaced the two slits with a large opaque plate in the x-y plane containing two small holes that act as two coherent point sources $(S_1, S_2)$ emitting light of wavelength 600nm. The student mistakenly placed the screen parallel to the x-z plane $(f \text{ or } z > 0)$ at a distance D=3 m from the mid-point of $S_1$,$S_2$, as shown schematically in the figure. The distance between the sources $d = 0.6003mm$. The origin O is at the intersection of the screen and the line joining $S_1S_2$. Which of the following is (are) true of the intensity pattern of the screen?




A. semiciricular bright and dasrk bands centred at point O

B. Hyperbolic bright and dark bands with focisymmetrically plasced about O in the x-direction

C. The region very close to the point O will be dark

D. Straight bright and dark bands parallel to the x-axis.

**Answer: A::C**

Watch Video Solution

**20.** In YDSE, the sources is red ligth of wavelength $7 \times 10^{-7} m$. When a thin glass plate of refractive index 1.5 is put in the path of one of the interfering beams, the central bright fringe shifts by $10^{-3}$ m to the position previously occupied by the 5th bright fringe.

What is the thickness of the plate?

A. $7 \times 10^{-6} m$

B. $9 \times 10^{-10} m$

C. $4 \times 10^{-6} m$

D. $6 \times 10^{-10} m$

**Answer: A**

Watch Video Solution

**21.** In Young's experiment, the source is red light of wavelength $7 \times 10^{-7} m$. When a thin glass plate of refractive index $1.5$ at this wavelength is put in the path of one of the intering beams, the central bright fringe shiffts by $10^{-3}m$ to the position previously occupied by the $5^{th}$ bright fringe.

When the source is now changed to green light of wavelength $5 \times 10^{-7}m$, the central fringe shifts to position initially occupied by the $6^{th}$ bright fringe to red light. Find the refractive index of glass for green light.

A. $1.4$

B. $1.2$

C. $1.6$

D. $1.3$

**Answer: C**

Watch Video Solution

**22.** In YDSE, the sources is red ligth of wavelength $7 \times 10^{-7}m$. When a thin glass plate of refractive index 1.5 is put in the path of one of the interfering beams, the central bright fringe shifts by $10^{-3}$ m to the position previously occupied by the 5th bright fringe.

Change is fringe width produced due to chanbe in wavelength is

A. $6.22 \times 10^{-5} m$

B. $-6.22 \times 10^{-5} m$

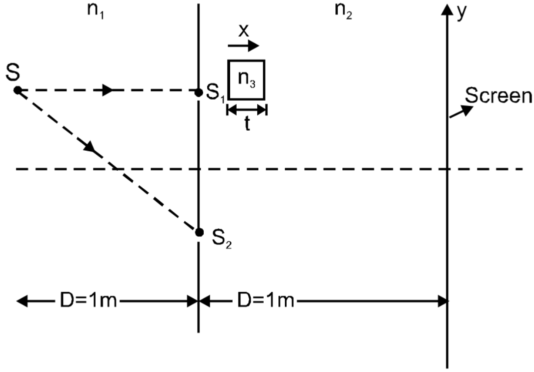
C. $-5.71 \times 10^{-5} m$

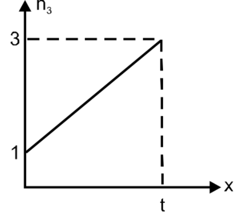
D. $5.71 \times 10^{-5} m$

**Answer: C**

Watch Video Solution

**23.** In YDSE arrangement as shown in figure, fringes are seen on screen using monochromatic source S having wavelength 3000 Å (in air). $S_1$ and $S_2$ are two slits seperated by d = 1 mm and D = 1m. Left of slits $S_1$ and $S_2$ medium of refractive index $n_1 = 2$ is present and to the right of $S_1$ and $S_2$ medium of $n_2 = \frac{3}{2}$, is present. A thin slab of thickness 't' is placed in front of $S_1$ . The refractive index of $n_3$ of the slab varies with distance from it's starting face as shown in figure.




Fringe width on the screen is

A. $1\mu m$

B. $2\mu m$

C. $0.5\mu m$

D. $1.5\mu m$

**Answer: A**

Watch Video Solution

**24.** In YDSE arangement shown in figure, fringes are seen on screen using monochromatic source S having wavelength $3000\overset{\circ}{\Delta}$ (in air). $S_1$ and $S_2$ are two slits separate by $d = 1mm$ and $D = 1m$ . Left of slits $S_1$ and $S_2$ medium of refractive index $\mu_1 = 2$ is presernt refractive index $\mu_2 = \frac{3}{2}$ is present. A thin slab of thickness 't' is placed in front of $S_1$ . The refractive index of slab $\mu_3$ varies with distance from its starting face as shown in figure.

If the thickness of the slab is selected $1\mu m$ , then the position of the central maxima will be (y - coordinate)

A. $\frac{1}{3}mm$

B. $-\frac{1}{3}mm$

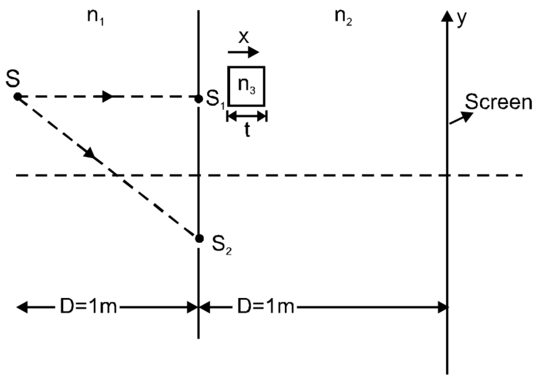
C. $\frac{1}{6}mm$

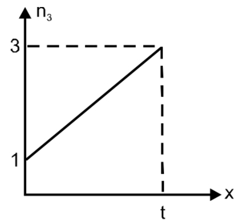
D. $-\frac{1}{6}mm$

**Answer: C**

View Text Solution

**25.** In YDSE arrangement as shown in figure, fringes are seen on screen using monochromatic source S having wavelength 3000 Å (in air). $S_1$and $S_2$ are two slits seperated by d = 1 mm and D = 1m. Left of slits $S_1$ and $S_2$ medium of refractive index $n_1 = 2$ is present and to the right of $S_1$ and $S_2$ medium of $n_2 = \frac{3}{2}$, is present. A thin slab of thickness 't' is placed in front of $S_1$ . The refractive index of $n_3$ of the slab varies with distance from it's starting face as shown in figure.




Fringe width on the screen is

A. $0.4mm$

B. $0.1mm$

C. $0.2mm$

D. $0.3mm$

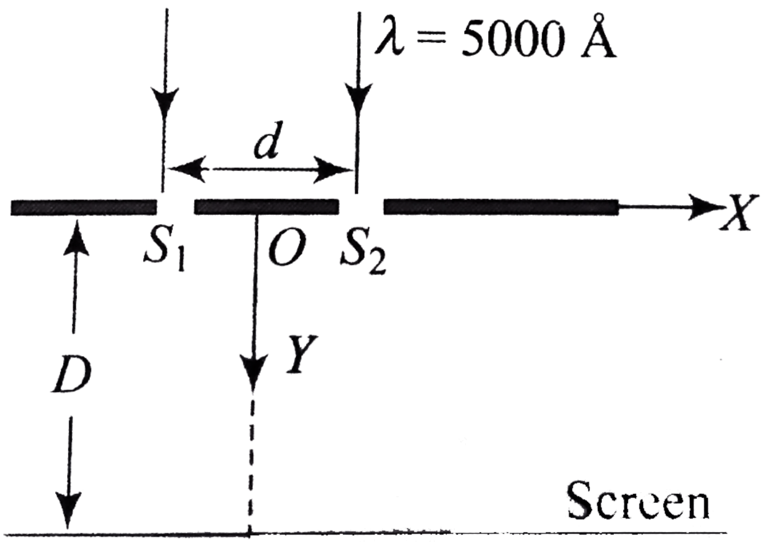
**Answer: B**

Watch Video Solution

**26.** In fig., light of wavelength $\lambda = 5000\text{Å}$ is incident on the slits (in a horizontally fixed place).

Here, $d = 1mm$ and $D = 1m$

Take origin at O and XY plane as shown in the figure. The screen is released from rest from the initial position as shown




The velocity of central maxima at $t = 5$s is

A. $50ms^{-1}$ along Y-axis

B. $50ms^{-1}$ along negative Y-axis

C. $25ms^{-1}$ along Y-axis

D. $3 \times 10^8 ms^{-1}$ along Y-axis

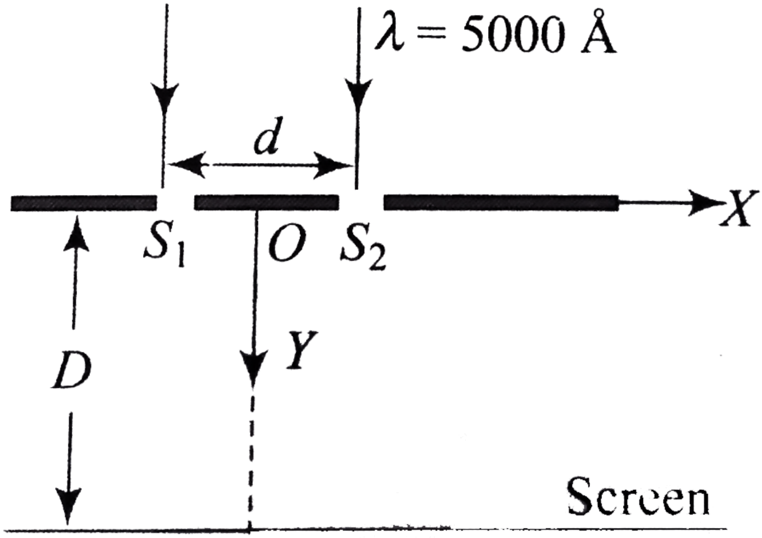
**Answer: A**

Watch Video Solution

**27.** In fig., light of wavelength $\lambda = 5000 \text{Å}$ is incident on the slits (in a horizontally fixed place).

Here, $d = 1mm$ and $D = 1m$

Take origin at O and XY plane as shown in the figure. The screen is released from rest from the initial position as shown




Velocity of 2nd maixma w.r.t central maxima at $t = 2$s is

A. $8\left(cms^{-1}\right)\hat{i} + 20\left(ms^{-1}\right)\hat{j}$

B. $8\left(cms^{-1}\right)\hat{i}$

C. $2\left(cms^{-1}\right)\hat{i}$

D. $86\left(ms^{-1}\right)\hat{i}$

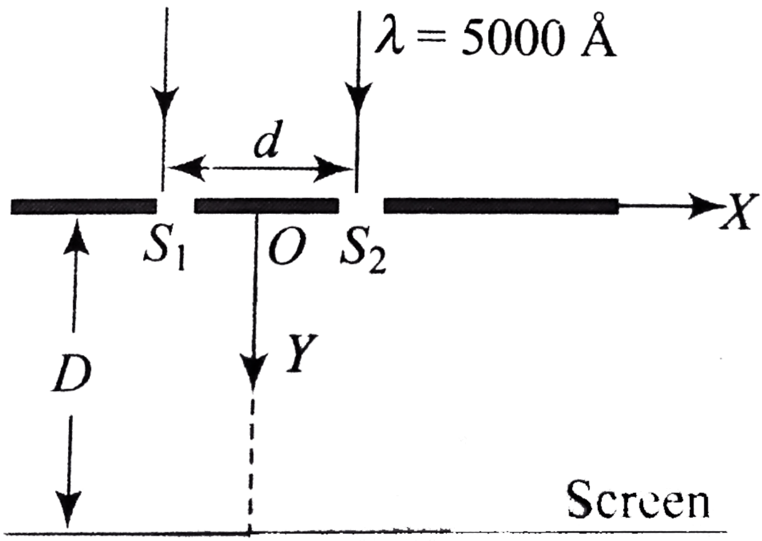
**Answer: C**

Watch Video Solution

**28.** In fig., light of wavelength $\lambda = 5000\text{Å}$ is incident on the slits (in a horizontally fixed place).

Here, $d = 1mm$ and $D = 1m$

Take origin at O and XY plane as shown in the figure. The screen is released from rest from the initial position as shown




Acceleration of 3rd maxima w.r.t. 3rd maxima on other side of central maxima at $t = 3$ s is

A. $0.02ms^{-2}\hat{i}$

B. $0.03ms^{-2}\hat{i}$

C. $10ms^{-2}\hat{i}$

D. $0.06ms^{-2}\hat{i}$

**Answer: B**

Watch Video Solution

**29.** A double slit apparatus is immersed in a liquid of refractive index 1.33. It has slit and the screen 1 mm. The slits are illuminated by a parallel beam of light whose wavelength in air is $6300\text{Å}$

a. calculate the fringe width.

b. One of the slits of the apparatus is covered by a thin glass sheet of refractive index 1.53. Find the smallest thickness of the sheet to bring athe adjacent minima on the axis.

A. 0.95

B. 0.36

C. 0.63

D. 0.56

**Answer: C**

Watch Video Solution

**30.** A double slit apparatus is immersed in a liquid of refractive index 1.33. It has slit and the screen 1 mm. The slits are illuminated by a parallel beam of light whose wavelength in air is $6300\text{Å}$

a. calculate the fringe width.

b. One of the slits of the apparatus is covered by a thin glass sheet of refractive index 1.53. Find the smallest thickness of the sheet to bring athe adjacent minima on the axis.

A. $2.132\mu m$

B. $2.512\mu m$

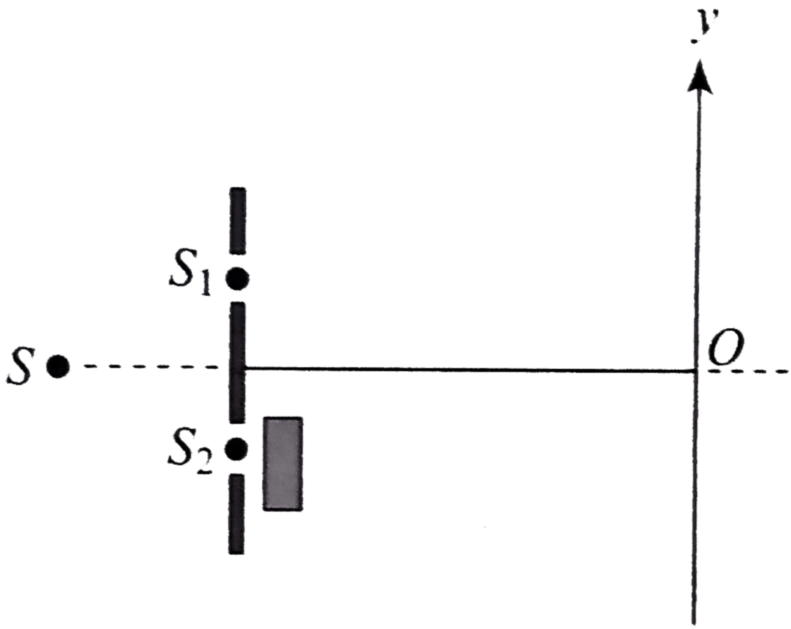
C. $6.521\mu m$

D. $1.579\mu m$

**Answer: D**

Watch Video Solution

**31.** A YDSE is performed in a medium of refractive index $4/3$, A light of 600 nm wavelength is falling on the slits having 0.45 nm separation . The lower slit $S_2$ is covered b a thin glass plate of thickness 10.4 mm and refractive index 1.5. The interference pattern is observed on a screen placed 1.5 m from the slits as shown in figure. (All the wavelengths in this problem are for the given medium of refractive index $4/3$, ignore absorption.)



The location of the central maximum (bright fringe with zero path difference) on the y-axis will be

A. $4.33mm$

B. $2.56mm$

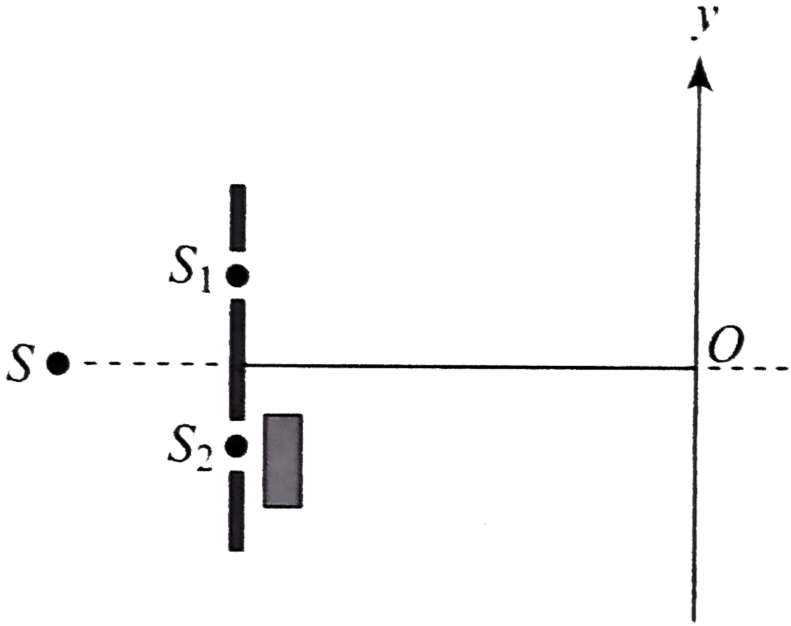
C. $3.26mm$

D. $5.16mm$

**Answer: A**

Watch Video Solution

**32.** A YDSE is performed in a medium of refractive index $4/3$, A light of 600 nm wavelength is falling on the slits having 0.45 nm separation . The lower slit $S_2$ is covered b a thin glass plate of thickness 10.4 mm and refractive index 1.5. The interference pattern is observed on a screen placed 1.5 m from the slits as shown in figure. (All the wavelengths in this problem are for the given medium of refractive index $4/3$, ignore absorption.)




Find the light intensity at point O relative t maximum fringe intensity.

A. $\frac{3}{2} I_{\max}$

B. $\frac{5}{4} I_{\max}$

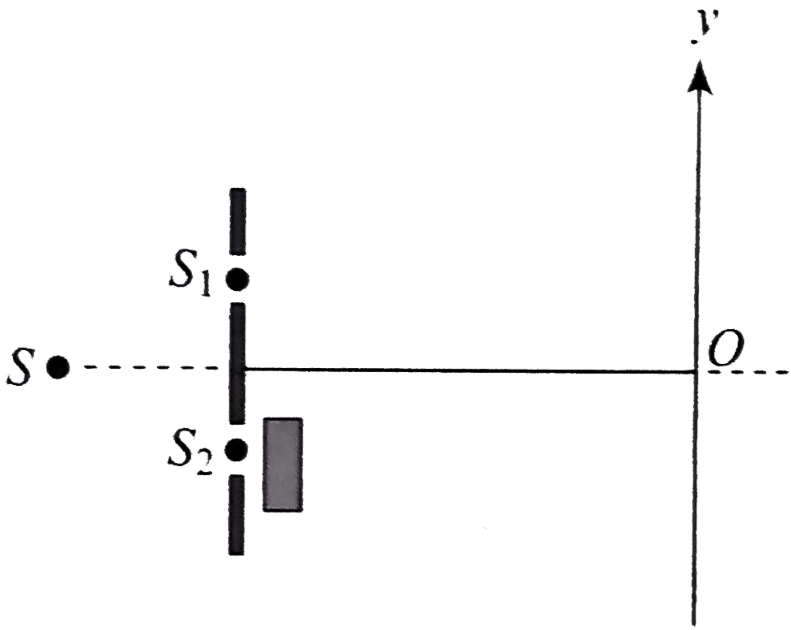
C. $\frac{3}{4} I_{\max}$

D. $\frac{7}{5} I_{\max}$

**Answer: C**

Watch Video Solution

**33.** A YDSE is performed in a medium of refractive index $4/3$, A light of 600 nm wavelength is falling on the slits having 0.45 nm separation . The lower slit $S_2$ is covered b a thin glass plate of thickness 10.4 mm and refractive index 1.5. The interference pattern is observed on a screen placed 1.5 m from the slits as shown in figure. (All the wavelengths in this problem are for the given medium of refractive index $4/3$, ignore absorption.)




Now, if 600 nm, find the wavelength of the ligth that forms maximum exactly at point O.

A. $650mn$, $6.32nm$

B. $350nm, 4.33nm$

C. $452nm, 3.53nm$

D. $650nm, 433nm$

**Answer: D**

Watch Video Solution

**34.** The arrangement for a mirror experiment is shown in figure. S is a point source of frequency $6 \times 10^{14} Hz$. D and C represent the two ends of a mirror placed horizontally and LOM represents the screen.

Determine the width of the region where the fringes will be visible

A. 4cm

B. 6cm

C. 2cm

D. 3cm

**Answer: C**

Watch Video Solution

**35.** The arrangement for a mirror experiment is shown in figure. S is a point source of frequency $6 \times 10^{14} Hz$. D and C represent the two ends of a mirror placed horizontally and LOM represents the screen.

Find the fringe width of the fringe pattern ?

A. $0.05cm$

B. $0.25cm$

C. $0.01cm$

D. $0.1cm$

**Answer: A**

Watch Video Solution

**36.** The arrangement for a mirror experiment is shown in figure. S is a point source of frequency $6 \times 10^{14} Hz$. D and C represent the two ends of a mirror placed horizontally and LOM represents the screen.

Calculate the number of fringes

A. 10

B. 20

C. 30

D. 40

**Answer: D**

Watch Video Solution

**37.** In YDSE, the intensity of light at a point on the screen is I for a path difference $\lambda$ . The intensity of light at a point where the path difference becomes $\frac{\lambda}{3}$ is $\frac{I}{P}$ . Find the value of P ?

Watch Video Solution

38. In YDSE, the slits separation is $0.6mm$ and the separation between slit and screen is $1.2m$. The wavelength of light used is $4800\overset{\circ}{\forall}$ . The angular fringe width is $P \times 10^{-4}$ radian. Find the value of P ?

Watch Video Solution

39. In YDSE, the slits have different widths. As a result, amplitude of waves from slits are A and 2A respectively. If $I_0$ be the maximum intensity of the intensity of the interference pattern then the intensity of the pattern at a point where the phase difference between waves is $\phi$ is given by $\frac{I_0}{P}(5+4\cos\phi)$ . Where P is in in integer. Find the value of P ?

Watch Video Solution

40. A Young's double slit interference arrangement with slits $S_1$ and $S_2$ is immersed in water (refractive index $=4/3$) as shown in the figure. The

positions of maxima on the surface of water are given by $x^2 = p^2 m^2 \lambda^2 - d^2$, where $\lambda$ is the wavelength of light in air (reflactive index = 1), 2d is the separation between the slits and m is an integer. The value of P is ..........

Watch Video Solution

## LEVEL - I(H.W)

**1.** The displacements of two interfering light waves are $y_1 = 2\sin\omega t$ and $y_2 = 5\sin\left(\omega t + \frac{\pi}{3}\right)$ the resultant amptitude is

A. $39cm$

B. $\sqrt{39}cm$

C. $7cm$

D. $\sqrt{29}cm$

**Answer: B**

Watch Video Solution

**2.** The intensity ratio of two waves is $9:1$. If they produce interference, the ratio of maximum to minimum intensity will be

A. $4:1$

B. $2:1$

C. $9:1$

D. $3:2$

**Answer: A**

Watch Video Solution

**3.** Two beams of ligth having intensities I and 4I interface to produce a fringe pattern on a screen. The phase difference between the beams is $\frac{\pi}{2}$ at point A and $\pi$ at point B. Then the difference between the resultant intensities at A and B is

A. 2I

B. 4I

C. 5I

D. 7I

**Answer: B**

Watch Video Solution

**4.** The maximum intensity in Young's double slit experiment is $I_0$ . What will be the intensity of light in front of one the slits on a screen where path difference is $\frac{\lambda}{4}$ ?

A. $\frac{I_0}{2}$

B. $\frac{3}{4}I_0$

C. $I_0$

D. $\frac{I_0}{4}$

**Answer: A**

Watch Video Solution

**5.** In Young's double-slit experiment, 30 fringes are obtained in the field of view of the observing telescope, when the wavelength of light used is $4000\text{Å}$. If we use monochromatic light of wavelength $6000\text{Å}$, the number of fringes obtained in the same field of view is

A. 60

B. 90

C. 40

D. $1.5$

**Answer: C**

Watch Video Solution

**6.** The separation between successive fringes in a double slit arrangement is x. If the whole arrangement is dipped under water, what will be the new fringe separation ? [The wavelength of light being used is $5000\text{Å}$]

A. $1.5x$

B. x

C. $0.75x$

D. $2x$

**Answer: C**

Watch Video Solution

**7.** In the Young's double slit experiment , a mica slip of thickness t and refractive index $\mu$ is introduced in the ray from first source $S_1$ . By how much distance fringes pattern will be displaced ? (d = distance between the slits and D is the distance between slits andscreen)

A. $\frac{d}{D}(\mu - 1)t$

B. $\frac{D}{d}(\mu - 1)t$

C. $\frac{d}{(\mu - 1)D}$

D. $\frac{D}{d}(\mu - 1)$

**Answer: B**

Watch Video Solution

**8.** In Young's double slit experiment, the 10th maximum of wavelength $\lambda_1$ is at distance of $y_1$ from the central maximum. When the wavelength of the source is changed to $\lambda_2$ , 5th maximum is at a distance of $y_2$ from its central masximum. Then $\frac{y_1}{y_2}$ is

A. $\frac{2\lambda_1}{\lambda_2}$

B. $\frac{2\lambda_2}{\lambda_1}$

C. $\frac{\lambda_1}{2\lambda_2}$

D. $\frac{\lambda_2}{2\lambda_1}$

**Answer: A**

Watch Video Solution

**9.** Two coherent monochormatic light source are located at two vertices of an equilateral trangle. If the intensity due to each of the source independently is $1Wm^{-2}$ at the third vertex. The resultant intensity due to both the sources at that point (i.e at the third vertex) is (in $Wm^{-2}$ )

A. zero

B. $\sqrt{2}$

C. 2

D. 4

**Answer: D**

Watch Video Solution

**10.** Light of wavelength $6000A^{\circ}$ is incident on a single slit. The first minimum of the diffraction pattern is obtained at 4 mm from the centre. The screen is at a distance of 2 m from the silt. The slit width will be

A. $0.3mm$

B. $0.2mm$

C. $0.15mm$

D. $0.1mm$

**Answer: A**

Watch Video Solution

**11.** A plane wave of wavelength $6250\text{Å}$ is incident normally of the principal maximum on a screen distant 50 cm will be

A. $312.5 \times 10^{-2}cm$

B. $312.5 \times 10^{-4}cm$

C. $312cm$

D. $312.5 \times 10^{-5} cm$

**Answer: A**

Watch Video Solution

**12.** The distance between the first and the sixth minima in the diffraction pattern of a single slit is 0.5 mm. The screen is 0.5 m away from the slit. If the wavelength of light used is 5000 Å. Then the slit width will be

A. $5mm$

B. $2.5mm$

C. $1.25mm$

D. $1.0mm$

**Answer: B**

Watch Video Solution

**13.** The diameter of an objective of a telescope, which can just resolve two stars situated at angular displacement of $10^{-4}$ degee, should be $(\lambda = 5000\text{Å})$

A. $35mm$

B. $35cm$

C. $35m$

D. $3.5cm$

**Answer: B**

Watch Video Solution

**14.** A telescope is used to resolve two stars separated by $4.6 \times 10^{-6}$ rad. If the wavelength of light used is $5460\text{Å}$ , what should be the aperture of the objective of the telescope ?

A. $0.448m$

B. $0.1448m$

C. $1.1448m$

D. $0.011m$

**Answer: B**

Watch Video Solution

**15.** Two point sources distant $0.1$ meter away viewed by a telescope. The objective is covered by a terlescope. The objective is covered by a screen having a hole of 1 mm width. If the wavelength of the light used is $6500\text{Å}$ , then maximum distance at which the two sources are seen just resolved, will be nearly

A. $125.0m$

B. $164m$

C. $131m$

D. $144m$

**Answer: A**

Watch Video Solution

**16.** Two polaroids are kept crossed to each other. Now one of them is rotated through an angle of $45^\circ$ . The percentage of incident light now transmitted through the system is

A. $15\ \%$

B. $25\ \%$

C. $50\ \%$

D. $60\ \%$

**Answer: B**

Watch Video Solution

**17.** The amplitude of polarised light transmitted through a polariser is A. The amplitude of unpolarised light incident on it is

A. $A/2$

B. $A/\sqrt{2}$

C. $2A$

D. $\sqrt{2}A$

**Answer: D**

Watch Video Solution

**18.** Unpolarised light of intensity 32 $W/m^2$ passes through a polariser and analyser which are at an angle of $30^\circ$ with respect to each other. The intensity of the light coming from analyser is

A. $16\sqrt{3}W/m^2$

B. $12W/m^2$

C. $16W/m^2$

D. $14W/m^2$

**Answer: B**

Watch Video Solution

**19.** The critical angle of a transparent crystal is $60^\circ$. Then its polarizing angle is

A. $\theta = \tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$

B. $\theta = \sin^{-1}(\sqrt{2})$

C. $\theta = \cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

D. $\theta = \cot^{-1}(\sqrt{2})$

**Answer: A**

Watch Video Solution

**20.** When an unpolarized light of intensity $I_0$ is incident on a polarizing sheet, the intensity of the light which dows not get transmitted is

A. $1/2I_0$

B. $1/4I_0$

C. zero

D. $I_0$

**Answer: A**

Watch Video Solution

## LEVEL - II(H.W)

**1.** In Young's double slit experiment the intensity of light at a point on the screen where the path difference $\lambda$ is K. The intensity of light at a point where the path difference is $\frac{\lambda}{6}$ [$\lambda$ is the wavelength of light used] is

A. $K/4$

B. $K/3$

C. $3K/4$

D. $K$

**Answer: C**

Watch Video Solution

**2.** 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 central maximum where the intensity is same as that due to a single slit is equla to

A. $\frac{D\lambda}{d}$

B. $\frac{D\lambda}{2d}$

C. $\frac{D\lambda}{3d}$

D. $\frac{2D\lambda}{d}$

**Answer: C**

Watch Video Solution

**3.** With two slits spaced 0.2 mm apart and a screen at a distance of 1 m, the third bright fringe is found to be at 7.5 mm from the central fringe. The wavelength of light used is

A. $400nm$

B. $500nm$

C. $550nm$

D. $600nm$

**Answer: B**

Watch Video Solution

**4.** The central fringe of the interference pattern produced by the light of wavelength 6000 Å is found to shift to the position of 4th dark fringe after a glass sheet of refractive index 1.5 is introduced. The thickness of glass sheet would be

A. $4.8\mu m$

B. $4.2\mu m$

C. $5.5\mu m$

D. $3.0\mu m$

**Answer: B**

Watch Video Solution

**5.** In Young's double slit intefrence experiment the wavelength of light used is $6000\text{Å}$ . If the path difference between waves reaching a point P on the screen is $1.5$ microns, then at that point P

A. Second bright band occurs

B. Second dark band occur

C. Third dark band occur

D. Third bright band occur

**Answer: C**

Watch Video Solution

**6.** When a mica plate of thickness $0.1$ mm is introduced in one of the interfering beams, the central fringe is displaced by a distance equal to 10 fringes. If the wavelength of the light is $6000 \text{Å}$ , the refractive index of the mica is

A. $1.06$

B. $1.6$

C. $2.4$

D. $1.3$

**Answer: A**

Watch Video Solution

**7.** In Young's experiment inteference bands are produced on the screen placed at $1.5m$ from the slits $0.15mm$ apart and illuminated by light of wavelength $6000\text{Å}$. If the scren is now taken away from the slit by 50 cm the change in the fringe width will be

A. $2 \times 10^{-4}m$

B. $2 \times 10^{-3}m$

C. $6 \times 10^{-3}m$

D. $7 \times 10^{-3}m$

**Answer: B**

Watch Video Solution

**8.** When a thin transparent plate of Refractive Index $1.5$ is introduced in one of the interfearing beam produces 20 fringes shift. If it is replaced by refractive index $1.7$ , the number of fringes that undergo displacement is

A. 23

B. 14

C. 28

D. 7

**Answer: B**

Watch Video Solution

**9.** In Young's double slit experiment, one of the slit is wider than other, so that amplitude of the light from one slit is double of that from other slit. If $I_m$ be the maximum intensity, the resultant intensity I when they interfere at phase difference $\phi$ is given by:

A. $\frac{I_m}{9}(4+5\cos\phi)$

B. $\frac{I_m}{3}\left(1+2\cos^2\left(\frac{\phi}{2}\right)\right)$

C. $\frac{I_m}{5}\left(1+4\cos^2\left(\frac{\phi}{2}\right)\right)$

D. $\frac{I_m}{9}\left(1+8\cos^2\left(\frac{\phi}{2}\right)\right)$

**Answer: D**

Watch Video Solution

**10.** In Young's double-slit experiment, the two slits act as coherent sources of equal amplitude $A$ and of wavelength $\lambda$. In another experiment with the same set-up the two slits are sources of equal amplitude $A$ and wavelength $\lambda$, but are incoherent. The ratio of the intensity of light at the midpoint of the screen in the first case to that in the second case is....

A. 4

B. 2

C. 1

D. $0.5$

**Answer: B**

Watch Video Solution

**11.** A micture of light, consisting of wavelength 590nm and an unknown wavelength, illuminates Young's double slit and gives rise to two overlapping interference patterns on the scree. The central maximum of both lights coincide. Further, it is obseved that the third bright fringe of known light coincides with the 4th bright fringe of the unknown light. From this data, the wavelength of the unknown light is:

A. $393.4nm$

B. $885.0nm$

C. $442.5nm$

D. $776.8nm$

**Answer: C**

Watch Video Solution

**12.** In a Young's double slit experiment using monochromatic light, the fringe pattern shifts by a certain distance on the screen when a mica sheet of refractive index 1.6 and thickness 1.964 microns is introduced in the path of one of the interfering waves. The mica sheet is then removed and the distance between the slits and screen is doubled. It is found that the distance between successive maxima now is the same as observed fringe shift upon the introduced of the mica sheet . Calculate the wavelength of the monochromatic light used in the experiment .

A. $5762\text{Å}$

B. $5825\text{Å}$

C. $6000\text{Å}$

D. $6500\text{Å}$

**Answer: C**

Watch Video Solution

**13.** Plane microwaves are incident on a long slit having a width of 5.0 cm. Calculate the wavelength of the microwaves if the first diffraction minimum is formed at $\theta = 30^\circ$.

A. $2.5cm$

B. $5cm$

C. $7.5cm$

D. $10cm$

**Answer: A**

Watch Video Solution

**14.** A screen is placed 50cm from a single slit, which is illuminated with 6000Å light. If distance between the first and third minima in the diffraction pattern is 3.0 mm, what is the width of the slit?

A. $0.1mm$

B. $0.2mm$

C. $0.4mm$

D. $0.8mm$

**Answer: B**

Watch Video Solution

**15.** A slit of width d is placed in front of a l ens of focal length 0.5m and is illuminated normally with light of wavelength $5.89 \times 10^{-7}m$. The first diffraction minima on either side of the central diffraction maximum are separated by $2 \times 10^{-3}m$ . The width d of the slit is ________m.

A. $1.47 \times 10^{-4} m$

B. $2.94 \times 10^{-4} m$

C. $1.47 \times 10^{-7} m$

D. $2.92 \times 10^{-7} m$

**Answer: B**

Watch Video Solution

**16.** Unpolarised light passes through a polariser and analyser which are at an angle of $45^\circ$ with respect to each other. The intensity of polarised light coming fromanalyse is $5W / m^2$ . The intensity of unpolarised light incident on polariset is

A. $5\sqrt{3}W / m^2$

B. $10W / m^2$

C. $20W / m^2$

D. $5\frac{\sqrt{3}}{4}W / m^2$

**Answer: C**

Watch Video Solution

**17.** A beam of ordinary light is incident on a system of four polaroids which are arranged in succession such that each polaroid is turned through $30^{\circ}$ with respect to the preceding one. The percentage of the incident intensity that emerges out from the system is appromately

A. $56\%$

B. $6.25\%$

C. $21\%$

D. $14\%$

**Answer: C**

Watch Video Solution

**18.** Two polaroid sheets are placed one over the other with their axes inclied to each other at an angle $\theta$ . If only $12.5\%$ of the intensity of the light incident on the first sheet emerges out from the second sheet, the value of $\theta$ is

A. $30^{\circ}$

B. $60^{\circ}$

C. $45^{\circ}$

D. $90^{\circ}$

**Answer: B**

Watch Video Solution

**19.** An unpolarized light is incident on a plate of refractive index $\sqrt{3}$ and the reflected light is found to be completely plane polarized. The angles of incidence and refraction are respectively

A. $60^\circ, 30^\circ$

B. $30^\circ, 60^\circ$

C. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right), 45^\circ$

D. $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right), 30^\circ$

**Answer: A**

Watch Video Solution

## Evaluate yourself - 1

**1.** In Young's double slit experiment, the ratio of maximum and minimum intensities in the fringe system is $9:1$ the ratio of amplitudes of coherent sources is

A. $9:1$

B. $3:1$

C. $2:1$

D. $1:1$

**Answer: C**

Watch Video Solution

**2.** Two waves

$y_1 = A_1 \sin(\omega t - \beta_1), y_2 = A_2 \sin(\omega t - \beta_2$

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. $|A_1 + A_2|$

**Answer: A**

Watch Video Solution

**3.** The intensity of each coherent source is $I_0$ . Which of the following gives the intensity at a point where the phase difference between the superposing waves is $\phi$

A. $I_0(1 \cos \phi)$

B. $2I_0 \cos^2(\phi/2)$

C. $2I_0(1 + \cos \phi)$

D. $I_0 \cos^2(\phi/2)$

**Answer: C**

View Text Solution

**4.** Monochromatic light of frequency $5 \times 10^{14} Hz$ travelling in vacuum enters a medium of refractive index 1.5. Its wavelength in the medium is

A. $5500Å$

B. $6000Å$

C. $4000\text{Å}$

D. $5000\text{Å}$

**Answer: C**

Watch Video Solution

**5.** In Young's experiment when sodium light of wavelength 5893 Å is used 62 fringes are visible in the vision -field. How many fringes will be visible if violet light of wave length 4358 Å is used ?

A. 54

B. 64

C. 74

D. 84

**Answer: D**

Watch Video Solution

**6.** Two light waves having the same wavelength $\lambda$ in vacuum are in phase initially. Then the first ray travels a path of length $L_1$ through a medium of refractive index $\mu_1$. Then second ray travels a path of length $L_2$ throug a medium of refractive index $\mu_2$. The two waves are then combined to observed interference effects. The phase difference between the two, when they interfere, is

A. $\frac{2\pi}{\lambda}(I_2 -_1 )$

B. $\frac{2\pi}{\lambda}(n_1 L_1 - n_2 L_2)$

C. $\frac{2\pi}{\lambda}(n_2 L_1 - n_1 L_2)$

D. $\frac{2\pi}{\lambda}\left(\frac{L_1}{n_1} - \frac{L_2}{n_2}\right)$

**Answer: B**

Watch Video Solution

**7.** In YDSE, the distance between the slits is 1 m m and screen is 25cm away from the slits . If the wavelength of light is $6000\text{Å}$ , the fringe width on the secreen is

A. 0 . 15 m m

B. 0 . 30 m m

C. 0 . 24 m m

D. 0 . 12 m m

**Answer: A**

Watch Video Solution

**8.** The path difference produced by two waves at a point is 3.75 $\mu m$ and the wavelength is 5000 Å. The point is

A. Uncertain

B. Dark

C. Partially bright

D. Bright

**Answer: B**

Watch Video Solution

**9.** Two coherent monochormatic light source are located at two vertices of an equilateral trangle. If the intensity due to each of the source independently is $1Wm^{-2}$ at the third vertex. The resultant intensity due to both the sources at that point (i.e at the third vertex) is (in $Wm^{-2}$ )

A. Zero

B. $\sqrt{2}W/m^2$

C. $2W/m^2$

D. $4W/m^2$

**Answer: D**

Watch Video Solution

Watch Video Solution

10. In young's double-slit experiment , the spacing between the slits is 'd' and the wavelength of light used is $6000\text{Å}$ If the angular width of a fringe formed on a distance screen is $1^\circ$ then calculate 'd' .

A. $1mm$

B. $0.05mm$

C. $0.03mm$

D. $0.01mm$

**Answer: C**

Watch Video Solution

11. In Young's double slit experiment, the fringe width is found to be 0.6 mm. without distrubing anything, the whole arrangment is dipped in water of refractive index $\frac{4}{3}$ the new fringe width will be

A. 0 . 30 m m

B. 0 . 40 m m

C. 0 . 53 m m

D. 0 . 2 m m

**Answer: A**

Watch Video Solution

**12.** A double slit experiment is performed with light of wavelength $500nm$. A thin film of thickness $2\mu m$ and refractive index $1.5$ is introduced in the path of the upper beam. The location of the central maximum will

A. Reman unshifled .

B. Shift downward by nearly two fringes

C. Shift upward by nearly two fringes

D. Shift downward by ten fringes

**Answer: C**

Watch Video Solution

## Evaluate yourself - 2

**1.** light of wavelength 600 nm is incident on a single slit. The first minimum of athe diffraction pattern is obtained at a distance of 4 m m from the centre. The distance between the screen and the slit is 2 m . What is the width of the slit ?

A. 0 . 1 m m

B. 0 . 3 m m

C. 0 . 5 m

D. 0 . 6m m

**Answer: B**

Watch Video Solution

**2.** A diffraction pattern is obtained using a beam of redlight. What happens if the red light is replaced by blue light

A. Bands become and farther apart

B. Bands become narrower and crowded

C. No change

D. Bands disappear

**Answer: A**

Watch Video Solution

**3.** White light may be considered to be mixture of waves of $\lambda$ ranging between $3900\text{Å}$ and $7800\text{Å}$. An oil film of thickness $10,000\text{Å}$ is examined normally by the reflected light. If $\mu = 1.4$, then the film appears bright for

A. $4000, 466\text{Å}, 5600\text{Å}, 7000\text{Å}$

B. $4308\text{Å}, 5091\text{Å}, 6222\text{Å}$

C. $4000\text{Å}, 5091\text{Å}, 5600\text{Å}$

D. $4667\text{Å}, 6222\text{Å}, 7000\text{Å}$

**Answer: B**

Watch Video Solution

## Evaluate yourself - 3

**1.** A polaroid is placed at $45^\circ$ to an incoming light of intensity $I_0$. Now the intensity of light passing through polaroid after polarisation would be

A. $I_0$

B. $I_0/2$

C. $I_0/4$

D. zero

**Answer: B**

Watch Video Solution

**2.** Light from a denser medium 1 passes to a rarer medium 2. When the angle of incidence is $\theta$ the partially reflected and refracted rays are mutually perpendicular. The critical angle will be

A. $\sin^{-1}(\cot\theta)$

B. $\sin^{-1}(\tan\theta)$

C. $\sin^{-1}(\cos\theta)$

D. $\sin^{-1}(\sec\theta)$

**Answer: B**

Watch Video Solution

**3.** Four polaroids are placed such that the optic axis of each is inclined at an angle of $30^\circ$ with the optic axis of the preceding one. If unpolarised light of intensity I_(0) falls on the first polaroid, the light transmitted from the fourth is

A. $I_0$

B. $\frac{1}{10}I_0$

C. $0.21I_0$

D. $0.93I_0$

**Answer: C**

Watch Video Solution

## C . U . Q (interference)

**1.** A plane wave front falls on a convex lens. The emergent wave front is

A. Plane

B. Cylindrical

C. Spherical diverging

D. Spherical kconverging

**Answer: D**

Watch Video Solution

**2.** When two light waves meet at a place

A. their displacements add up

B. their intensities add up

C. both will add up

D. Energy bocomes zero

**Answer: B**

Watch Video Solution

**3.** The following phenomena which is not explained by Huygens' construction of wave front is

A. refraction

B. reflection

C. diffraction

D. origin of kspectra

**Answer: D**

Watch Video Solution

**4.** A wavefront is an imaginary surface where

A. Phase is same for all points

B. Phase changes at constant rate at all points along the surface .

C. constant phase difference continuously changes between the points

D. Phase changes all over the surface

**Answer: A**

Watch Video Solution

**5.** Huygens wave theory is used

A. to determine the velocity of light

B. to find the position of the wave front

C. to determine the wavelength of light

D. to find the focal length of a lens .

**Answer: B**

Watch Video Solution

**6.** In a Laser beam the photons emitted are

A. same wavelength

B. coherent

C. of same velocity

D. All the avove

**Answer: D**

Watch Video Solution

**7.** The amplitudes of two interfering waves are 4 cm and 3 cm respectively.

If the resutant amplitude is 1 am then the interference becomes

A. constructive

B. Destructive

C. Both constructive and destructive

D. Given date is insufficient

**Answer: B**

Watch Video Solution

8. Two coherent waves are represented by $y_1 = a_1 \cos_{\omega}$ t and $y_2 = a_2 \sin_{\omega}$t. The resultant intensity due to interference will be

A. $(a_1^2 - a_2^2)$

B. $(a_1^2 + a_2^2)$

C. $(a_1 - a_2)$

D. $(a_1 + a_2)$

**Answer: B**

Watch Video Solution

9. Two light waves are represented by $y_1 = a \sin_{\omega} t$ and $y_2 = a \sin(\omega t + \delta)$. The phase of the resultant wave is

A. $2\delta$

B. $\frac{\delta}{2}$

C. $\frac{\delta}{3}$

D. $\frac{\delta}{4}$

**Answer: B**

Watch Video Solution

**10.** Laser light is considered to be coherent because it consists of

A. many wavelengths

B. uncoordinated wavelengths

C. coordinated waves of exactly the same wavelength

D. divergent beams

**Answer: C**

Watch Video Solution

**11.** Two waves having the same wave length and amplitude but having a constant phase difference with time are known as

A. identical waves

B. incoherent waves

C. coherent waves

D. collateral waves

**Answer: C**

Watch Video Solution

**12.** Light waves spreading from two sources produces steady inteference only if they have

A. congruence

B. coherence

C. same intensity

D. same amplitude

**Answer: B**

Watch Video Solution

**13.** For different independent waves are represented by

a) $Y_1 = a_1 \sin \omega_1 t$, b) $Y_2 = a_2 \sin \omega_2 t$

c) $Y_3 = a_3 \sin \omega_3 t$, d) $Y_4 = a_4 \sin\left(\omega_4 t + \frac{\pi}{3}\right)$

The sustained interference is possible due to

A. $y_1 = a_1 \sin \omega_1 t$

B. $y_2 = a_2 \sin \omega_2 t$

C. $y_3 = a_3 \sin \omega_3 t$

D. $y_4 = a_4 \sin\left(\omega_4 t + \frac{\pi}{3}\right)$

**Answer: D**

Watch Video Solution

Watch Video Solution

**14.** Interference fringes in Young's double slit experiment with monochromatic light are

A. always equispaced

B. always unequally spaced

C. both equally and unequally spaced

D. formed by a portion of the wave front

**Answer: A**

Watch Video Solution

**15.** The necessary condition for an interference by two sources of light is that:

A. two light sources must have the same wavelength

B. two point sources should have the same amplitude and same wavelength

C. two sources should have the same wavelength, nearly the same amplitude amd have a constant phase angle difference

D. the two point sources should have a randomly varying phase difference

**Answer: C**

Watch Video Solution

**16.** For the sustained interference of light, the necessary condition is that the two sources should

A. haveconstant phase difference only

B. be narrow

C. be close to each other

D. be of same amplitude with constant phase difference

**Answer: D**

Watch Video Solution

**17.** When interference of light takes place

A. Energy is created in the region of maximum intensity

B. Energy is destroyed in the region of maximum intensity

C. Conservation of energy holds good and energy is redistributed

D. Conservation of energy doesn't hold good

**Answer: C**

Watch Video Solution

**18.** Which of the following is conserved when light waves interfere

A. momentum

B. amplitude

C. energy

D. intensity

**Answer: C**

Watch Video Solution

**19.** The path difference between two interfering waves at a point on screen is $70.5$ times the wave length. The point is

A. Dark

B. Bright

C. Not possible

D. Green in colour

**Answer: A**

Watch Video Solution

**20.** Interference is produced with two coherent sources of same intensity. If one of the sources is covered with a thin film so as to reduce the intensity of light coming out of it to half, then

A. Bright fringes will be less bright and dark fringes will be less dark

B. Bright fringes will be more bright and the dark fringes will be more dark

C. Brightness of both types of the fringes will remain the same

D. Dark region will spread completely

**Answer: A**

Watch Video Solution

**21.** For constructive interference between two waves of equal wavelength, the phase angle $\delta$ should be such that

A. $\cos^2\frac{\delta}{2} = -1$

B. $\cos^2\frac{\delta}{2} = 0$

C. $\cos^2\frac{\delta}{2} = 1$

D. $\cos^2\frac{\delta}{2}$ = infinite

**Answer: C**

Watch Video Solution

**22.** Two coherent waves each of amplitude 'a' traveling with a phase difference $\delta$ when superpose with each other the resultant intensity at a given point on the screen is

A. $a^2(1 + \cos\delta)$

B. $4a^2(1 + \cos\delta)$

C. $2a^2(1 + \cos\delta)$

D. $(1 + \cos\delta)$

**Answer: C**

Watch Video Solution

**23.** In young's experiment of double slit, the number of times the intensity of the central bright band greater than the individual intensity of the interfering waves

A. 2

B. 4

C. 6

D. 16

**Answer: B**

Watch Video Solution

**24.** 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. hypcrbola

D. circle

**Answer: C**

Watch Video Solution

**25.** The contrast in the fringes in any interference pattern depends on:

A. fringe width

B. wave length

C. intensity of the sources

D. distance between the sources.

**Answer: C**

Watch Video Solution

**26.** If monochromatic red light is replaced by green light the fringe width becomes

A. increases

B. remain same

C. we cannot say

D. decreases

**Answer: D**

Watch Video Solution

**27.** Interference was observed in interference chamber, when air was present. Now the chamber is evacuated, and if the same light is used, a careful observer will see

A. no interference

B. interference with central bright band

C. interference with central dark band

D. interference in which breadth of the fringe will be slightly increased

.

**Answer: B**

Watch Video Solution

**28.** In young's experiment with white light central fringe is white. If now a transparent film is introduced in the upper beam coming from the top, slit, the white fringe

A. moves down ward

B. moves upward

C. remains at the same place

D. totally disappears

**Answer: B**

Watch Video Solution

**29.** In young's double slit experiment the slits are of different length and widths. The amplitude of the light waves is directly proportional to the

A. length of the slit

B. distance between the slits

C. area of the slits

D. width of slits

**Answer: C**

Watch Video Solution

**30.** In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then, in the interference pattern

A. The intensities of both the maxima and the minima increase

B. The intensity of the maxima increases and the minima has zero intensity

C. The intensity of the maxima decreases and that of the minima increases

D. The intensity of the maxima decreases and the minima has zero intensity .

**Answer: A**

Watch Video Solution

**31.** When the width of slit aperture is increased by keeping 'd' as constant in Young's experiment .

A. Fringe width will increase

B. Fringe width will decrease and then increase

C. Fringe width first fringes will be merge

D. Gradually the fringes will be merge

**Answer: C**

View Text Solution

**32.** When viewed in white light, soap bubbles show colours because of

A. Interference

B. Scattering

C. diffraction

D. Dispersion

**Answer: A**

Watch Video Solution

**33.** When petrol drops from a vehicle fall over rain water on road surface colours are seen because of

A. Dispersion of light

B. Interference of light

C. Scattering of light

D. Absorption of light

**Answer: B**

View Text Solution

**34.** In young's double slit experiment, the distance of the n-th dark fringe from the centre is

A. $n\left(\frac{\lambda D}{2d}\right)$

B. $n\left(\frac{2d}{\lambda D}\right)$

C. $(2n-1)\frac{\lambda D}{2d}$

D. $(2n-1)\frac{4d}{\lambda D}$

**Answer: C**

Watch Video Solution

**35.** When a thin film of thickness t is placed in the path of light wave emerging out of the slit , then increase in the length of optical path will be

A. $(\mu-1)t$

B. $(\mu+1)t$

C. $\mu t$

D. $\frac{\mu}{t}$

**Answer: A**

View Text Solution

**36.** A Young's double slit experiment is performed with white light, then

A. the central maximum will be dark

B. there will not be completely dark fringe

C. the fringe next to the central bright band will be red

D. the fringe to the central will be violet

**Answer: C**

Watch Video Solution

**37.** Which of the following decides about the contrast between bright and dark fringes in an interference experiment ?

A. wavelength

B. distance between two coherent sources

C. fringe width

D. intensity ratio

**Answer: D**

View Text Solution

**38.** If a torch is used in place of monochromatic light in Young's experiment what will happen?

A. Fringe will occure as from monochromatic souce

B. Fringe will appear for a moment and then it will disappear

C. No fringes will appear

D. Only bright fringe will appear

**Answer: C**

Watch Video Solution

**39.** At a finite distance from the source, a point source of light produces

A. spherical wave front

B. plane wavefront

C. cylindrical wavefront

D. both spherical and plane wavefronts

**Answer: A**

Watch Video Solution

**40.** Nature of wave front depends on

A. shape of source

B. distance of source

C. both 1 and 2

D. none of these

**Answer: C**

Watch Video Solution

**41.** A Young's double-slit set-up for interference shifted from air to within water. Then the

A. Fringe width decreases

B. Fringe width increases

C. Fringe width remains same

D. Fringe system disappears

**Answer: A**

Watch Video Solution

**42.** In Young's double slit experiment the phase difference between the waves reaching the central fringe and fourth bright fringe will be

A. Zero

B. $4\pi$

C. $6\pi$

D. $8\pi$

**Answer: D**

Watch Video Solution

**43.** Instead of using two slits as in Young's experiment, if we use two separate but identical sodium lamps, which of the following will occur?

a) uniform illuminations is observed

b) widely separate interference

c) very bright maximum

d) very minimum

A. a only

B. a, b only

C. c, d only

D. b, d only

**Answer: A**

Watch Video Solution

**44.** Alternate bright and dark fringes appear in Young's double slit experiment due to the phenomenon of

A. Polarisation

B. Diffraction

C. Interference

D. Dispersion

**Answer: C**

Watch Video Solution

## C . U . Q (Diffraction light)

**1.** The bending of light about corners of an obstacle is called

A. Dispersion

B. Refraction

C. Deviation

D. Diffraction

**Answer: D**

Watch Video Solution

**2.** To observe diffraction, the size of the obstacle

A. should be of the same order as wave length

B. Should be must larger than the wave length

C. Has no relation to wave length

D. May be greater or smaller than the wave length

**Answer: A**

Watch Video Solution

**3.** In diffraction pattern the fringes are of

A. The fringe widths are equal

B. The fringe widths are not equal

C. The fringes can not be produced

D. The fringe width may or may not be equal

**Answer: B**

Watch Video Solution

**4.** Sun light filtering through a tree leaves often makes circular patches on the ground because

A. The sun is round

B. The space through which light penetrates is round

C. Light is transverse in nature

D. Of diffraction effects

**Answer: D**

Watch Video Solution

**5.** In studying diffraction pattern of different obstacles, the effect of

A. full wave front is studied

B. portion of a wave front is studied

C. waves from two coherent sources is studied

D. waves from one of the coherent source is studied

**Answer: B**

Watch Video Solution

**6.** Both light and soucnd waves produced diffraction. It is more difficult to bserve the diffraction with light waves because

A. Light wave do not require medium

B. Wavelength of light waves is far smaller

C. Light waves are transverse

D. Speed of light is far greater

**Answer: B**

Watch Video Solution

**7.** In Young's double slit experiment

A. only interference occurs

B. only diffraction occurs

C. both interference and diffraction occurs

D. polarisation occurs

**Answer: C**

Watch Video Solution

**8.** Light travels in a straight line because

A. it is not absorbed by atmosphere

B. its velocity is very high

C. diffraction effect is negligible

D. due to interference

**Answer: C**

Watch Video Solution

**9.** One of the following statements is correct. Pick out the one

A. Diffraction can not take place without interference

B. Interference will not take place with out diffraction.

C. Interference and diffraction are the result of polarization

D. The fringe width in Young's double slit experiment does not depends on the wave length

**Answer: A**

Watch Video Solution

**10.** Diffraction of light is

A. the bending of light at the surface of separation when it travels from rarer medium of denser medium

B. the bending of light at the surface of separation when it travels from denser medium to rarer medium

C. encroachment of light into the geometrical shadow of the obstacle placed in its path

D. emergence of a light ray grazing the surface of separation when it travels from denser to rarer medium

**Answer: C**

Watch Video Solution

**11.** Pick out the correct statement

A. diffracton is exhibited by all electromagnetic waves but not by mechanical waves

B. diffraction cannot be observed with a plane polarized light

C. the limit of resolution of a microscope devreases with increase in the wavelength of light used

D. the width of central maximumin the diffraction pattern due to single slit increases as wavelength increases

**Answer: D**

Watch Video Solution

**12.** A lens of focal length f gives diffraction pattern of Fraunhoffer type of a slit having width a. If wavelength of light is $\lambda$, the distance of first dark band and next bright band from axis is given by

A. $\frac{a}{\lambda}f$

B. $\frac{\lambda}{a}f$

C. $\frac{\lambda}{af}$

D. $a\lambda f$

**Answer: B**

Watch Video Solution

13. The class of diffraction in which incident and diffracted wave fronts are planar is called

A. Fresnel diffraction

B. Fraunho fferdiffraction

C. Huygen's diffraction

D. Newton's diffraction

**Answer: B**

Watch Video Solution

14. Neutron diffraction pattern is used to determine

A. Density of solids

B. Atomic number of elements

C. Crystal structure of solid

D. Refractive index of liquid

**Answer: C**

Watch Video Solution

15. Geometrical shadow is formed due to the phenomenon of

A. Diffraction of light

B. Polarisation of light

C. Interference of light

D. Redtilinear propagation of light

**Answer: D**

View Text Solution

**16.** The surface of crystals can be studied using

A. diffraction of visible light

B. diffraction of x-rays

C. interference of sound waves

D. refraction of radio waves

**Answer: B**

Watch Video Solution

**17.** The diffraction bands observed in the case of straight edge producing diffraction effects are

A. equally spaced like the interference bands but with less contrast

B. unequally spaced with increasing width as we move away from the edge of geometric shadow

C. unequally spaced with decreasing width as we move away from the edgo of geometric shadow

D. equally spaced like the interference bands but with more contrast

**Answer: C**

Watch Video Solution

**18.** As we move away from the edge into the geometrical shadow of a straight edge, the intensity of illumination

A. Decreases

B. Increases

C. Remains unchanged

D. Increase and then decreases

**Answer: A**

Watch Video Solution

**19.** In Fresnel's diffraction , wavefront must be

A. spherical

B. Cylindrical

C. plane

D. both 1 and 2

**Answer: D**

View Text Solution

## C . U . Q (Resolving power)

**1.** What is the resolving power of human eye.

A. $\approx 1$

B. $\approx 1^0$

C. $\approx 10$

D. $\approx 5$

**Answer: A**

Watch Video Solution

**2.** Resolving power of a telescope increases with

A. Increases in focal length of eye piece

B. Increase in forcal length of objective

C. Increase in aperture of eye piece

D. Incerease in apperture of objective

**Answer: D**

Watch Video Solution

**3.** To increase both the resolving power and magnifying power of a telecscope

A. Both the focal length and apperture of the objective has to be increased

B. The focal length of the objective has to bein creased

C. The aperture of the objective has to be increased

D. The wavelength of light has to be decreased

**Answer: D**

Watch Video Solution

## C . U . Q (Polarisation)

**1.** Waves that cannot be polarised are

A. Longitudinal

B. Transverse

C. E,ectrp,agmetic

D. Light

**Answer: A**

Watch Video Solution

**2.** Human eye

A. Can detect polarised light

B. Can not detect polarisation of light

C. Can detect only circularly polarised light

D. Can detect only linearly polarised light

**Answer: B**

View Text Solution

**3.** Polarisation of light was first successfully explained by

A. Corpuscular theory

B. Huygens's wave theroy

C. Electromagnetic wave theory

D. Planck's theory

**Answer: C**

Watch Video Solution

**4.** Plane of polarisation is

A. The plane in which vibrations of the electric vector takes place

B. A plane perpenicular to the plane in which vibrations of the electric vector takes place

C. Is perpendicular to the plane of vibration

D. Horizontal plane

**Answer: A**

Watch Video Solution

**5.** In the propagation of polarised light waves, the angle between the plane of vibration and the plane of polarization is

A. $0^0$

B. $90^0$

C. $45^0$

D. $180^0$

**Answer: B**

Watch Video Solution

**6.** Transverse wave nature is established by

A. Interference

B. Diffraction

C. Polarization

D. All the avove

**Answer: C**

Watch Video Solution

**7.** Choose the correct statement .

A. The Brewster's angle is independent of wavelength of light

B. the Brewster's angle is independent of the nature of reflecting surface

C. the Brewster's angle is different for different wavelengths

D. Breswster's angle depends on wavelength but not on the nature of reflecting surface.

**Answer: C**

View Text Solution

**8.** The polarising angle for glass is

A. same for different kinds of glass

B. different for different kinds of glass

C. same for lights of all colours

D. varies with time

**Answer: B**

Watch Video Solution

**9.** When an unpolarised light is polarized, then the intensity of light of the polarized waves

A. remains same

B. doubled

C. halved

D. depends on the colour of the light.

**Answer: C**

Watch Video Solution

**10.** Unpolarised light is incident on two polarizing sheets which are so oriented that no light is transmitted. If a third polarizing sheet is placed between them, not parallel to either of the above two sheets in question

A. no light is transmitted

B. some light is transmitted

C. light may or may not be transmitted

D. certainly 50% light is transmitted

**Answer: B**

Watch Video Solution

**11.** When light falls on two polaroid sheets, one observes complex brightness. Then the two polaroids axes are

A. Mutually perpendicular

B. Mutually parallel

C. Angle between their two axes is $45^0$

D. None of the above

**Answer: D**

Watch Video Solution

**12.** Polaroid are used

A. to climinate head light glare in automobile

B. in production of 3-D motion pictures

C. in sun glasses

D. All the avove

**Answer: D**

Watch Video Solution

**13.** A diffraction pattern is obtained using a beam of redlight. What happens if the red light is replaced by blue light

A. no change

B. diffraction bands become narrower and crowded together

C. bands beome broader and farther apart

D. Bands disappear

**Answer: B**

Watch Video Solution

**14.** In a diffraction pattern the width of any fringe is

A. directly proportional to slit width

B. inversely proportional to slit width

C. Independent of the slit width

D. None of the above

**Answer: B**

Watch Video Solution

**15.** Yellow light is used in a single slit of diffraction experiment with slit width $0.6mm$. If yellow light is replaced by X-rays then the observed pattern will reveal

A. that the central maximum is narrower

B. more number of fringes

C. less number of fringes

D. no diffraction patterns

**Answer: D**

Watch Video Solution

**16.** A star is going away from the earth. An observer on the earth will see the wavelength of light coming from the star

A. decreased

B. increased

C. neither decreased nor increased

D. decreased or increased depending upon the velocity of the star

**Answer: B**

Watch Video Solution

**17.** Red shift is an illustration of

A. low temperature emission

B. high frequency absorption

C. Doppler effect

D. unknown phenomenon

**Answer: C**

Watch Video Solution

**18.** If the shift of wavelength of light emitted by a star is towards violet, then this shows that star is

A. stationary

B. moving towards earth

C. moving away from earth

D. Information is incomplete

**Answer: B**

Watch Video Solution

**19.** When there is a relative motion of an observer from a source of light, the apparent change in its wavelength is termed as

A. Raman effect

B. Seebeck effect

C. Doppler's effect

D. Gravitational effect

**Answer: C**

Watch Video Solution

**20.** In the context of Doppler effect in light, the term red shift signifies

A. decreasesin frequency

B. increase in frequency

C. decreases in intensity

D. increase in intensity

**Answer: A**

Watch Video Solution

**21.** As we change the colour of light from Red to Blue, which of the following is correct for the polarizing angle and critical angle of glass ?

A. the formaer increases, the latter decreases

B. the former decreases, the latter increases

C. the former increases, the latter increases

D. the former decreases, the latter decreases

**Answer: A**

Watch Video Solution

**22.** Atmospheric refraction is due to

A. changing pressure in the atmosphere

B. varying density of atmosphere

C. varying temperature of the atmosphere

D. both (2) and (3)

**Answer: D**

Watch Video Solution

**23.** Which of the following phenomenon is not common to sound and light waves

A. Interferenec

B. Diffraction

C. Polarisation

D. Reflection

**Answer: B**

Watch Video Solution

**24.** Polarisation can be produced by

A. Reflection

B. Refracton

C. Scattering

D. All the avove

**Answer: D**

Watch Video Solution

**25.** An unpolarised light is incident on a surface separating two transparent media of different optical densities at the polarizing angle. Then the reflected ray and refracted ray are

A. parallel to each other

B. perpendicular to each other

C. inclined to each other making an angle $45^0$

D. None of the above

**Answer: B**

Watch Video Solution

**26.** The intensity of the polarized transmitted through the analyzer is given by

A. Brewster's law

B. Malus Law

C. Fresnel's assumptions

D. law of superposition

**Answer: B**

Watch Video Solution

## Exercise - 1 (C.W) Interference

**1.** The displacements of two intering lightwaves are $y_1 = 4\sin\omega t$ and $y_2 = 3\cos(\omega t)$. The amplitude of the resultant wave is ($y_1$ and $y_2$ are in CGS system)

A. 5 cm

B. 7 cm

C. 1 cm

D. zero

**Answer: A**

Watch Video Solution

**2.** 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. $625:1$

**Answer: C**

Watch Video Solution

**3.** Two sources of intensity 2I and 8I are used in an interference experiment. The intensity at a point where the waves from two sources superimpose with a phase difference of (a) zero (b) $\pi/2$ and $(c)\pi$ is

A. $18I, 10I, 2I$

B. $5I, 4I, I$

C. $2I, I, \frac{I}{2}$

D. $2I, 10I, 18I$

**Answer: A**

Watch Video Solution

**4.** The intensity of interference waves in an interference pattern is same as $I_0$. The resultant intensity at any point of observation will be

A. $I = 2I_0[1 + \cos\phi]$

B. $I = I_0[1 + \cos\phi]$

C. $I = \frac{[1 + \cos \phi]}{I_0}$

D. $I = \frac{[1 + \cos \phi]}{2I_0}$

**Answer: A**

Watch Video Solution

5. In Young's double slit experiment, the constant phase difference between two source is $\frac{\pi}{2}$. The intensity at a point equidistant from the slits in terms of maximum intensity $I_0$ is

A. $I_0$

B. $I_0 / 2$

C. $3I_0 / 4$

D. $3I_0$

**Answer: B**

Watch Video Solution

**6.** The path difference between two interfering waves at a point on the screen is $\lambda/6$, The ratio of intensity at this point and that at the central bright fringe will be (assume that intensity due to each slit is same)

A. $0.75$

B. $7.5$

C. $85.3$

D. 853

**Answer: A**

Watch Video Solution

**7.** In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength $600nm$ is used. If the wavelength of light is changed to $400nm$, number of fringes observed in the same segment of the screen is given by

A. 12

B. 18

C. 24

D. 8

**Answer: B**

Watch Video Solution

**8.** A double slit apparatus is immersed in a liquid of refractive index 1.33. it has slit separation of 1 mm and distance between the plane of the slits and the screen is 1.33 m. the slits are illuminated by a parallel beam of light whose wavelength in air is 6300 Å. what is the fringe width?

A. $(1.33 \times 0.63)$ m m

B. $\frac{0.63}{1.33}$ m m

C. $\frac{0.63}{(1.33)^2}$ m m

D. $0.63mm$

**Answer: D**

Watch Video Solution

**9.** The fringe width at a distance of 50 cm from the slits in Young's experiment for light of wavelength $6000\text{Å}$ is $0.048 cm$. The fringe width at the same distance for $\lambda = 5000\text{Å}$ will be

A. 0 . 04 cm

B. 0 . 4 cm

C. 0 . 14 cm

D. 0 . 45 cm

**Answer: A**

Watch Video Solution

**10.** In young's double slit experiment the slits are illumated by light of wavelength $5890^\circ$ A and the distance between the fringes obtained on the screen is $0.2^\circ$. If the whole apparatus is immersed in water then the angular fringe width will be, if the refractive index of water is $4/3$

A. $0.30^0$

B. $0.15^0$

C. $15^0$

D. $30^0$

**Answer: B**

Watch Video Solution

**11.** A plate of thickness t made of material of refractive index $\mu$ is placed in front of one of the slits in a double slit experiment . What should be the minimum thickness t which will make the intensity at the centre of the fringe pattern zero ?

A. $(\mu-1)\frac{\lambda}{2}$

B. $(\mu-1)\lambda$

C. $\frac{\lambda}{2(\mu-1)}$

D. $\frac{\lambda}{(\mu-1)}$

**Answer: C**

View Text Solution

**12.** In Young's double-slit experiment, the separation between the slits is halved and the distance between the slits and the screen in doubled. The fringe width is

A. unchanged

B. halved

C. doubled

D. quadrupled

**Answer: D**

Watch Video Solution

**13.** The maximum number of possible interference maxima for slit-separation equal to twice the wavelength in Young's double-slit experiment is

A. infinite

B. five

C. three

D. zero

**Answer: B**

Watch Video Solution

**14.** Two identical coherent sources produce a zero order bright fringe on a screen. If $\beta$ is the band width, the minimum distance between two points on either side of the bright where the intensity is half that of maximum intensity is

A. b/2

B. b/4

C. b/3

D. b/6

**Answer: B**

Watch Video Solution

**15.** In Young's double slit experiment, the 8th maximum with wavelength $\lambda_1$ is at a distance $d_1$ from the central maximum and the 6th maximum with a wavelength $\lambda_2$ is at a distance $d_2$. Then $(d_1 / d_2)$ is equal to

A. $\frac{4}{3}\left(\frac{\lambda_2}{\lambda_1}\right)$

B. $\frac{4}{3}\left(\frac{\lambda_1}{\lambda_2}\right)$

C. $\frac{3}{4}\left(\frac{\lambda_2}{\lambda_1}\right)$

D. $\frac{3}{4}\left(\frac{\lambda_1}{\lambda_2}\right)$

**Answer: B**

Watch Video Solution

## Exercise - 1 (C.W) Diffraction

**1.** First diffraction minima due to of a single slit diffraction is at $\theta = 30^\circ$ for a light of wavelength $6000\text{Å}$. The width of slits is

A. $1 \times 10^{-6} cm$

B. $1.2 \times 10^{-6} cm$

C. $2 \times 10^{-6} cm$

D. $2.4 \times 10^{-6} m$

**Answer: B**

Watch Video Solution

**2.** Angular width of central maxima is $\pi/2$, when a slit of width 'a' is illuminated by a light of wavelength $7000\text{Å}$ then a =

A. $9 \times 10^{-9} m$

B. $8.9 \times 10^{-7} m$

C. $9 \times 10^{-7} m$

D. $3.5 \times 10^{-7} m$

**Answer: B**

Watch Video Solution

## Exercise -1 (C.W) Diffraction

**1.** In a single slit diffraction, the width of slit is $0.5cm$, focal lengths of lens is 40 cm and wavelength of light is $4890\text{Å}$. Distance of first dark fringe is

A. $2 \times 10^{-5}m$

B. $4 \times 10^{-5}m$

C. $6 \times 10^{-5}m$

D. $8 \times 10^{-5}m$

**Answer: B**

Watch Video Solution

## Exercise - 1 (C.W) Diffraction

**1.** The sun subtends an angle of $(1/2)^{\circ}$ on earth. The image of sun is obtained on the screen with the help of a convex lens of focal length 100 cm the diameter of the image obtained on the screen will be

A. 18 cm

B. 1 m m

C. 50 cm

D. 8 . 73 mm

**Answer: D**

Watch Video Solution

## Exercise -1 (C.W) Resolving power

**1.** The limit of resolution of microscope, if the numerical aperture of microscope is $0.12$, and the wavelength of light used is 600 nm, is

A. $0.3\mu m$

B. $1.\ 2\nu m$

C. $2.\ 5\mu m$

D. $3\mu m$

**Answer: D**

Watch Video Solution

## Exercise - 1 (C.W) Resolving power

**1.** The least resolvable angle by a telescope using objective of aperture 5 m is nearly $(\lambda = 400\text{Å})$

A. $\frac{1}{50^0}$

B. $\frac{1}{50}$ minute

C. $\frac{1}{50}$sec

D. $\frac{1}{500}$ sec

**Answer: C**

Watch Video Solution

**2.** Wavelength of light used in an optical instrument are $\lambda_1 = 4000 \text{Å}$ and $\lambda_2 = 5000 \text{Å}$ then ratio of their respective resolving powers (corresponding to $\lambda_1$ and $\lambda_2$) is

A. $16 : 25$

B. $9 : 1$

C. $4 : 5$

D. $5 : 4$

**Answer: D**

Watch Video Solution

## Exercise - 1 (C.W) Polarisation

**1.** The angle of incidence at which reflected light is totally polarized for reflection from air to glass (refraction index n ) is

A. $\sin^{-1}(n)$

B. $\sin^{-1}(1/n)$

C. $\tan^{-1}(1/n)$

D. $\tan^{-1}(n)$

**Answer: D**

Watch Video Solution

**2.** A light is incident on a transparent medium of $\mu = 1.732$ at the polarising angle. The angle of refraction is

A. $60^0$

B. $30^0$

C. $45^0$

D. $90^0$

**Answer: B**

Watch Video Solution

**3.** A ray of light in air is incident on a glass plate at polarising angle of incidence. It suffers a deviation of $22^\circ$ on entering glass. The angle of polarization is

A. $90^0$

B. $56^0$

C. $68^0$

D. zero

**Answer: B**

Watch Video Solution

**4.** The critical angle for total internal reflection for a substance is $45^\circ$. The polarizing angle for this substance is $\left(\tan 54^\circ 44' = \sqrt{2}\right)$

A. $46^0 16^1$

B. $54^0 44^1$

C. $46^0 44^1$

D. $54^0 16^1$

**Answer: B**

Watch Video Solution

**5.** Unpolarized light of intensity $I_0$ is incident on a polarizer and the emerging light strikes a second polarizing filter with its axis at $45^0$ to that of the first . The intensity of the emerging beam

A. $\frac{I_0}{2}$

B. $\frac{I_0}{4}$

C. $I_0$

D. $\frac{I_0}{3}$

**Answer: B**

View Text Solution

**6.** The axes of the polariser and analyser are inclined to each other at $60^\circ$. If the amplitude of polarised light emergent through analyser is A. The amplitude of unpolarised light incident polariser is

A. $\frac{A}{2}$

B. A

C. 2A

D. $2\sqrt{2}A$

**Answer: D**

Watch Video Solution

**7.** Unplarised light of intensity I is incident on a polarizer and the emerging light strikes a second polarizing filter with its axis at $45^0$ to that the first . Determine

(a) the intensity of the emerging beam and

(b) its state of polarization

A. $\frac{I}{4}$ and parallel to second filter

B. $\frac{I}{4}$ and perpendicular to second filter

C. $\frac{I}{8}$ and parallel to second filter

D. $\frac{I}{8}$ and perpendicular to second filter

**Answer: A**

View Text Solution

## Exercise - 1 (C.W) Huygen. s principle

**1.** A parallel beam of width 'a' is incident on the surface of glass slab $(\mu = 3/2)$ at an angle 'I' and the angle of refraction in glass is 'r'. The width of the refracted parallel beam will be

A. equal to a

B. less than a

C. more than a

D. exactly 2a / 3

**Answer: C**

Watch Video Solution

## Exercise -1 (C.W) Huygen. s principle

**1.** When a parallel beam of monochromatic light suffers refraction while going from a rarer medium into a denser medium, which of the following are correct ?

a) the width of the beam decreases

b) the width of the beam increases

c) the refracted beam makes more angle with the interface

d) the refracted beam makes less angle with the interface

A. a,c true

B. b,d true

C. a, d true

D. b,c true

**Answer: D**

Watch Video Solution

## Exercise -1 (C.W) Huygen. s principle

**1.** A parallel beam of light in incident on a liquid surface such that the wave front makes an angle $30^\circ$ with of the surface and has a width of

$\sqrt{3}m$ , the width of the refracted beam is ____

$\left(\cdot_a \mu_L = \sqrt{3}\right)$

A. 3 m

B. $\sqrt{3}m$

C. $\frac{\sqrt{11}}{3}m$

D. $\sqrt{\frac{11}{3}}$ m

**Answer: A**

Watch Video Solution

## Exercise - 1 (H.W) Interference

**1.** The displacements of two interfering light waves are $y_1 = 2\sin\omega t$ and $y_2 = 5\sin\left(\omega t + \frac{\pi}{3}\right)$ the resultant amptitude is

A. 39 cm

B. $\sqrt{39}$ cm

C. 7 cm

D. $\sqrt{29}$ cm

**Answer: B**

Watch Video Solution

**2.** The intensity ratio of two waves is $9 : 1$. If they produce interference, the ratio of maximum to minimum intensity will be

A. $4 : 1$

B. $2 : 1$

C. $9 : 1$

D. $3 : 2$

**Answer: A**

Watch Video Solution

**3.** Two beam of light having intensities I and 4I interfere to produce a fringe pattern on a screen. The phase difference between the beams is $\frac{\pi}{2}$ at point A and $\pi$ at point B. Then the difference between resultant intensities at A and B is : $(2001, 2M)$

A. 2I

B. 4I

C. 5I

D. 7I

**Answer: B**

Watch Video Solution

**4.** The maximum intensity in Young's double slit experiment is $I_0$ . What will be the intensity of light in front of one the slits on a screen where path difference is $\frac{\lambda}{4}$ ?

A. $\frac{I_0}{2}$

B. $\frac{3}{4}I_0$

C. $I_0$

D. $\frac{I_0}{4}$

**Answer: A**

Watch Video Solution

**5.** In Young's double slit experiment, we get $60$ fringes in the field of view of monochromatic light of wavelength $4000\text{Å}$. If we use monochromatic light of wavelength $6000\text{Å}$, then the number of fringes obtained in the same field of view is

A. 60

B. 90

C. 40

D. $1.5$

**Answer: C**

Watch Video Solution

**6.** The separation between successive fringes in a double slit arrangement is x. If the whole arrangement is dipped under water, what will be the new fringe separation ? [The wavelength of light being used is $5000\text{Å}$]

A. $1.5$x

B. x

C. 0 . 75 x

D. 2 x

**Answer: C**

Watch Video Solution

7. In the Young's double slit experiment , a mica slip of thickness t and refractive index $\mu$ is introduced in the ray from first source $S_1$ . By how much distance fringes pattern will be displaced ? (d = distance between the slits and D is the distance between slits and screen)

A. $\frac{d}{D}(\mu-1)t$

B. $\frac{D}{d}(\mu-1)t$

C. $\frac{d}{(\mu-1)D}$

D. $\frac{D}{d}(\mu-1)$

**Answer: B**

Watch Video Solution

8. In young's double slit experiment, the 10th maximum of wavelength $\lambda_1$, is at a distance of $y_1$ from the central maximum. When the wavelength of the source is changed to $\lambda_2$, $5^{th}$ 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. $\frac{\lambda_2}{2\lambda_1}$

**Answer: A**

Watch Video Solution

**9.** Two coherent monochormatic light source are located at two vertices of an equilateral trangle. If the intensity due to each of the source independently is $1Wm^{-2}$ at the third vertex. The resultant intensity due to both the sources at that point (i.e at the third vertex) is (in $Wm^{-2}$ )

A. Zero

B. $\sqrt{2}$

C. 2

D. 4

**Answer: D**

Watch Video Solution

## Exercise - 1 (H.W) Diffraction

**1.** Light of wavelength $6000A^{\circ}$ is incident on a single slit. The first minimum of the diffraction pattern is obtained at 4 mm from the centre. The screen is at a distance of 2 m from the silt. The slit width will be

A. 0 . 3 m m

B. 0 . 2 m m

C. 0 . 15 m m

D. 0 . 1m m

**Answer: A**

Watch Video Solution

**2.** A plane wave of wavelength 6250 $\text{Å}$ is incident normally on a slit of width $2 \times 10^{-2}$ cm. The width of the principal maximum on a screen distant 50 cm will be

A. $312.5 \times 10^{-2}$ cm

B. $312.5 \times 10^{-4}$ cm

C. 312 cm

D. $312 \times 10^{-5}$ cm

**Answer: A**

Watch Video Solution

**3.** The distance between the first and the sixth minima in the diffraction pattern of a single slit is 0.5 mm. The screen is 0.5 m away from the slit. If the wavelength of light used is 5000 Å. Then the slit width will be

A. 5 m m

B. 2 . 5 m m

C. 1.25 m m

D. 1.0 m m

**Answer: B**

Watch Video Solution

## Exercise - 1 (H.W) Resolving power

**1.** The diameter of an objective of a telescope, which can just resolve two stars situated at angular displacement of $10^{-4}$ degee, should be $(\lambda = 5000Å)$

A. 35 mm

B. 35 cm

C. 35 m

D. 3 . 5 cm

**Answer: B**

Watch Video Solution

**2.** A telescope is used to resolve two stars separated by $4.6 \times 10^{-6}$ rad. If the wavelength of light used is $5460\text{Å}$ , what should be the aperture of the objective of the telescope ?

A. 0 . 448 m

B. 0 . 1448 m

C. 1 . 1448 m

D. 0 . 0 11 m

**Answer: B**

Watch Video Solution

**3.** Two point sources distant $0.1$ meter away viewed by a telescope. The objective is covered by a screen having a hole of 1 mm width. If the wavelength of the light used is $6500\text{Å}$ , then maximum distance at which the two sources are seen just resolved, will be nearly

A. 125.0 m

B. 164 m

C. 131 m

D. 144 m

**Answer: A**

Watch Video Solution

## Exercise - 1 (H.W) Polarisation

**1.** Two polaroids are kept crossed to each other. Now one of them is rotated through an angle of $45^{\circ}$ . The percentage of incident light now transmitted through the system is

A. $15\%$

B. $25\%$

C. $50\%$

D. $60\%$

**Answer: B**

Watch Video Solution

**2.** The amplitude of polarised light transmitted through a polariser is A. The amplitude of unpolarised light incident on it is

A. A/2

B. $A/\sqrt{2}$

C. $2A$

D. $\sqrt{2}A$

**Answer: D**

Watch Video Solution

**3.** Unpolarised light of intensity 32 $W/m^2$ passes through a polariser and analyser which are at an angle of $30^\circ$ with respect to each other. The intensity of the light coming from analyser is

A. $16\sqrt{3}W/m^2$

B. $12W/m^2$

C. $16W/m^2$

D. $14W/m^2$

**Answer: B**

Watch Video Solution

**4.** The critical angle of a transparent crystal is $60^\circ$. Then its polarizing angle is

A. $\theta = \tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$

B. $\theta = \sin^{-1}(\sqrt{2})$

C. $\theta = \cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

D. $\theta = \cot^{-1}(\sqrt{2})$

**Answer: A**

Watch Video Solution

**5.** When an unpolarized light of intensity $I_0$ is incident on a polarizing sheet, the intensity of the light which does not get transmitted is

A. $1/2I_0$

B. $1/4I_0$

C. zero

D. $I_0$

**Answer: A**

Watch Video Solution

## Exercise - 2 (C . W) Interference

**1.** In Young's double slit experiment the intensity of light at a point on the screen where the path difference is $\lambda$ is K . The intensity of light at a point where the path difference is $\frac{\lambda}{3}$ [ $\lambda$ is the wavelength of light used ] is

A. K / 4

B. K / 3

C. K / 2

D. K

**Answer: A**

View Text Solution

**2.** In YDSE, having slits of equal width, let $\beta$ be the fringe width and $I_0$ be the maximum intensity. At a distance x from the central brigth fringe, the intensity will be

A. $I_0 \cos\left(\frac{x}{\beta}\right)$

B. $I_0 \cos^2\left(\frac{x}{\beta}\right)$

C. $I_0 \cos^2\left(\frac{\pi x}{\beta}\right)$

D. $\frac{I_0}{4}\cos^2\left(\frac{\pi x}{\beta}\right)$

**Answer: C**

Watch Video Solution

**3.** In a Young's double slit interference experiment the fringe pattern is observed on a screen placed at a distance D from the slits. The slits are separated by a distance d and are illuminated by monochromatic light of wavelength $\lambda$. Find the distance from the central point where the intensity falls to (a) half the maximum, (b) one fourth of the maximum.

A. $\frac{\lambda D}{3d}$

B. $\frac{\lambda D}{2d}$

C. $\frac{\lambda D}{d}$

D. $\frac{\lambda D}{4d}$

**Answer: D**

Watch Video Solution

**4.** In a double slit experiment , the slit separation is $0.20$ cm and the slit to screen distance is 100 cm. The positions of the first three minima, if wavelength of the source is 500 nm is

A. $\pm 0.125cm, \ \pm 0.375cm, \ \pm 0.\ 625cm$

B. $\pm 0.025cm, \ \pm 0.075cm, \ \pm 0.125cm$

C. $\pm 12.5cm, \ \pm 37.\ 5cm, \ \pm 62.\ 5cm$

D. $\pm 1.25cm, \ \pm 3.75cm, \ \pm 6.25cm$

**Answer: A**

Watch Video Solution

**5.** In Young's double slit experiment, the fringes are displaced 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. $2.25$

B. $2.0$

C. $1.75$

D. $1.25$

**Answer: C**

Watch Video Solution

**6.** A double slit experiment is performed with light of wavelength $500nm$. A thin film of thickness $2\mu m$ and refractive index $1.5$ is introduced in the path of the upper beam. The location of the central maximum will

A. remain unshifted

B. Shift downward by nearly two fringes

C. Shift upward by nearly two fringes

D. shift downward by 10 fringes

**Answer: C**

Watch Video Solution

**7.** In Young's double slit experiment, an interference pattern is obtained on a screen by a light of wavelength 6000 $\overset{\circ}{A}$ coming from the coherent sources $S_1$ and $S_2$. At certain point P on the screen third dark fringe is formed. Then, the path difference $S_1P - S_2P$ in micron is

A. $0.75$

B. $1.5$

C. $3.0$

D. $4.5$

**Answer: B**

Watch Video Solution

**8.** In double slit experiment fringes are obtained using light of wavelength $4800\text{Å}$ One slit is covered with a thin glass film of refractive index. $1.4$ and another slit is covered by a film of same thickness but refractive index $1.7$. By doing so, the central fringe is shifted to fifth bright fringe in the original pattern. The thickness of glass film is

A. $2 \times 10^{-3}$ m m

B. $4 \times 10^{-3}$ m m

C. $6 \times 10^{-3} mm$

D. $8 \times 10^{-3} mm$

**Answer: D**

Watch Video Solution

**9.** In Young's double slit experiment, $5th$ dark fringe is obtained at a point. If a thin transparent film is placed in the path of one of waves, then 7th bright is obtained at the same point. The thickness of the film in terms of wavelength $\lambda$ and refractive index $\mu$ will be

A. $\frac{1.5\lambda}{(\mu - 1)}$

B. $1.5(\mu - 1)\lambda$

C. $2.5(\mu - 1)\lambda$

D. $\frac{2.5\lambda}{(\mu - 1)}$

**Answer: D**

Watch Video Solution

**10.** The Young's double slit experiment is performed with blue light and green light of wavelength $4360\text{Å}$ and $5460\text{Å}$ respectively. If y is the distance of $4th$ maxima from the central one, then

A. $y_b = y_g$

B. $y_b < y_g$

C. $y_b > y_g$

D. $\dfrac{y_b}{y_g} = \dfrac{5460}{4360}$

**Answer: C**

Watch Video Solution

**11.** In double slit experiment , the distance between two slits is $0.6mm$ and these are illuminated with light of wavelength $4800\text{Å}$. The angular width of dark fringe on the screen at a distance 120 cm from slits will be

A. $8 \times 10^{-4}$ radian

B. $6 \times 10^{-4}$ radian

C. $4 \times 10^{-4}$ radian

D. $16 \times 10^{-4}$ radian

**Answer: A**

Watch Video Solution

**12.** Fig shows a double slit experiment , P and Q are the two coherent sources. The path length s PY and QY are nl and (n + 4) 1 respectively where n is whole number and 1 is wavelength . Thaking the central bright fringe as zero , what is formed at Y ?

A. First Bright

B. First Dark

C. Fourth Bright

D. Second Dark

**Answer: C**

View Text Solution

**13.** White light is used to illuminate the two slits in a Young's double slit experiment. The separation between the slits is b and theh screen is at a distance $d( > \ > b)$ from the slits At a point on the screen directly in front of one of the slits, certain wavelengths are missing some of these missing wavelengths are

A. $\frac{b^2}{d}, \frac{b^2}{3d}$

B. $\frac{b^2}{d}, \frac{b^2}{4d}$

C. $\frac{b^2}{2d}, \frac{b^2}{3d}$

D. $\frac{b^2}{2d}, \frac{b^2}{4d}$

**Answer: A**

Watch Video Solution

## Exercise - 2 (C . W) Diffraction

**1.** The $I^{st}$ diffraction minimum due to single slit diffraction is $\theta$, for a light of wave length $5000\text{Å}$ . If the width of the slit si $1 \times 10^{-4} cm$ then the value of $\theta$

A. $30^0$

B. $45^0$

C. $60^0$

D. $15^0$

**Answer: A**

Watch Video Solution

**2.** Light of wavelength $5000 \times 10^{-10} m$ is incident normally on a slit. The first minimum of the diffraction pattern is observed to lie at a distance of

5 mm from the central maximum on a screen placed at a distance of 3m from the slit. Then the width of the slits is

A. 3 cm

B. 0 . 3 cm

C. 0 . 0 3 cm

D. 0 . 01 cm

**Answer: C**

Watch Video Solution

**3.** A small aperture is illuminated with a parallel beam of $\lambda = 628nm$. The emergent beam has an anglur divergence of $2^{\circ}$. The size of the aperture is

A. $9\mu$m

B. $18\mu m$

C. $27\mu m$

D. $36\mu m$

**Answer: D**

Watch Video Solution

**4.** 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. $1.2 mm$

B. $2.4 mm$

C. $3.6 mm$

D. $2.4 mm$

**Answer: B**

Watch Video Solution

## Exercise - 2 (C . W) Resolving power

**1.** A man wants to distinguish between two pillars located at a distance of $11 km$. What should be the minimum distance between the pillars ?

A. 3 m

B. 1 m

C. 0 . 25 m

D. 0 . 5 m

**Answer: A**

Watch Video Solution

**2.** Two point white dots are 1mm apart on a black paper. They are viewed by eye of pupil diameter 3mm. Approximately, what is the maximum distance at which these dits can be resolved by the eye? [Take wavelelngth of light =500nm]

A. 6m

B. 3m

C. 5m

D. 1m

**Answer: C**

Watch Video Solution

## Exercise - 2 (C . W) Polarisation

**1.** A horizontal beam of vertically polarized light of intensity $43W/m^2$ is sent through two polarizing sheets. The polarizing direaction of the first is $60^\circ$ to the vertical, and that of the second is horizontal. The intensity of the light transmitted b y the pair of sheets is (nearly)

A. $8.\ 1W/m^2$

B. $7.\ 3W/m^2$

C. $6.\ 4W/m^2$

D. $3.\ 8W/m^2$

**Answer: A**

Watch Video Solution

**2.** Unpolarised light of internsity $32Wm^{-2}$ passes through three polarisers such that the transmission axis of the last polariser is crossed with the first. If the intensity of emerging light is $2Wm^{-2}$, the angle between the transmission axes o the first two polarisers is

A. $45^0$

B. $60^0$

C. $30^0$

D. zero

**Answer: C**

Watch Video Solution

Watch Video Solution

**3.** Two polariods are oriented with their transmision axes making angle of $30^\circ$ with each other. The fraction of incident un polarised light is transmitted

A. $37\%$

B. $37.5\%$

C. $3.36\%$

D. $36.5\%$

**Answer: B**

Watch Video Solution

**4.** The polaroids $P_1, P_2 \& P_3$ are arranged coaxially. The angle between $P_1$ and $P_2$ is $37^\circ$. The angle between $P_2$ and $P_3$ is, if intensity of emerging light is a quarter of intensity of unploarized light

A. $\theta = \cos^{-1}\left(\frac{5}{4}\right)$

B. $\theta = \cos^{-1}\left(\frac{4}{5}\right)$

C. $\theta = \cos^{-1}\left(\frac{4}{5\sqrt{2}}\right)$

D. $\theta = \cos^{-1}\left(\frac{5}{4\sqrt{2}}\right)$

**Answer: D**

Watch Video Solution

**5.** A ray of light is going from air to glass such that the reflected light is found to be completely plane polarized. Also the angle of refraction inside the glass is found exactly equal to the angle of deviation suffered by the ray. The refractive index of the glass is

A. $1.5$

B. $\sqrt{2}$

C. $\sqrt{3}$

D. $4/3$

**Answer: C**

Watch Video Solution

**6.** A plane polarized beam of intensity I is incident on a polariser with the electric vector inclined at $30^0$ to the optic axis of the polariser passes through an analyzer whose optio axis is inclined at $30^0$ to that of polariser . Intensity of light coming out of the analyzer is

A. (9 / 16) I

B. (3 / 4) I

C. (1 / 4 ) I

D. $(\sqrt{3}/2)I$

**Answer: A**

View Text Solution

**7.** Match list A and list B accurately

| List - A | List - B |
|---|---|
| a) spherical wave front | e) linear source |
| b) plane wave front | f) point light source |
| c) cylindrical wave front | g) at infinite distance |

A. (a,f), (b,g), (c,e)

B. (a,f), (b,e), (c,g)

C. (a, g), (b,f), (c,e)

D. (a,e), (b,g), (c,f)

**Answer: A**

View Text Solution

**8.** Match the following

| PART - A | PART - B |
|---|---|
| A) achromatic light | d) $\frac{\lambda D}{d}$ |
| b) monochromatic two successive bright bands | e) distance between ligh |
| c) fringe width | f) distance between two |
| | g) central fringe is alwa |
| | h) central fringe is alwa |

A. $a \to gb \to e, f, g, c \to e, f, g$

B. $a \to g, hb \to h, gc \to d, e, f$

C. $a \to e, f, gb \to gc \to e, f, g$

D. $a \to eb \to h, c \to g, h$

**Answer: B**

View Text Solution

**9.** Match the following

| PART - A | PART - B |
|---|---|
| a) Polarisation | e) All types of waves |
| b) interference | f) longitudinal waves |
| c) diffraction | g) transverse waves |
| d) reflection | h) only with transverse waves |
| | i) stationary waves produced in stretched strings |

A. $a \to gb \to e, f, g, i$

$c \to e, f, gd \to e, f, g$

B. $a \to h, gb \to f, gc \to gd \to h$

C. $a \rightarrow e, f, g, b \rightarrow gc \rightarrow e, f, gd \rightarrow g$

D. $a \rightarrow eb \rightarrow h, ic \rightarrow g, hd \rightarrow e$

**Answer: A**

Watch Video Solution

**10.** Match the following

| List - I | List - II |
|---|---|
| a) Silver lining of mountains | e) polarization by refraction |
| b) Rectilinear propagation light | f) transverse nature of light |
| c) Polarization | g) diffraction |
| d) Pile of plates | h) ray optic |

A. $a - h, b - g, c - f, d - e$

B. $a - g, b - h, c - e, d - f$

C. $a - f, b - h, c - h, d - e$

D. $a - g, b - h, c - f, d - e$

**Answer: D**

View Text Solution

View Text Solution

**11.** Match the following

| List - I | List - II |
|---|---|
| a) cigerent monochromatic highly unidirectionally | e) Malus law |
| b) $I = I_0 \cos^2 \theta$ | f) Polstiod |
| c) Selective absorption is exhibited by | g) Spherical wave fror |
| d) Fresnel diffraction | h) LASER |

A. $a - h, b - e, c - f, d - g$

B. $a - g, b - h, c - e, d - f$

C. $a - h, b - g, c - e, d - f$

D. $a - g, b - h, c - f, d - e$

**Answer: A**

View Text Solution

**12.** Match the following

| List - I | List - II |
|---|---|
| a) Interference | e) Thamos young |
| b) Polarisation by | f) Bartholinus reflection |
| c) Diffraction | g) Grimaldi |
| d) Polarisation by | h) Malus refraction |

A. $a-e, b-g, c-f, d-h$

B. $a-h, b-f, c-g, d-e$

C. $a-e, b-h, c-g, d-f$

D. $a-h, b-g, c-f, d-e$

**Answer: C**

View Text Solution

**13.** Statement A: In the interference pattern the intensity is same at all points in a brightband

Statement B: In Young's double slit experiment, as we move away from the central maximum, the third maximum always comes before the third minimum.

A. Both A and B are ture

B. Both A and B are false

C. A is true but B is false

D. A is false and B is true

**Answer: A**

Watch Video Solution

**14.** A light of wavelength $\lambda$ is incident on an object of size b. If a screen is at a distance D from the object. Identify the correct condition for the observation of different phenomenon

a) if $b^2 = D\lambda$, Fresnel diffraction is observed

b) if $b^2 > \, > D\lambda$, Fraunhoffer diffeaction is observed

c) $b^2 < \, < D\lambda$, Fraunhoffer diffraction is observed

d) $b^2 > > Dalmbad$, the approximation of geometrical optics is applicable

A. a, b and d are true

B. a, c and d are true

C. a and c are true

D. a and d are true

**Answer: B**

Watch Video Solution

## Exercise - 2 (H. W) Interference

**1.** In Young's double slit experiment the intensity of light at a point on the screen where the path difference $\lambda$ is K. The intensity of light at a point where the path difference is $\frac{\lambda}{6}$ [$\lambda$ is the wavelength of light used] is

A. K/4

B. K / 3

C. 3K/4

D. K

**Answer: C**

Watch Video Solution

**2.** 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 central maximum where the intensity is same as that due to a single slit is equla to

A. $\frac{D\lambda}{d}$

B. $\frac{D\lambda}{2d}$

C. $\frac{D\lambda}{3d}$

D. $\frac{2D\lambda}{d}$

**Answer: C**

Watch Video Solution

**3.** With two slits spaced 0.2 mm apart and a screen at a distance of 1 m, the third bright fringe is found to be at 7.5 mm from the central fringe. The wavelength of light used is

A. 400nm

B. 500nm

C. 550nm

D. 600nm

**Answer: B**

Watch Video Solution

**4.** The central fringe of the interference pattern produced by the light of wavelength 6000 Å is found to shift to the position of 4th dark fringe after a glass sheet of refractive index 1.5 is introduced. The thickness of glass sheet would be

A. $4.\ 8\mu m$

B. $4.\ 2\mu m$

C. $5.\ 5\mu m$

D. $3.\ 0\mu m$

**Answer: B**

Watch Video Solution

**5.** In Young's double slit intefrence experiment the wavelength of light used is $6000\text{Å}$ . If the path difference between waves reaching a point P on the screen is $1.5$ microns, then at that point P

A. Second bright band occurs

B. Second dark band occur

C. Third dark band occur

D. Third bright band occur

**Answer: C**

Watch Video Solution

**6.** When a mica plate of thickness $0.1$ mm is introduced in one of the interfering beams, the central fringe is displaced by a distance equal to 10 fringes. If the wavelength of the light is $6000\text{Å}$ , the refractive index of the mica is

A. $1.06$

B. $1.6$

C. $2.4$

D. $1.3$

**Answer: A**

Watch Video Solution

**7.** In Young's experiment inteference bands are produced on the screen placed at $1.5m$ from the slits $0.15mm$ apart and illuminated by light of wavelength $6000\text{Å}$. If the scren is now taken away from the slit by 50 cm the change in the fringe width will be

A. $2 \times 10^{-4}m$

B. $2 \times 10^{-3}m$

C. $6 \times 10^{-3}m$

D. $7 \times 10^{-3}m$

**Answer: B**

Watch Video Solution

**8.** When a thin transparent plate of Refractive Index $1.5$ is introduced in one of the interfering beam produces 20 fringes shift. If it is replaced by refractive index $1.7$ , the number of fringes that undergo displacement is

A. 23

B. 14

C. 28

D. 7

**Answer: B**

Watch Video Solution

**9.** In Young's double slit experiment, one of the slit is wider than other, so that amplitude of the light from one slit is double of that from other slit. If $I_m$ be the maximum intensity, the resultant intensity I when they interfere at phase difference $\phi$ is given by:

A. $\frac{I_m}{9}(4+5\cos\phi)$

B. $(I_m)(3)\left(1+2\cos^2\frac{\phi}{2}\right)$

C. $\frac{I_m}{5}\left(1+4\cos^2\frac{\phi}{2}\right)$

D. $\frac{I_m}{9}\left(1+8\cos^2\frac{\phi}{2}\right)$

**Answer: D**

Watch Video Solution

**10.** In a Young's double slit experiment, the two slits act as coherent sources of waves of equal amplitude A and wavelength $\lambda$ in another experiment with the same arrangement the two slits are made to act as incoherent sources of waves of same amplitude and wavelength. if the intensity at the middle point of the screen in te first case is $I_1$ and in te second case $I_2$ then the ratio $\frac{I_1}{I_2}$ is

A. 4

B. 2

C. 1

D. $0.5$

**Answer: B**

Watch Video Solution

**11.** A micture of light, consisting of wavelength 590nm and an unknown wavelength, illuminates Young's double slit and gives rise to two overlapping interference patterns on the scree. The central maximum of both lights coincide. Further, it is obseved that the third bright fringe of known light coincides with the 4th bright fringe of the unknown light. From this data, the wavelength of the unknown light is:

A. $393.4nm$

B. 885.0nm

C. 442.5nm

D. 776.8 nm

**Answer: C**

Watch Video Solution

**12.** In Young's experiment using monochromatic light , the fringe pattern shifts by a certain distance on the screen when a mica sheet of refractive index 1.6 and thickness 2 micron is introduced in the path of one of the interfering waves. The

mica sheet is then removed and the distance between the slits and the screen is doubled. it is found that the distance between successive maxima now is the same as the observed fringe shift upon the introduction of the mica sheet . The wavelength of light is

A. $5762\text{Å}$

B. $5825\text{Å}$

C. $6000\text{Å}$

D. $6500\text{Å}$

**Answer: C**

View Text Solution

## Exercise - 2 (H. W) Diffraction

**1.** Plane microwaves are incident on a long slit having a width of 5.0 cm. Calculate the wavelength of the microwaves if the first diffraction minimum is formed at $\theta = 30^{\circ}$.

A. 2 . 5 cm

B. 5 cm

C. 7 . 5 cm

D. 10 cm

**Answer: A**

Watch Video Solution

**2.** A screen is placed $50cm$ from a single slit, which is illuminated with $6000\text{Å}$ light. If the distance between the first and third minima in the diffraction pattern is $3.00mm$, what is the width of the slit ?

A. 0.1 m m

B. 0.2 m m

C. 0.4 m m

D. 0.8 m m

**Answer: B**

Watch Video Solution

**3.** A slit of width d is placed in front of a l ens of focal length 0.5m and is illuminated normally with light of wavelength $5.89 \times 10^{-7}m$. The first diffraction minima on either side of the central diffraction maximum are separated by $2 \times 10^{-3}m$ . The width d of the slit is __________m.

A. $1.47 \times 10^{-4} m$

B. $2.94 \times 10^{-4} m$

C. $1.47 \times 10^{-7}$ m

D. $2.92 \times 10^{-7} m$

**Answer: B**

Watch Video Solution

## Exercise - 2 (H. W) Polarisation

**1.** Unpolarised light passes through a polariser and analyser which are at an angle of $45^\circ$ with respect to each other. The intensity of polarised light coming fromanalyse is $5W/m^2$ . The intensity of unpolarised light incident on polariser is

A. $5\sqrt{3}/m^2$

B. $10W/m^2$

C. $20W / m^2$

D. $5\frac{\sqrt{3}}{4}W / m^2$

**Answer: C**

Watch Video Solution

**2.** A beam of ordinary light is incident on a system of four polaroids which are arranged in succession such that each polaroid is turned through $30^\circ$ with respect to the preceding one. The percentage of the incident intensity that emerges out from the system is appromately

A. $56\%$

B. $6.25\%$

C. $21\%$

D. $14\%$

**Answer: C**

Watch Video Solution

Watch Video Solution

**3.** Two polaroid sheets are placed one over the other with their axes inclied to each other at an angle $\theta$. If only $12.5\%$ of the intensity of the light incident on the first sheet emerges out from the second sheet, the value of $\theta$ is

A. $30^0$

B. $60^0$

C. $45^0$

D. $90^0$

**Answer: B**

Watch Video Solution

**4.** An unpolarised light is incident on a plate of refractive index $\sqrt{3}$ and the reflected light is found to be completely plane polarised. The angles of incidence and refraction are respectively

A. $60^0, 30^0$

B. $30^0, 60^0$

C. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right), 45^0$

D. $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right), 30^0$

**Answer: A**

Watch Video Solution

## Exercise - 3

**1.** A double slit experiment is performed with light of wavelength $500nm$. A thin film of thickness $2\mu m$ and refractive index $1.5$ is introduced in the path of the upper beam. The location of the central maximum will

A. remain unshifted

B. Shift downward by nearly two fringes

C. Shift upward by nearly two fringes

D. Shift downward by 10 fringes.

**Answer: C**

Watch Video Solution

**2.** When a beam of light is used to determine the position of an object, the maximum accuracy is achieved if the light is

A. Polarised

B. of longer wavelength

C. of shorter wavllength

D. of high intensity

**Answer: C**

Watch Video Solution

**3.** When exposed to sunlight, thin films of oil on water often exhibit brilliant colours due to the phenomenon of

A. Interference

B. diffraction

C. dispersion

D. polarisation

**Answer: A**

Watch Video Solution

**4.** The angular resolution of a $10cm$ diameter telescope at a wavelength $5000\text{Å}$ is of the order

A. $10^{6}$ rad

B. $10^{-2}$ rad

C. $10^{-4}$ rad

D. $10^{-6}$ rad

**Answer: A**

Watch Video Solution

**5.** In Young's double slit experiment, the distance between two slits is made three times then the fringe width will becomes

A. 9 times

B. 1/9 times

C. 3 times

D. 1/3 times

**Answer: D**

Watch Video Solution

**6.** Light is incident normally on a diffraction grating through which the first order diffraction is seen at $32^\circ$. The second order diffraction will be seen at

A. $at80^0$

B. $at64^0$

C. $at48^0$

D. there is no second order diffraction

**Answer: D**

Watch Video Solution

**7.** White light is used to illuminate the two slits in Young's double slit experiment. The separation between the slits is b and the screen is at a distance $D > \; > b$ from slits. At a point on the screen directly in front of one of the slits, the missing wavelengths are

A. A, B and C are correct

B. A and B are correct

C. B and D are correct

D. A and C are correct

**Answer: D**

Watch Video Solution

**8.** In Young's double slit experiment, two slits are made 5 mm apart and the screen is palced 2m away . What is the fringe separation when light of wavelength 500 nm is used ?

A. 0.002 m m

B. 0..02 m m

C. 0 . 2 m m

D. 2 m m

**Answer: C**

View Text Solution

9. For what distance is ray optics a good approximation when the aperture is 4 mm wide and the wavelength is 500 nm?

A. 32 m

B. 64 m

C. 16 m

D. 8 m

**Answer: A**

Watch Video Solution

10. The fringe separation, for a light of wavelength 700 mm , if the slits are made one milimeter apart and screen are placed one metre away

A. 0.7 cm

B. 0.74 m

C. 0.7 m

D. $74 \times 10^{-6} m$

**Answer: C**

View Text Solution

**11.** If the fringe with X =0.4 m m, the distance between $6^{th}$ bright band and the $4^{th}$ dark band on the same side is ?

A. 1 m m

B. 0 . 5 m m

C. 1 . 5 m m

D. 2 . 5 m m

**Answer: A**

View Text Solution

12. A beam of light of wavelength $600nm$ from a distant source falls on a single slit $1mm$ wide and the resulting diffraction pattern is observed on a screen $2m$ away. The distance between the first dark fringes on either side of the central bright fringe is

A. $2.\ 4mm$

B. 1 . 2 m m

C. 2 . 4 m m

D. 1 . 2 cm

**Answer: A**

Watch Video Solution

13. In Young's double-slit experiment, the two slits act as coherent sources of equal amplitude $A$ and of wavelength $\lambda$. In another experiment with the same set-up the two slits are sources of equal

amplitude $A$ and wavelength $\lambda$, but are incoherent. The ratio of the intensity of light at the midpoint of the screen in the first case to that in the second case is....

A. $2:1$

B. $1:2$

C. $3:4$

D. $4:3$

**Answer: A**

Watch Video Solution

**14.** Two coherent sources of wavelength $6.2 \times 10^{-7}$ m produce interference . The path difference corresponding to $10^{th}$ order maximum will be ?

A. $6.2 \times 10^{-6} m$

B. $3.1 \times 10^{-6} m$

C. $1.5 \times 10^{-6} m$

D. $12.4 \times 10^{-6} m$

**Answer: A**

View Text Solution

**15.** For a parallel beam of monochromatic light of wavelength $'\lambda'$ diffraction is produced by a single slit whose width $'a'$ is of the order of the wavelength of the light. If $'D'$ is the distance of the screen from the slit, the width of the central maxima will be

A. $\frac{Da}{\lambda}$

B. $\frac{2Da}{\lambda}$

C. $\frac{2D\lambda}{a}$

D. $\frac{D\lambda}{a}$

**Answer: C**

Watch Video Solution

**16.** In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic lightg 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 ?

A. 0 . 5 m m

B. 0 . 02 m m

C. 0 . 2 m m

D. $0.1$

**Answer: C**

Watch Video Solution

**17.** Two slits in Young's experiment have width in the ratio $1:25$. The ratio of intensity at the maxima and minima in the interference pattern $\frac{I_{\max}}{I_{\min}}$

is :

Watch Video Solution

## Exercise - 4 Interference of light

**1.** Two coherent sources of intensity ratio $\beta$ interfere, then $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}}$ is

A. $\frac{\beta}{1+\beta}$

B. $\frac{2\sqrt{\beta}}{1+\beta}$

C. $\frac{2\sqrt{\beta}}{1+\sqrt{\beta}}$

D. $\frac{2\beta}{1+\sqrt{\beta}}$

Watch Video Solution

**2.** Monochromatic green light of wavelength 550 nm illuminates two parallel narrow slits $7.7\mu m$ apart. The angular deviation $\theta$ of third order (for m =3) bright fringe in radian and in degree

A. $21.\ 6,\ 12.\ 4^0$

B. $0.216,\ 1.24^0$

C. $0.216,\ 12.4^0$

D. $216,\ 1.24^0$

Watch Video Solution

**3.** A source emitting light of wavelengths 480 nm and 600 nm is used in a double slit interference experiment. The separation between the slits is 0.25 mm and the interference is observed on a screen placed at 150 cm from the slits. Find the linear separation between the first maximum (next to the central maximum) corresponding to the two wavelengths.

A. 0 . 72 m m

B. 0 . 72 cm

C. 7 . 2 cm

D. 2 . 2 m m

Watch Video Solution

**4.** In the Young's double slit experiment, maximum of bright bands observed (inclusive of the central bright band) is found to be 11. If $\lambda$ is the wavelength of the monochromatic light used, the distance between the slits is

A. $5\lambda$

B. $6\lambda$

C. $10\lambda$

D. $11\lambda$

Watch Video Solution

**5.** In a double slit experiment, interference is obtained from electron waves produced in an electron gun supplied with voltage V. If $\lambda$ is wavelength of the beam, D is the distance of screen, d is the spacing between coherent source, h is Planck's constant, e is charge on electron and m is mass of electron, then fringe width is given as

A. $\dfrac{hD}{\sqrt{2meV}d}$

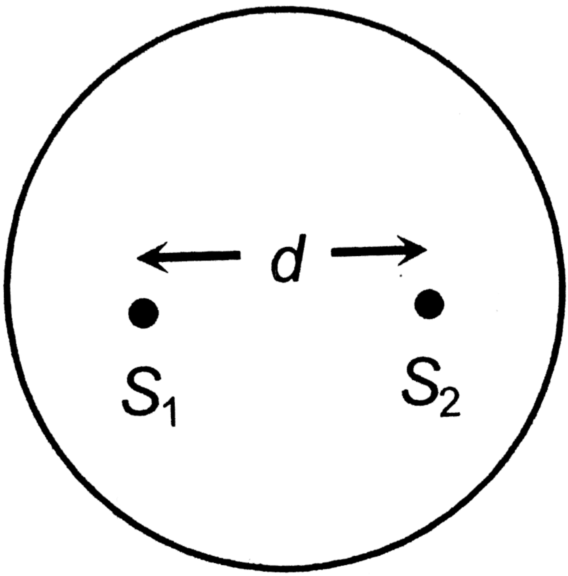
B. $\dfrac{2hD}{\sqrt{meV}d}$

C. $\dfrac{hd}{\sqrt{2meV}D}$

D. $\dfrac{2hD}{\sqrt{meV}D}$

Watch Video Solution

**6.** Two coherent sources separated by distance d are radiating in phase having wavelength $\lambda$. 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. $\cos^{-1}\frac{\lambda}{4d}$

Watch Video Solution

**7.** In a double slit experiment, the separation between the slits is d and distance of the screen from slits is D. If the wavelength of light used is $\lambda$ and I is the intensity of central bright fringe, then intensity at distance from central maximum is

A. $I\cos^2\left(\frac{\pi^2 xd}{\lambda D}\right)$

B. $I^2\sin^2\left(\frac{\pi xd}{2\lambda D}\right)$

C. $1\cos^2\left(\frac{\pi xd}{\lambda D}\right)$

D. $I\sin^2\left(\frac{\pi xd}{\lambda D}\right)$

Watch Video Solution

**8.** Two polaroids are placed in the path of unpolarized beam of intensity $I_0$ such that no light is emitted from the second polarid. If a third polaroid whose polarization axis makes an angle $\theta$ with the polarization axis of first polaroid, is placed between these two polariods then the intensity of light emerging from the last polaroid will be

A. $\left(\frac{I_0}{8}\right)\sin^2 2\theta$

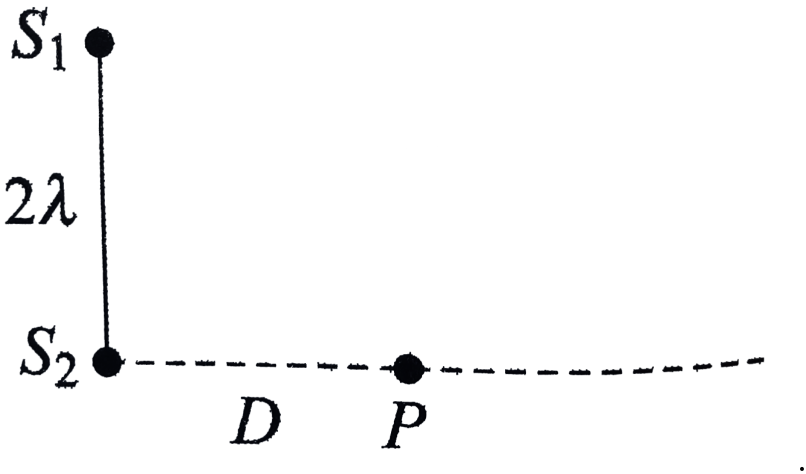
B. $\left(\frac{I_0}{4}\right)\sin^2 2\theta$

C. $\left(\frac{I_0}{2}\right)\cos^2 \theta$

D. $I_0 \cos^4 \theta$

Watch Video Solution

**9.** Two coherent point sources $S_1$ and $S_2$ vibrating in phase emit light of wavelength $\lambda$. The separation between the sources is $2\lambda$. Consider a line passing through $S_2$ and perpendicular to line $S_1S_2$. Find the position of farthest and nearest minima.




A. $\frac{7\lambda}{12}$

B. $\frac{15\lambda}{4}$

C. $\frac{\lambda}{2}$

D. $\frac{3\lambda}{4}$

Watch Video Solution

**10.** A monochromatic beam of light is used for the formation of fringes on a screen by illuminating the two slits in the Young,s double slit interference experiment. When a thin film of mic is interposed in the path of one of the interfering beams

A. the fringe-width increases

B. the fringe-width decreases

C. the fringe pattern disappears

D. fringe-width remains the same but the pattern shifts

Watch Video Solution

**11.** What happens to the fringe pattern when the Young's double slit experiment is performed in water instead of air ?

A. Shrinks

B. Disappears

C. Unchanged

D. Enlarged

Watch Video Solution

**12.** Two periodic waves of intensities $I_1$ and $I_2$ pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is:

A. $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$

B. $2(I_1 + I_2)$

C. $I_1 + I_2$

D. $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$

Watch Video Solution

**13.** What is the minimum thickness of a soap bubble needed for constructive interference in reflected light if the light incident on the film has wavelengths 900 nm ? Assume the refractive index for the film is $\mu = 1.5$

A. 100 nm

B. 150 nm

C. 200 nm

D. 250 nm

Watch Video Solution

**14.** Two identical coherent sources are placed on a diameter of a circle of radius R at separation x $( < \; < R)$ symmetrical about the center of the circle. The sources emit identical wavelength $\lambda$ each. The number of points on the circle of maximum intensity is $(x = 5\lambda)$

A. 20

B. 22

C. 24

D. 26

Watch Video Solution

**15.** In Young's double slit experiment, the 10th bright fringe is at a distance x from the central fringe. Then

a) the 10th dark fringe is at a distance of $19x/20$ from the central fringe

b) the 10th dark fringe is at a distance of $21x/20$ from the central fringe

c) the 5th dark fringe is at a distance of $x/2$ from the central fringe.

d) the 5th dark fringe is at a distance of $9x/20$ from the central fringe.

A. a, b, c only

B. b, c, d only

C. a, d only

D. a, b, c, d only

Watch Video Solution

## Exercise - 4 Diffraction

**1.** Light of wavelength $6000\text{Å}$ from a distance source falls on a slit $0.5$ mm wide. The distance between two dark bands on each side of the central bright band of the diffraction pattern observed on a screen placed at a distance 2m from the slit is

A. $1.\ 2nm$

B. $2.\ 4nm$

C. $3.\ 6nm$

D. $4.\ 8nm$

Watch Video Solution

**2.** A parallel beam of wavelength $\lambda = 450 \times 10^{9} m$ passes through a long slit of width $2 \times 10^{-4} m$. The angular divergence for which most of light is diffracted is

A. $\frac{2\pi}{3}$

B. $\frac{5\pi}{4}$

C. $\frac{3\pi}{4}$

D. $\frac{\pi}{3}$

Watch Video Solution

## Exercise - 4 Polarisation

**1.** A polariser and an analyser are oriented so that the maximum amount of lights is transmmitted. Fraction of its maximum value is the intensity of the transmitted through reduced when the analyzer is rotated through (intensity of incident light $= I_o$) , a) $30^\circ$ , b) $45^\circ$ , c) $60^\circ$

A. $0.375I_0, 0.25I_0, 0.125I_0$

B. $0.25I_0, 0.375I_0, 0.125I_0$

C. $0.125I_0, 0.25I_0, 0.0375I_0$

D. $0.125I_0, 0.375I_0, 0.25I_0$

Watch Video Solution

**2.** As polaroid examines two adjacent plane polarised beam A and B whose planes of polarisation are mutually perpendicular. In the first position of the analyser, beam B shows zero intensity. From this position a rotation $30^\circ$ shows that thebeams have same intensity. The ratio of intensity of the two beam $I_Z \& I_B$

A. $1:3$

B. $3:1$

C. $\sqrt{3}:1$

D. $1:\sqrt{3}$

Watch Video Solution

3. An analyser is inclined to a polariser at an angle of $30^0$ . The intensity of light emerging from the analyser is $\frac{1}{n}$ th of that is incident on the polariser. Then n is equal to

A. 4

B. $4/3$

C. $8/3$

D. $1/4$

Watch Video Solution

**4.** When a beam of light wavelength $\lambda$ is incident on the surface of a liquid at an angle $\phi$ , the reflected ray is completely polarized. The wavelength of light in the liquid medium is

A. $\lambda \tan \phi$

B. $\dfrac{\lambda}{\tan \phi}$

C. $\dfrac{\lambda}{\cos \phi}$

D. $\dfrac{\lambda}{\sin \phi}$

Watch Video Solution

**5.** Following statements which are true for light waves but not for sound waves are is

(I) The speed of waves is greater in vacuum than in a medium

(II) Waves of different frequencies travel with different speeds in a medium

(III) Waves travel with different speeds in different media.

A. (I) only

B. (I) and (III)

C. (II) and (III)

D. (I), (II) and (III)

Watch Video Solution

**6.** In Young's doubles slit experiment for producing interference pattern the fringe width depends on

i) wave length

ii) distance between the two slits

iii) distance between the screen and the slits

iv) distance between source and the slits

A. i only

B. i, ii only

C. i, ii and iii

D. i, ii and iv

Watch Video Solution

**7.** Both in interference and diffraction phenomena, alternate dark and bright fringes are obtained on screen

i) generally fringe width is same in interference and not same in diffraction

ii) the central fringe in interference has maximum brightness and thei intensity gradually decreases on either side

iii) in interference the intensity of all bright fringes in same

iv) both the phenomena are produced from same coherent sources

A. i only

B. i and ii

C. i, ii and iv

D. i and ii

Watch Video Solution

**8.** Consider the following statements A to B and identify the correct answer

A. Polarised light can be used to study the helical surface of nucleic acids.

B. Optics axis is a direction and not any particular line in the crystal

A. A and B are correct

B. A and B are wrong

C. A is correct and B is wrong

D. A is wrong and B is correct

Watch Video Solution

**9.** Consider sunlight incident on a slit of width $10^4 \text{Å}$ . The image seen through the slit shall

A. bea fine sharp slit white in colour at the center.

B. a bright slit white at the center diffusing to zero intensities at the edges.

C. a bright slit white at the center diffusing to regions of different colours .

D. Only be a diffused slit white in colour.

Watch Video Solution