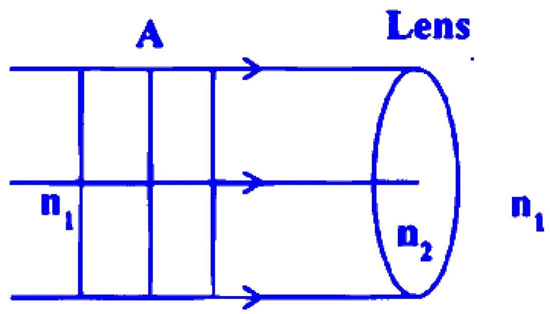
Question1

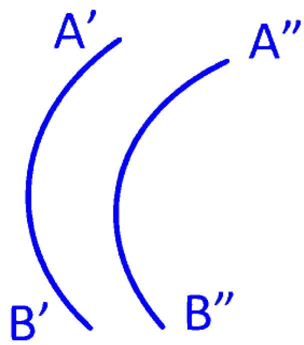
If AB is incident plane wave front then refracted wave front in $(n_2 > n_1)$



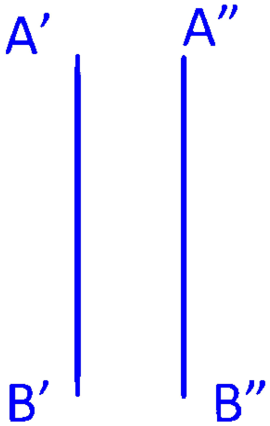
KCET 2025

Options:

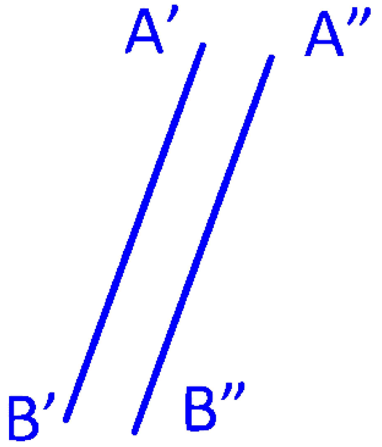
A.



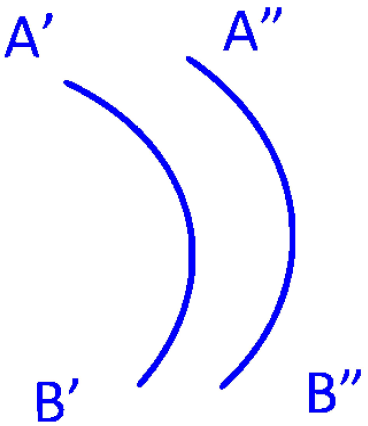
B.



C.

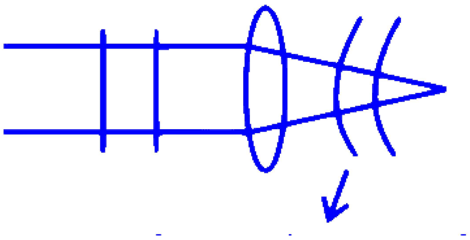


D.



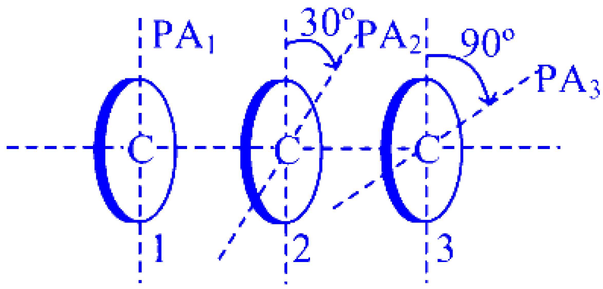
Answer: A

Solution:



Refracted wave front

Question2



Three polaroid sheets are co-axially placed as indicated in the diagram. Pass axes of the polaroids 2 and 3 make 30° and 90° with pass axis of polaroid sheet 1 . If I_0 is the intensity of the incident unpolarised light entering sheet 1 , the intensity of the emergent light through sheet 3 is

KCET 2024

Options:

A. zero

B. $\frac{3I_0}{32}$

C. $\frac{3I_0}{8}$

D. $\frac{3I_0}{16}$

Answer: A

Solution:

Intensity of polarised light passing through first polaroid,

$I_1 = I_0/2$

Intensity of light passing through second polaroid,

$$\begin{aligned} I_2 &= I_1 \cos^2\theta \\ &= \frac{I_0}{2}\cos^2 30^{\circ} = \frac{3}{4} I_0 \end{aligned}$$

Intensity of polarised light transmitted through third polaroid,

$$\begin{aligned} I_3 &= I_2 \cos^2\theta \\ &= \frac{3}{4} I_0 \cos^2 90^{\circ} \\ &= \frac{3}{4} I_0 \times 0 = 0 \end{aligned}$$

Question3

In Young's double slit experiment, an electron beam is used to produce interference fringes of width β_1. Now the electron beam is replaced by a beam of protons with the same experimental set-up and same speed. The fringe width obtained is β_2. The correct relation between β_1 and β_2 is

KCET 2024

Options:

A. $\beta_1 = \beta_2$

B. No fringes are formed

C. $\beta_1 < \beta_2$

D. $\beta_1 > \beta_2$

Answer: D

Solution:

In Young's double slit experiment, the fringe width β is determined by the formula:

$\beta = \frac{\lambda D}{d}$

where λ is the wavelength of the particles involved, D is the distance from the slits to the screen, and d is the separation between the two slits.

For particles like electrons and protons, the de Broglie wavelength λ is given by:

$\lambda = \frac{h}{mv}$

where h is Planck's constant, m is the mass of the particle, and v is the velocity (or speed) of the particle.

Both electrons and protons are used at the same speed v in this scenario, and the experimental setup (slit separation d and distance to screen D) remains unchanged. Therefore, the ratio of their fringe widths, β_1 (for electrons) and β_2 (for protons), is determined by their respective de Broglie wavelengths:

Calculate the wavelength of the electrons:

$\lambda_{\text{electron}} = \frac{h}{m_{\text{electron}} \cdot v}$

Calculate the wavelength of the protons:

$\lambda_{\text{proton}} = \frac{h}{m_{\text{proton}} \cdot v}$

Since $m_{\text{proton}} > m_{\text{electron}}$, it follows that $\lambda_{\text{proton}} < \lambda_{\text{electron}}$ when both have the same speed. The narrower wavelength of protons results in narrower fringes. Therefore:

$\beta_1 = \frac{\lambda_{\text{electron}} D}{d} > \frac{\lambda_{\text{proton}} D}{d} = \beta_2$

Thus, the correct relation between β_1 and β_2 is:

Option D: $\beta_1 > \beta_2$

Question4

When light propagates through a given homogeneous medium, the velocities of

KCET 2023

Options:

A. primary wavefront are larger than those of secondary wavelets.

B. primary wavefronts are lesser than those of secondary wavelets.

C. primary wavefronts are greater than or equal to those of secondary wavelets.

D. primary wavefront and wavelets are equal.

Answer: D

Solution:

According to Huygen's principle, in homogeneous medium, velocity of primary wavefront is equal to velocity of secondary wavelets.

Question5

An unpolarised light of intensity I is passed through two polaroids kept one after the other with their planes parallel to each other. The intensity of light emerging from second polaroid is $\frac{I}{4}$. The angle between the pass axes of the polaroids is

KCET 2023

Options:

A. 45°

B. 0°

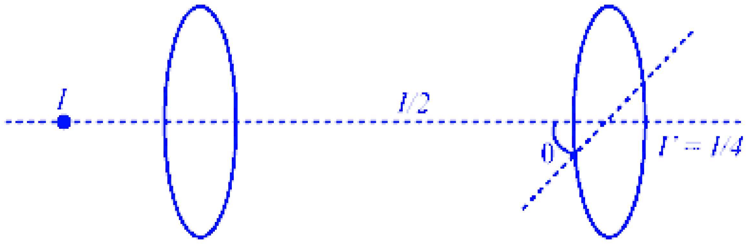
C. 60°

D. 30°

Answer: A

Solution:

The given situation is shown in the figure.



According to law of Malus,

$$I' = \left(\frac{I}{2}\right)\cos^2\theta$$
$$\Rightarrow \frac{I}{4} = \frac{I}{2}\cos^2\theta$$
$$\Rightarrow \cos^2\theta = \frac{1}{2}$$
$$\Rightarrow \cos\theta = \frac{1}{\sqrt{2}}$$
$$\Rightarrow \theta = 45^\circ$$

Question6

In the Young's double slit experiment, the intensity of light passing through each of the two double slits is $2 \times 10^{-2}\ \mathrm{Wm}^{-2}$. The screen-slit distance is very large in comparison with slit-slit distance. The fringe width is β. The distance between the central maximum and a point P on the screen is $x = \frac{\beta}{3}$. Then, the total light intensity at the point is

KCET 2023

Options:

A. $8 \times 10^{-2}\ \mathrm{Wm}^{-2}$

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

C. $2 \times 10^{-2}\ \mathrm{Wm}^{-2}$

D. $16 \times 10^{-2}\ \mathrm{Wm}^{-2}$

Answer: C

Solution:

Given, $x = \frac{\beta}{3}$

$I_0 = 2 \times 10^{-2}\ \mathrm{Wm}^{-2}$

for YDSE where $D >>> d, \Delta x = d \sin\theta$

Also $\sin\theta \simeq \tan\theta \simeq \frac{x}{D} = \frac{\beta}{3D} = \frac{\lambda D}{d \times 3D} = \frac{\lambda}{3d}$

$$\therefore \Delta = \frac{2\pi}{\lambda}\Delta x = \frac{2\pi}{\lambda} d\sin\theta = \frac{2\pi}{\lambda} \times \frac{d \times \lambda}{3d} = \frac{2\pi}{3} = \Delta\phi$$

$$I = 4I_0 \cos^2\left(\frac{\Delta\phi}{2}\right) = 4I_0 \cos^2\left(\frac{2\pi}{3} \times \frac{1}{2}\right)$$

$$= 4I_0 \cos^2\left(\frac{\pi}{3}\right) = 4 \times I_0 \times \frac{1}{4}$$

$$\therefore I = I_0 = 2 \times 10^{-2}\ \mathrm{W\ m}^{-2}$$

Question7

For light diverging from a finite point source,

KCET 2022

Options:

A. the intensity decreases in proportion to the distance squared

B. the wavefront is parabolic

C. the intensity at the wave front does not depend on the distance

D. the wave front is cylindrical

Answer: A

Solution:

A light diverging from a finite point source produces spherical wavefront that moves in all directions from the point. The intensity of light dependent on the distance and it follows the inverse square law. Hence, the intensity decreases with an increase in the distance from the source.

Question8

The fringe width for red colour as compared to that for violet colour is approximately

KCET 2022

Options:

A. 2 times

B. 4 times

C. 8 times

D. 3 times

Answer: A

Solution:

We know that, fringe width,

$\beta=\frac{D\lambda}{d}$

where, $D=$ distance between the screen and source,

$d=$ distance between the slits

and $\lambda=$ wavelength of light used.

$\Rightarrow \quad \beta \propto \lambda$ ..... (i)

As we know that,

$$\begin{aligned} \lambda_{\text{red}} & \simeq 2\lambda_{\text{violet}} \\ \frac{\beta_{\text{red}}}{\beta_{\text{violet}}} & =\frac{\lambda_{\text{red}}}{\lambda_{\text{violet}}}=\frac{2\lambda_{\text{violet}}}{\lambda_{\text{violet}}}=2 \\ \Rightarrow \quad \beta_{\text{red}} & =2\beta_{\text{violet}} \end{aligned}$$

Question9

In case of Fraunhoffer diffraction at a single slit, the diffraction pattern on the screen is correct for which of the following statements?

KCET 2022

Options:

A. Central bright band having alternate dark and bright bands of decreasing intensity on either side.

B. Central dark band having uniform brightness on either side.

C. Central bright band having dark bands on either side.

D. Central dark band having alternate dark and bright bands of decreasing intensity on either side.

Answer: A

Solution:

In case of Fraunhoffer diffraction at a single slit, the diffraction pattern on the screen, central bright band having alternate dark, and bright bands of decreasing intensity on either side.

Question10

When a compact disc (CD) is illuminated by small source of white light coloured bands are observed. This is due to

KCET 2022

Options:

A. diffraction

B. interference

C. reflection

D. scattering

Answer: A

Solution:

When a compact disc (CD) is illuminated by small source of white light, coloured bands are observed. This happens due to the phenomenon of diffraction, in which small ripples on the surface of it, break up white light into the colour of rainbow.

Question11

A slit of width a is illuminated by red light of wavelength $6500\overset{o}{A}$. If the first diffraction minimum falls at 30°, then the value of a is

KCET 2021

Options:

A. 6.5×10^{-4} mm

B. 1.3 micron

C. $3250\overset{o}{A}$

D. 26×10^{-4} cm

Answer: B

Solution:

Given values:

Wavelength, $\lambda = 6500\ \mathring{A} = 6500 \times 10^{-10}$ m

Angle, $\theta = 30^\circ$

In a single-slit diffraction pattern, the position of the first diffraction minimum is determined by the equation:

$a \sin\theta = n\lambda$

where n is the order of the minima. For the first minimum, $n = 1$.

Let's substitute the given values into the equation:

$a \sin 30^\circ = 1 \times 6500 \times 10^{-10}$

Since $\sin 30^\circ = \frac{1}{2}$, we have:

$\frac{a}{2} = 6500 \times 10^{-10}$

Solving for a:

$a = 13000 \times 10^{-10}$

Converting the value of a into microns, we find:

$a = 1.3 \times 10^{-6}\,\mathrm{m} = 1.3\,\mathrm{micron}$

Question12

Which of the following statements are correct with reference to single slit diffraction pattern?

(I) Fringes are of unequal width.

(II) Fringes are of equal width.

(III) Light energy is conserved.

(IV) Intensities of all bright fringes are equal.

KCET 2021

Options:

A. Both (I) and (III)

B. Both (I) and (IV)

C. Both (II) and (IV)

D. Both (II) and (III)

Answer: A

Solution:

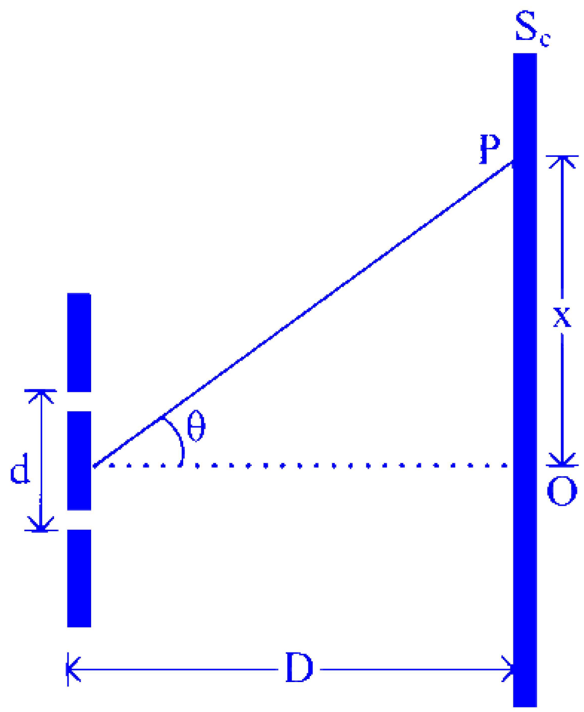
In single slit diffraction pattern, the width of central maxima is larger than the width of maxima on either sides and the intensity decreases rapidly on either side, but the light energy remains conserved.

Hence, statements I and II are correct.

Question13

In the Young's double slit experiment a monochromatic source of wavelength λ is used. The intensity of light passing through each slit is I_0

. The intensity of light reaching the screen S_C at a point P, a distance x from O is given by (Take, $d << D$)



KCET 2021

Options:

A. $I_0 \cos^2\left(\frac{\pi D}{\lambda d} x\right)$

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

C. $I_0 \sin^2\left(\frac{\pi d}{2\lambda D} x\right)$

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

Answer: B

Solution:

Path difference, $\Delta x = \frac{xd}{D}$

So, corresponding phase difference, $\phi = \frac{2\pi}{\lambda}(\Delta x)$

$= \frac{2\pi}{\lambda}\left(\frac{xd}{D}\right)$

The resultant intensity at P is

$$I_P = 4I_0 \cos^2\left(\frac{\phi}{2}\right)$$
$$= 4I_0 \cos^2\left(\frac{2\pi}{\lambda}\frac{xd}{D} \times \frac{1}{2}\right) = 4I_0 \cos^2\left(\frac{\pi dx}{\lambda D}\right)$$

Question14

Three polaroid sheets P_1, P_2 and P_3 are kept parallel to each other such that the angle between pass axes of P_1 and P_2 is 45° and that between P_2 and P_3 is 45°. If unpolarised beam of light of intensity $128\ \mathrm{Wm}^{-2}$ is incident on P_1. What is the intensity of light oming out of P_3 ?

KCET 2020

Options:

A. $128\ \mathrm{Wm}^{-2}$

B. zero

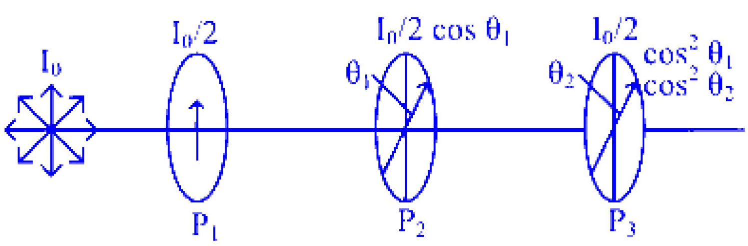
C. $16\ \mathrm{Wm}^{-2}$

D. $64\ \mathrm{Wm}^{-2}$

Answer: C

Solution:

The situation given in question can be shown as



Here, $I_0 = 128\mathrm{Wm}^{-2}, \theta_1 = 45^\circ$ and $\theta_2 = 45^\circ$

According to Malus's law, intensity of the light coming out of P_2,

$I = \frac{I_0}{2}\cos^2\theta_1$

Similarly, intensity of light coming out of P_3,

$$\begin{aligned} I' &= \frac{I_0}{2} \cos^2 \theta_1 \cos^2 \theta_2 \\ &= \frac{128}{2} \times \cos^2 45^\circ \times \cos^2 45^\circ \\ &= 64 \times \frac{1}{2} \times \frac{1}{2} = 16 \mathrm{Wm}^{-2} \end{aligned}$$

Question15

Two poles are separated by a distance of 3.14 m. The resolving power of human eye is 1 min of an arc. The maximum distance from which he can identify the two poles distinctly is

KCET 2020

Options:

A. 10.8 km

B. 5.4 km

C. 188 m

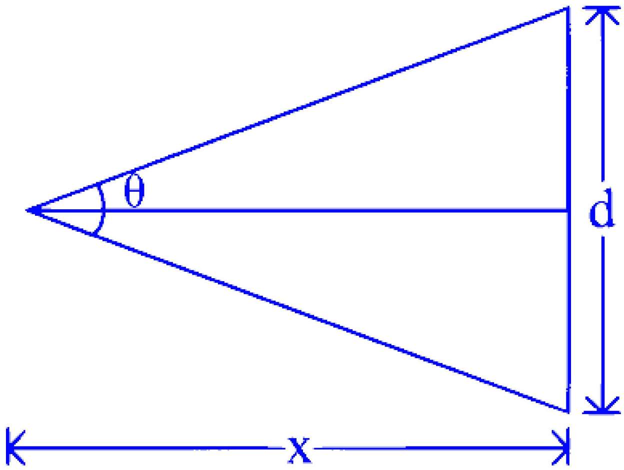
D. 376 m

Answer: A

Solution:

Given, distance between poles $(d) = 3.14$ m Resolving power $= 1$ min or $1'$

Let maximum distance of two poles from eye to be resolved distinctly be x. Then, angle on eye in minute for two poles can be found using figure given below



$$\theta = \frac{d}{x} \times \frac{180}{\pi} \times 60$$

$$\Rightarrow \quad 1 = \frac{3.14}{x} \times \frac{180}{\pi} \times 60$$

$$\Rightarrow \quad x = \frac{3.14 \times 180 \times 60}{\pi} = 10794.5$$

$$\simeq 10.8 \text{ km}$$

Question16

In Young's double slit experiment, the distance between the slits and the screen is 1.2 m and the distance between the two slits is 2.4 mm. If a thin transparent mica sheet of thickness 1μm and RI 1.5 is introduced between one of the interfering beams, the shift in the position of central bright fringe is

KCET 2020

Options:

A. 2 mm

B. 0.5 mm

C. 0.125 mm

D. 0.25 mm

Answer: D

Solution:

Given,

$D = 1.2 \text{ m}, d = 2.4 \text{ mm} = 2.4 \times 10^{-3} \text{ m}$
$t = 1 \mu\text{m} = 1 \times 10^{-6} \text{ m and } \mu = 1.5$

When a transparent sheet is introduced in the path of one of the interfering beam, the shift in the position of central bright fringe is

$$y = (\mu - 1)t\frac{D}{d}$$
$$= (1.5 - 1)1 \times 10^{-6} \times \frac{1.2}{2.4 \times 10^{-3}}$$
$$= \frac{0.5 \times 10^{-6} \times 1.2}{2.4 \times 10^{-3}}$$
$$= 0.25 \times 10^{-3} \text{ or } 0.25 \text{ mm}$$

Question17

If Young's double slit experiment, using monochromatic light of wavelength λ, the intensity of light at a point on the screen where path difference is λ is K units. The intensity of light at a point where path difference is $\frac{\lambda}{3}$ is

KCET 2019

Options:

A. K

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

C. $4K$

D. $2K$

Answer: B

Solution:

The intensity at any point on the screen in Young's double slit experiment $K = I_0 \cos^2 \frac{\phi}{2}$ .... (i)

where, I_0 is intensity of either source.

when, path difference $= \lambda$

then, phase difference $\phi = 2\pi$, then from Eq. (i)

$$\therefore \quad K = I_0 \cos^2 \frac{2\pi}{2} = I_0(-1)^2$$
$$K = I_0 \quad \text{.... (ii)}$$

when, path difference $= \frac{\lambda}{3}$

then path difference, $\phi = \frac{2\pi}{\lambda} \times$ path difference

$= \frac{2\pi}{\lambda} \times \frac{\lambda}{3} = \frac{2\pi}{3}$

$\therefore$ From Eq (i), $I' = I \cos^2 \left(\frac{\frac{2\pi}{3}}{2}\right) = I_0 \cos^2 \frac{\pi}{3} = \frac{I_0}{4} = \frac{K}{4}$

Question18

A plane wavefront of wavelength λ is incident on a single slit of width a. The angular width of principal maximum is

KCET 2018

Options:

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

B. $\frac{2\lambda}{a}$

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

D. $\frac{a}{2\lambda}$

Answer: B

Solution:

For a single slit of width a being illuminated by a plane wave of wavelength λ, the intensity distribution is given by the formula:

$I(\theta) = I_0\left(\frac{\sin\beta}{\beta}\right)^2, \quad \text{where} \quad \beta = \frac{\pi a \sin\theta}{\lambda}.$

The minima (points of zero intensity) occur when

$\beta = m\pi \quad \text{with} \quad m = \pm1, \pm2, \ldots$

For the first minima on each side of the central maximum, take $m = \pm1$:

$\frac{\pi a \sin\theta}{\lambda} = \pi \quad \Rightarrow \quad a \sin\theta = \lambda.$

Assuming the small angle approximation (i.e., $\sin\theta \approx \theta$ in radians), we have

$\theta \approx \frac{\lambda}{a}$.

Since the central (principal) maximum extends from $\theta = -\frac{\lambda}{a}$ to $\theta = \frac{\lambda}{a}$, the angular width is the total angle between these two minima:

$\Delta\theta \approx \frac{\lambda}{a} - \left(-\frac{\lambda}{a}\right) = \frac{2\lambda}{a}$.

Thus, the angular width of the principal maximum is

$\boxed{\frac{2\lambda}{a}}$.

Option B is the correct answer.

Question19

In a Fraunhofer diffraction at a single slit, if yellow light illuminating that slit is replaced by blue light, then diffraction bands

KCET 2018

Options:

A. remain unchanged

B. become wider

C. disappear

D. become narrower

Answer: D

Solution:

In a Fraunhofer diffraction pattern for a single slit, the positions of the minima are given by the equation:

$a \sin\theta = m\lambda$,

where:

a is the width of the slit,

λ is the wavelength of the light,

θ is the diffraction angle, and

m is an integer (other than zero) representing the order of the minima.

Here's the key point:

The angular position of the first minimum (for $m = 1$) occurs at:

$\sin\theta = \frac{\lambda}{a}$.

When you replace yellow light with blue light, the wavelength λ decreases (since blue light has a shorter wavelength than yellow light).

A smaller wavelength λ will result in a smaller value of θ (because a remains unchanged). This means that the overall diffraction pattern, including the width of the central maximum and the spacing between the bands, becomes narrower.

Thus, the correct answer is:

Option D: Become narrower.

Question20

In Young's double slit experiment, two wavelengths $\lambda_1 = 780\ \text{nm}$ and $\lambda_2 = 520\ \text{nm}$ are used to obtain interference fringes. If the n^{th} bright band due to λ_1 coincides with $(n+1)^{\text{th}}$ bright band due to λ_2, then the value of n is

KCET 2018

Options:

A. 4

B. 3

C. 2

D. 6

Answer: C

Solution:

In Young's double slit experiment, the position of the bright fringes is given by

$y_m = \frac{m\lambda D}{d}$,

where:

m is the fringe order (an integer),

λ is the wavelength,

D is the distance to the screen, and

d is the distance between the slits.

Since the experimental setup remains the same, the distance from the central maximum for the bright fringes is proportional to the product of the order and the wavelength.

For the two wavelengths:

For $\lambda_1 = 780\,\text{nm}$, the position of the n^{th} bright fringe is proportional to $n\lambda_1$.

For $\lambda_2 = 520\,\text{nm}$, the position of the $(n+1)^{\text{th}}$ bright fringe is proportional to $(n+1)\lambda_2$.

Since these fringes coincide, we have

$n\lambda_1 = (n+1)\lambda_2$.

Let's solve for n step by step:

Write the equation:

$n\lambda_1 = (n+1)\lambda_2$.

Expand the right-hand side:

$n\lambda_1 = n\lambda_2 + \lambda_2$.

Rearrange to isolate terms with n:

$n(\lambda_1 - \lambda_2) = \lambda_2$.

Solve for n:

$n = \frac{\lambda_2}{\lambda_1 - \lambda_2}$.

Substitute the given wavelengths:

$\lambda_1 = 780\,\text{nm}$,

$\lambda_2 = 520\,\text{nm}$,

so the equation becomes

$n = \frac{520}{780-520} = \frac{520}{260} = 2$.

Thus, the n^{th} bright fringe due to $780\,\text{nm}$ coincides with the $(n+1)^{\text{th}}$ bright fringe due to $520\,\text{nm}$ when $n = 2$.

Therefore, the correct answer is Option C: 2.

Question21

In Young's double slit experiment, slits are separated by 2 mm and the screen is placed at a distance of 1.2 m from the slits. Light consisting of two wavelengths $6500\overset{o}{A}$ and $5200\overset{o}{A}$ are used to obtain interference fringes. Then, the separation between the fourth bright fringes of two different patterns produced by the two wavelengths is

KCET 2018

Options:

A. 0.312 mm

B. 0.123 mm

C. 0.213 mm

D. 0.412 mm

Answer: A

Solution:

To find the separation between the fourth bright fringes in Young's double-slit experiment, we use the formula for fringe position:

$y_n = \frac{nD\lambda}{d}$

where n is the fringe order, D is the distance from the slits to the screen, λ is the wavelength of light, and d is the separation between the slits.

For the fourth bright fringe ($n = 4$), the separation between the fringes for two different wavelengths, λ_1 and λ_2, is given by:

Separation $= \frac{4D\lambda_1}{d} - \frac{4D\lambda_2}{d}$

Substituting the given values:

$D = 1.2\,\text{m}$

$d = 2 \times 10^{-3}\,\text{m}$

$\lambda_1 = 6500\,\text{Å} = 6500 \times 10^{-10}\,\text{m}$

$\lambda_2 = 5200\,\text{Å} = 5200 \times 10^{-10}\,\text{m}$

The separation becomes:

$\frac{4\times1.2}{2\times10^{-3}} \times (6500 - 5200) \times 10^{-10} = \frac{4\times1.2}{2\times10^{-3}} \times 1300 \times 10^{-10}$

Simplifying this calculation:

$\frac{4\times1.2\times1300}{2} \times 10^{-7} = 3120 \times 10^{-7} = 0.312\,\text{mm}$

Thus, the separation between the fourth bright fringes produced by the two different wavelengths is $0.312\,\text{mm}$.

Question22

According to Huygens' principle, during refraction of light from air to a denser medium

KCET 2017

Options:

A. Wavelength decreases but speed increases

B. Wavelength increases but speed decreases

C. Wavelength and speed increases

D. Wavelength and speed decreases

Answer: D

Solution:

When light travels from air into a denser medium, two important things happen:

The speed of light decreases because the medium's refractive index is higher.

The wavelength of the light decreases, as the frequency remains constant and wavelength is given by $\lambda = \frac{v}{f}$.

So, by Huygens' principle and the wave nature of light, both the speed and the wavelength decrease.

Therefore, the correct answer is:

Option D: Wavelength and speed decreases.

Question23

In a system of two crossed polarisers, it is found that the intensity of light from the second polariser is half from that of first polariser. The angle between their pass axes is

KCET 2017

Options:

A. 60°

B. 30°

C. 0°

D. 45°

Answer: D

Solution:

Explanation

According to Malus's Law, the intensity of light passing through a polariser can be described as:

$I = I_0 \cos^2 \theta$

Where:

I is the intensity of light after passing through the second polariser.

I_0 is the intensity of light after the first polariser.

θ is the angle between the pass axes of the two polarisers.

Given in this problem, the intensity of light after the second polariser is half of that after the first polariser:

$I = \frac{I_0}{2}$

Substituting into Malus's Law, we have:

$\frac{I_0}{2} = I_0 \cos^2 \theta$

Dividing both sides by I_0, we obtain:

$\cos^2 \theta = \frac{1}{2}$

Taking the square root of both sides gives:

$\cos \theta = \frac{1}{\sqrt{2}}$

This leads to:

$\theta = \cos^{-1}\left(\frac{1}{\sqrt{2}}\right) = 45^\circ$

Therefore, the angle between the pass axes of the two polarisers is 45°.

Question24

During scattering of light, the amount of scattering in inversely proportional to................ of wavelength of light.

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Options:

A. square

B. fourth power

C. half

D. cube

Answer: B

Solution:

The correct answer is Option B: fourth power.

Here's why:

In Rayleigh scattering, the intensity of scattered light I is inversely proportional to the fourth power of the wavelength λ. This is expressed as:

$I \propto \frac{1}{\lambda^4}$

This relationship means that shorter wavelengths (like blue light) scatter much more than longer wavelengths (like red light).

Thus, the scattering is inversely proportional to the fourth power of the wavelength of light.

Question25

In Young's double-slit experiment, if yellow light is replaced by blue light, the interference fringes becomes

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Options:

A. darker

B. brighter

C. wider

D. narrower

Answer: D

Solution:

In Young's double-slit experiment, the wavelength (λ) of yellow light is greater than that of blue light.

The formula for fringe width (w) is given by:

$w = \frac{D\lambda}{d}$

where:

w is the fringe width,

D is the distance from the slits to the screen,

λ is the wavelength of the light,

d is the separation between the slits.

From this formula, we can see that fringe width (w) is directly proportional to the wavelength (λ).

Since blue light has a shorter wavelength than yellow light, when the yellow light is replaced by blue light, the value of λ decreases. Consequently, the interference fringes become narrower.
