PHYSICS

BOOKS - MODERN PUBLICATION

Interference of Light

Example

1. If the two slits in Young's double slit experiment have width ratio $16:1$, deduce the ratio of intensity at maxima and minima in the interfernce pattern.

Watch Video Solution

2. Two slits are 1 m mapart and the same slits are 1 m from a screen.Find out fringe separation,when light of wavelength 500 nm is used.

Watch Video Solution

3. Using light of wavelength $6,000\overset{\circ}{A}$,it is found that in a thin film of air,7 fringes occur between two points,deduce the difference of the film thickness between these points.

Watch Video Solution

4. If the two slits in Young's experiment have widths in the ratio $4:9$,then find the ratio of intesnity at the maxmum to the intesity at the minimum in the interference pattern.

Watch Video Solution

5. In Young wavelength λ, the intensity of light at a point on the screen where path difference is λ, is K units. What is the intensity of light at a point where path difference is $\frac{\lambda}{3}$?

Watch Video Solution

6. In a Young's double slit experiment,the fringe width obtained is 0.6 cm,when light of wavelength $4,800\overset{\circ}{A}$ is used .If the distance between the screen and the slit is reduced to half,what should be the wavelength of light used to obtain fringes 0.0045 m wide?

Watch Video Solution

7. In a Young's double slit experiment,the slits are 1.5 mm apart.When the slits are illuminated by a monochromatic source and the screen is kept 1 m aprat from the slits,width of 10 fringes is measured as 3.93 mm.Calculate the wavelength of light used.What will be the width of 10 figes,when the distance between the slits and the screen is increased by 0.5 m?The source of light used remains the same.

Watch Video Solution

8. Two slits in Young's experiment are 0.02 cm apart.The interference fringes for light of wavelength $6,000\overset{\circ}{A}$ are formed on a screen 80 cm away.Calculate the distance of the fifth brigth fringe.

Watch Video Solution

9. In a Young's double slit experiment, the slits are separated by 0.03 cm and the screen is placed 1.5 m away. The distance between the central fringe and the fourth bright fringe is 1 cm. Determine the wavelength of light used in the experiment.

Watch Video Solution

10. Two slits 0.125 mm aprt are illuinated by igth of wavelength $4500^\circ A$.The screen is one metre way from the plane of the slits.Find the separation between the second bright fringes on both sides of the central maximum.

Watch Video Solution

11. In a Young's double slit experiment ,the fringes are formed at a distance of 1 m from double silt of separation 0.12 mm.Calculate the distance of 3rd dark b and from the centre of the screen. consider wavelength equal to 6000 A°

Watch Video Solution

12. In a Young's double slit experiment the slit are 0.2 mm apart and the screen is 1.5 m away.It is observed that the distance between the central brigth fringe and fourth dark fringe is 1.8 cm .Find the wavelength of light used.

Watch Video Solution

13. In a Young's experiment,the width of the fringes objrtained with oligth of wavelength $6,000\overset{\circ}{A}$ is 2.0 mm.what will be the fringe width,if the entire apparatus is immersed in a iquid of erfractive index 1.33?

Watch Video Solution

14. A beam of light consisting of two wavelegnths,$6,500\overset{\circ}{A}$ and $5,200\overset{\circ}{A}$ is used to obtain interfrerence fringes in a Young's double slit experirmejnt.The distance between the slits and the screen is 120 cm.

Find the distance of third bright fringe on the screen from the central maximum for the wavelength $6, 500\overset{\circ}{A}$.

Watch Video Solution

15. A double slit is illuminated by light of wavelength $6, 000\overset{\circ}{A}$.The slits are 0.1 cm apart and the screen is placed on meter away.

Calculate the angular position of the 10th maximum in radian.

Watch Video Solution

16. A double slit is illuminated by light of wavelength $6,000\overset{\circ}{A}$.The slits are 0.1 cm apart and the screen is placed on metre away.Calculate

separation of the two adjacent imnima.

Watch Video Solution

17. White light may be considred to have λ from $4000\overset{\circ}{A}$ to $7500\overset{\circ}{A}$.If an oil film has thickness 10^{-4}cm, deduce the wavelength in the visible region for which the reflection along the normal direction will be

Weak Takeμ of the oil as 1.4.

Watch Video Solution

18. White light may be considred to have λ from $4,000\overset{\circ}{A}$ to $7,500\overset{\circ}{A}$.If an oil film has thickness 10^{-4}cm,deduce the wavelength in the visible refion for which the reflection alog the normal direction will be strong.Takeμ of the oil as 1.4.

Watch Video Solution

19. In a two-slit experiment with monochromatic light, fringes are obtained on the screen placed at some distance form the slits. If the screen is moved by $5 \times 10^{-2} m$ towards the slits, the change in fringe width is $3 \times 10^{-5} m$. If the distance between the slits is $10^{-3}m$, calculate the wavelength of the light band.

Watch Video Solution

20. In a certain region A to B in a thin film,we get 10 fringes with lith of wavelendth $4,125\overset{\circ}{A}$ .HOw many fringes will be obeserved in the same region with waveength $5,893\overset{\circ}{A}$?

Watch Video Solution

21. In Young' double slit experiment, the expriment, the angular width of a fringe formed on a distant screen is 0.5°. The wavelength of light used is $6000\overset{\circ}{A}$. What is the spacing between the slits?

Watch Video Solution

22. A beam of light consisting of two wavelengths, 650 nm and 520 nm,is used to obtain interference fringes in a Young experiment.-What is the least distance from the central maximum where the bright fringes due to both the wavelengths coincide?

Watch Video Solution

23. A beam of light consisting of two wavelegnths,$6, 500\overset{\circ}{A}$ and $5, 200\overset{\circ}{A}$ is used to obtain interfrerence fringes in a Young's double slit experirmejnt.The distance between the slits and the screen is 120 cm.

Find the distance of third bright fringe on the screen from the central maximum for the wavelength $6, 500\overset{\circ}{A}$.

Watch Video Solution

24. A beam of light consisting of two wavelegnths,$6, 500\overset{\circ}{A}$ and $5, 200\overset{\circ}{A}$ is used to obtain interference fringes in a Young's double slit experiment. The distance between the slits is 2 mm and the screen is 120 cm. What is the least distance from the central maximum, when the bright fringes due to both the wavelengths coincide?

Watch Video Solution

25. A point source S emitting light of wavelength 600 nm is placed at a very small height h above a flat reflecting surface AB [Fig.6.07].The intensity of the reflected light is 36% of the incident intensity.Interfrerence fringes are observed on a screen placed parallel to the reflecting surface at a very large distance D from it.

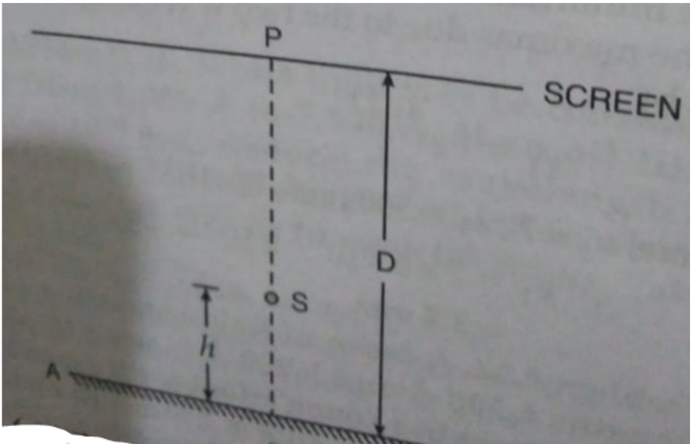


Fig. 6.07

What is the shape of the interference fringes on the screen?

Watch Video Solution

26. A point source S emitting light of wavelength 600 nm is placed at a very small height h above a flat reflecting surface AB [Fig.6.07].The intensity of the reflected light is 36% of the incident intensity.Interfrerence fringes are observed on a screen placed parallel to the reflecting surface at a very large distance D from it.

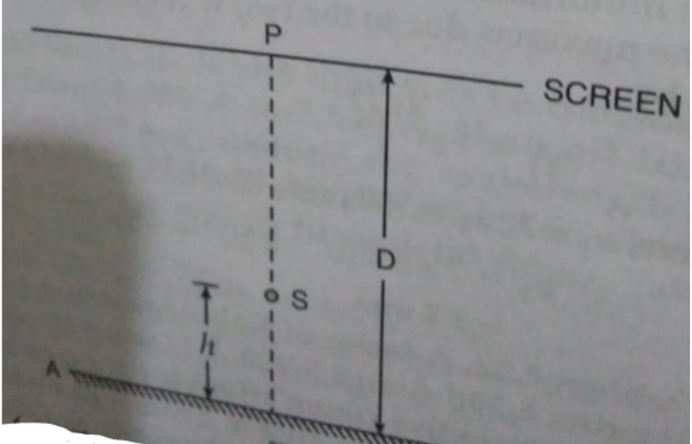
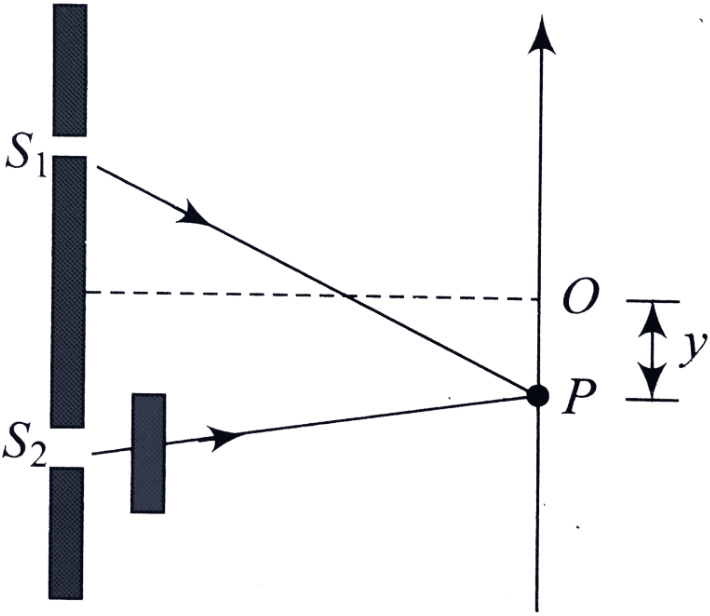


Fig. 6.07

If the intensity t pint P corresponds to a maximum,calculate the minimum distance through which the reflecting surface AB sould be shifted so that the intensity at P again becomes maximum.

Watch Video Solution

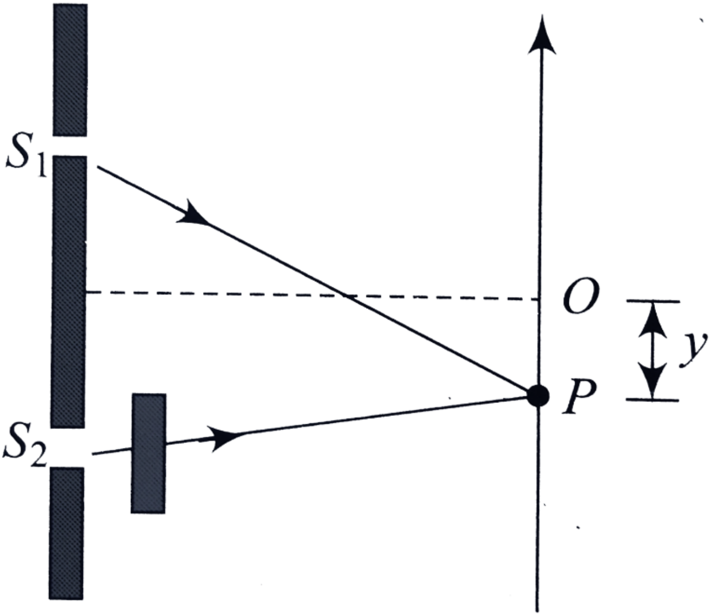
27. The Young's double-slit experiment is done in a medium of refractive index $4//3$. A light of 600 nm wavelength is falling on the slits having 0.45 mm separation. The lower shift $S_{(2)}$ is covered by a thin glass sheet of refractive index. 1.5. The interference pattern is observed on a screen placed 1.5 m from the slits as shown in Figure



a. Find the location of central maximum (bright fringe with zero path difference) on the y-axis.

Watch Video Solution

28. The Young's double-slit experiment is done in a medium of refractive index 4//3. A light of 600 nm wavelength is falling on the slits having 0.45 mm separation. The lower shift S_(2) is covered by a thin glass sheet 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



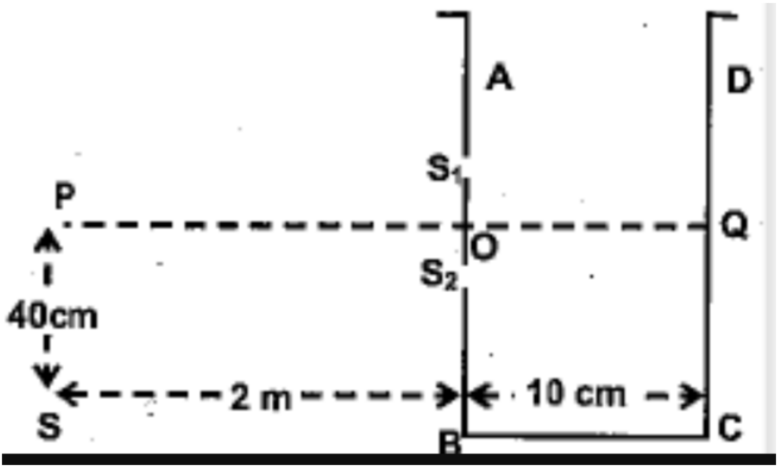
Find the light intensity of point O relative to the maximum fringe intensity.

Watch Video Solution

29. 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 and the two reflected rays interface . If $\lambda = 648nm$, obtain the least value of t $\left(\text{in} 10^{-8} m\right)$ which the rays interface constructively.

Watch Video Solution

30. A vessel ABCD of 10 cm width has two small slits S_1 and S_2 sealed with idebtical glass plates of equal thickness. The distance between the slits is 0.8 mm. POQ is the line perpendicular to the plane AB and passing through O, the middle point ofS_1 and S_2. A monochromatic light source is kept at S, 40 cm below P and 2 m from the vessel, to illuminate the slits as shown in the figure. Calculate the position of the central bright fringe on the other wall CD with respect of the line OQ. Now, a liquid is poured into the vessel and filled up to OQ. The central bright fringe is fiund to be at Q. Calculate the refractive index of the liquid.



Watch Video Solution

31. In figure S is a monochromatic point source emitting light of wavelength $\lambda = 500nm$. A thin lens of circular shape and focal length

0.10 m 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 0.5 mm. The distance along the axis from A to L_1 and $L_2 is 0.15 m$, while that from L_1 and L_2 to O is 1.30 m. The screen at O is normal to SO.

(a) If the 3^{rd} intensity maximum occurs at point

P on screen, find distance OP.

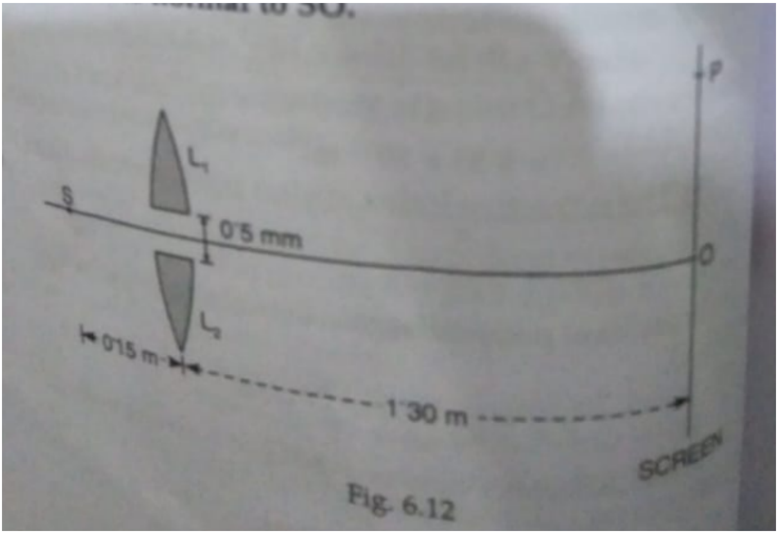


Fig. 6.12

Watch Video Solution

32. In figure S is a monochromatic point source emitting light of wavelength $\lambda = 500nm$. A thin lens of circular shape and focal length 0.10 m 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 0.5 mm. The distance along the axis from A to L_1 and $L_2 is 0.15 m$, while that from L_1 and L_2 to O is 1.30 m. The screen at O is normal to SO.

If the gap between L_1 and L_2 is reduced from its original value of 0.5 mm, will the distance OP (Distance between origin and third maxima) increases, decreases or remain the same?

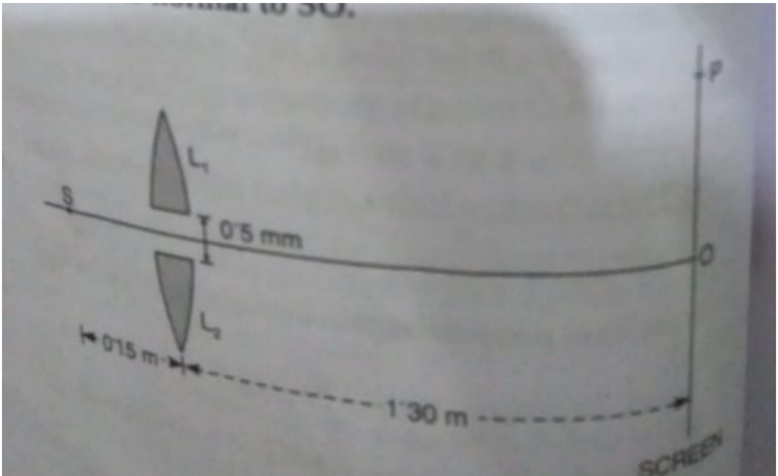


Fig. 6.12

Watch Video Solution

33. What is interference of light?

Watch Video Solution

34. What are coherent sources of light?

Watch Video Solution

35. Can two independent source of light be coherent ? Why ?

Watch Video Solution

36. State with reason, why two independent sources of light cannot be considered on coherent sources.

Watch Video Solution

37. State two conditions to obtain sustained intereferance.

Watch Video Solution

38. State conditions which must be satisfied for two light sources to be coherent.

Watch Video Solution

39. What happens to the interference pattern if phase difference between two light sources varies continuously?

Watch Video Solution

40. State with reason, why two independent sources of light cannot be considered on coherent sources.

Watch Video Solution

41. If Young's double slit experiment, two slits are illuminated by two light sources of the same wavelength, will you observe interference patterns?

Watch Video Solution

42. Why should we have narrow sources to produce good interference fringes?

Watch Video Solution

43. What is the main condition to produce interference of light?

Watch Video Solution

44. What is interference of light? Write two essential condition for sustained interference pattern to be produced on the screen.

Watch Video Solution

45. Define the term'coherent sources' which are required to produce interference pattern in Young's double slit experiment.

Watch Video Solution

46. What is the limitations of the principle of superposition of waves?

Watch Video Solution

47. Give the principle of superposition.

Watch Video Solution

48. What happens to the interference pattern,when one of the slits is closed?

Watch Video Solution

49. What is the relation between path difference and phase difference?

Watch Video Solution

50. Describe the condition for constructive and destructive interfernce.

Watch Video Solution

51. What are constructive and destructive interferences ?

Watch Video Solution

52. Ratio of intensity of two waves is given by 4:1. Then, ratio of the amplitude of the two waves is:

Watch Video Solution

53. What is the ratio of slit widths, when the amplitude of light waves from them have a ratio $\sqrt{2}:1$?

Watch Video Solution

54. If the separation between two alits is decreased in Young's double slit experiment,keeping the screen position fixed,what will happen to the fringe width?

Watch Video Solution

55. Why interference pattern not detected when two coherent sources are far apart.

Watch Video Solution

56. The phase difference between the light waves emerging from the slits of the Young's experiment is π radian. Will the central fringe will be dark or bright?

Watch Video Solution

57. What happens to fringe width,when the separation between the sources is increased?

Watch Video Solution

58. What is the effect of slit width and wavelength of light source on fringe width of the fringes formed by Young's double slit experiment?

Watch Video Solution

59. What will be the effect on the interferece fringes,if red light is replaced by blue light?

Watch Video Solution

60. In Young's double-slit experiment, the separation of slits is doubled and the distance of the slits and screen is halved. How will its affect the fringe width?

Watch Video Solution

61. How would the angular separation of interfernece frings in Young's double slit experiment change when the distance of separation between the slits and the screen is doubled?

Watch Video Solution

62. Is energy conserved in interference?

Watch Video Solution

63. Can white light produce interference? What is its nature?

Watch Video Solution

64. When a thin trjansparent film is placed just in front of one of the two slitts in the Young's double slit experiment using white light ,what change results in the fringe system?

Watch Video Solution

65. Why do the oil films on the surface of water appear to be coloured?

Watch Video Solution

66. Why does an excessively thin film appear black in reflected light?

Watch Video Solution

67. Bubbles of colourless soap solution appear coloured in sunlight.Why?

Watch Video Solution

68. Oil floating on water looks coloured due to interference of light.What should be the approximate thickness of the fiml jfor such effects to be visible?

Watch Video Solution

69. Thin films such as soap bubbles or a thin layer of oil on water show bequtiful colours,when illuminated by white ligth.Explain the observation.

Watch Video Solution

70. Define the term 'coherence' for light waves.

Watch Video Solution

71. Why two independent sources cannot produce sustained interfernce?

Watch Video Solution

72. What are the coherent source of light ? What are the conditions for obtaining two coherent sources of light ?

Watch Video Solution

73. State conditions which must be satisfied for two light sources to be coherent.

Watch Video Solution

74. What is the difference between coherent and incoherent sources of light?

Watch Video Solution

75. State two conditions to obtain sustained intereferance.

Watch Video Solution

76. In Young wavelength λ, the intensity of light at a point on the screen where path difference is λ, is K units. What is the intensity of light at a point where path difference is $\frac{\lambda}{3}$?

Watch Video Solution

77. Consider interfernece between two sources of intejnsities I and 4 I.Obtain intesity at a point,where the phase difference is $\pi/2$.

Watch Video Solution

78. Find the ratio of intensities at the two pints X and Y on a screen in Young's double slit experiment, where waves from the two sources S_1 and S_2 have path difference of 0 and $\frac{\lambda}{4}$

Watch Video Solution

79. Find the ratio of intensities at the two pints X and Y on a screen in Young's double slit experiment, where waves from the two sources S_1 and S_2 have path difference of 0 and $\frac{\lambda}{4}$

Watch Video Solution

80. Two light waves of amplitudes a_1 and a_2 interfere with each other. write the ratio of the intensities of a maxima to that of a minima.

Watch Video Solution

81. What will be the intensities of the maxima and minima,when the ligth waves interfering with each other are of the same amplitude? Show that the intensity of the maxima is four times the intensity of light due to each of two slits.

Watch Video Solution

82. In a double slit interfrence experiment the two coherent beams have slightly different intensitties I and $I + \delta I(\delta I is lower than I)$

.Show that the resultant intensity at the maxima in nerly 4 I,while that at minima is nearly zero.

Watch Video Solution

83. Fill ups

The width of dark and bright frings are..................

.

Watch Video Solution

84. Sketch the variation of intensity of the interference pattern in Young's double slit experiment.

Watch Video Solution

85. Why interference pattern not detected when two coherent sources are far apart.

Watch Video Solution

86. No interference pattern is detected when two coherent sources are infinitely close to each other. Why?

Watch Video Solution

87. No interference pattern is detected when two coherent sources are infinitely close to each other. Why?

Watch Video Solution

88. Why interference pattern not detected when two coherent sources are far apart.

Watch Video Solution

89. How will the angular separation and visibility of fringes in Young's double slit experiment change when

screen is moved away from the plane of the slits.

Watch Video Solution

90. What is the effect on the interference fringes in a Young's double slit experiment due to each of the following oerations?

The source is replced by nother source of shorter wavelength.

Watch Video Solution

91. What is the effect on the interference fringes in a Young's double slit experiment due to each of the following oerations?

The separtion betwen the two slits is decreased.

Watch Video Solution

92. What is the effect on the interference fringes in a Young's double slit experiment due to each of the following oerations?

The monochromatic source is replaced by a source of white light.

Watch Video Solution

93. What is the effect on the interference pattern in Young's double slit experiment due to each of the following operations?

The widths of the slits are increased equally.

Watch Video Solution

94. What is the effect on the interference pattern in Young's double slit experiment due to each of the following operations?

The shole apparatus is kept in a denser medium.

Watch Video Solution

95. How does the fringe width of interfernce fringe change, when the whole apparatus of Young's experiment is kept in a liquid of refractive index 1.3?

Watch Video Solution

96. Imagne a situation in which Young's double slit apparatus is completely immersed in water.What wiull be the change in fringe width as compared to the case,when the apparatus lies in air?

Watch Video Solution

97. In Young's double silt experiment, the fringe width obtained is 3 mm in air. If the apparatus is immersed in water $(\mu = 4/3)$,what will be the new fringe width?

Watch Video Solution

98. What will be the effect on the fringes formed in Young's double slit experiment, if the apparatus is immersed in water,

Watch Video Solution

99. What kind of frings do you expect to observe if white light is used instead of monochromatic light?

Watch Video Solution

100. How does the angular separation of interfernce fringes change in Young's experiment, if the distance between the slits is increased?

Watch Video Solution

101. In Young's double slit experiment,usin light of wavelength 400 nm,interference fringes of width X are obtained .The wavelength of light is increassed to 600 nm and the separation between the slits is halved.If one wants the observed fringe width on the screen to be the same in the two caes,find the rati of the distance between the screen and the plane of the interfering sources in the two arrangements.

Watch Video Solution

102. How does the central fringe appear,when white light is used in a biprism experiment? Explain your answer.

Watch Video Solution

103. In a Young's double slit experiment ,the distance between the slits and the screen is 1 m.If the distance between the slits is 5 mm,the fringe width is found to be 0.1 mm.Calculate the wavelength of the light used.

Watch Video Solution

104. Draw a labelled diagram to show how interference can take place in thin transparent films by reflected ligth.

Watch Video Solution

105. Does total energy remain conserved in the phenomenon of interference ?

Watch Video Solution

106. When two light waves interfere at same point to produce darkness, what becomes of the light energy?

Watch Video Solution

107. Can wo electric bulbs, point-like and having filaments of the same material placed close together, produce interference? Explain.

Watch Video Solution

108. Prove that the law of conservation of energy is obeyed during interference of light.

Watch Video Solution

109. Consider interfernece between two sources of intejnsities I and 4 I.Obtain intesity at a point,where the phase difference is $\pi / 2$.

Watch Video Solution

110. Consider interference between waves from two sources of intensities I and 4I.find intensities at pints,where phase difference is π.

Watch Video Solution

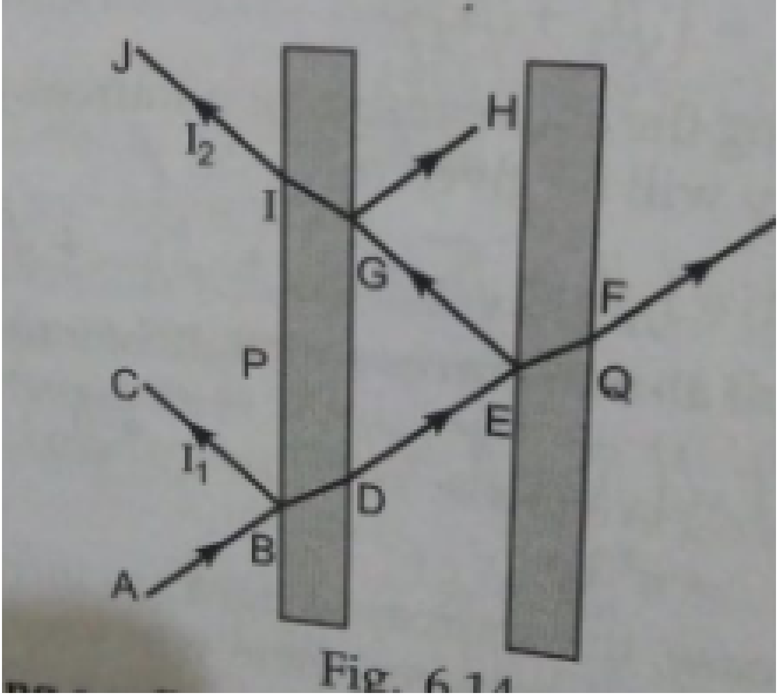
111. What change is observed in interference pattern of Young's double slit experiment ,if one of the two slits is painted,so that it transmits half the light intensity of the other?

Watch Video Solution

112. There aree n identical sources and each of them is emitting light of intensity I_0.Find the resultant intensity of light on interference,when the sources of light are incoherent.

113. There aree n identical sources and each of them is emitting light of intensity I_0.Find the resultant intensity of light on interference,when the sources of light are incoherent.

114. Two glass pates P and Q are held close and parallel to each other.A narrow beam of onochromatic light AB of intensity I is incident on plnate P ,which is partially reflected and transmitted by it. The transmitted beam DE is reflected by plate Q,which is subsequently again reflected and transmitted by the plate P as shown in Fig.6.14.



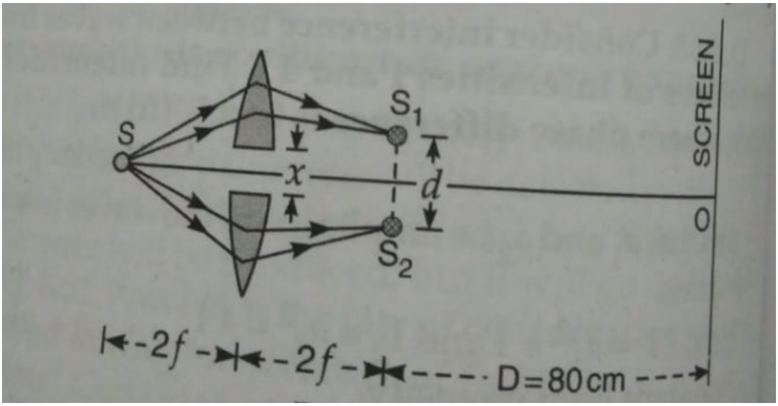
If durign a reflection,each glass plate reflects one-fourth of the light incident on it,then find the intesnstities of maxima and minima in the interference pattern produced by the two beams BC and IJ.

Watch Video Solution

115. What will happen to the interfernce pattern in Young's experiment,if the source is not exactly on the centre line between the slits?

Watch Video Solution

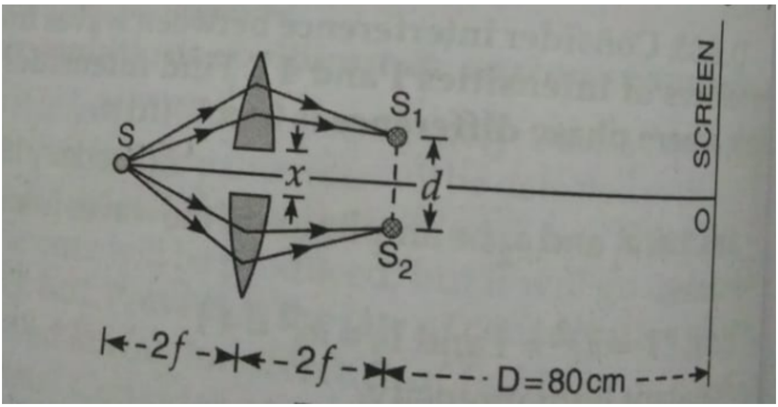
116. One method of prodocing two in - phase point sources of light for interference is to form two images of a point source by means of the two halves of a lens,which has been split along a diameter[Fig.6.17].



How must the two halves of a 5 cm focal length lens be placed to form two real images sources0.24 cm apart and 20 cm from the source?

Watch Video Solution

117. One method of prodocing two in - phase point sources of light for interference is to form two images of a point source by means of the two halves of a lens,which has been split along a diameter[Fig.6.17].



A screen placed perpendicular tot he principal axis and 80 cm from the mage sources.What is the width of central maxima formed on the screen,if the wavelength of the light used is $5.4 \times 10^{-5} cm$?

Watch Video Solution

118. Can you suggest reasons,why no interference is seen ,when ligth reflects from the two surfaces of a windowpane?

Watch Video Solution

119. Lenses are often coated with a thin film to reduce the intesntiy of reflected light.

If the index of refraction of the coating is 1.3 ,what is the smallest thickness that wilo give minimum relfaction of yello light $\left(\lambda = 5, 800\overset{\circ}{A}\right)$?

Watch Video Solution

120. Lenses are often coated with a thin film to reduce the intensity of reflected light.

Such lenses often show a faint purple colour by reflected light.Why?

Watch Video Solution

121. Why does the colour of the oil fim on the surface of water continously change?

Watch Video Solution

122. In a thin soap film is arranged vertically,the coloured horizontal interference bands move downwards and at the same time change their width.After some time , a rapidly growing dark spot appears at the top of the film,which bursts shortly afterwards.Explain,why.

Watch Video Solution

Exercise

1. What is interference of light?

Watch Video Solution

2. What is interference of light?

Watch Video Solution

3. What is interference of light?

Watch Video Solution

4. What are coherent sources of light?

Watch Video Solution

5. What are coherent sources of light?

Watch Video Solution

6. What are coherent sources of light?

Watch Video Solution

7. Two sources of intensity I_1 and I_2 undergo interference in Young's double slit experiment.Show that

$$\frac{I_{\max}}{I_{\min}} = \left(\frac{a_1 + a_2}{a_1 - a_2}\right)^2$$

,where a_1 and a_2 are the amplitudes of distrubance for wo sources S_1 and S_2.

Watch Video Solution

8. What are coherent sources of light? Draw the variation of intensity with position, in the interference pattern of Young's double slit experiment.

Watch Video Solution

9. Obtain the condition for gettin dark and bright fringes in Young's experiment.Hence write the experssion for the fringe width.

Watch Video Solution

10. Derive an expression for fringe width in Young's double slit interference of light.

Watch Video Solution

11. Light after passing through two adjacent narrow slits falls on a screeen.Find the exprssion for fringe width.

Watch Video Solution

12. Derive an expression for fringe width in Young's double slit interference of light.

Watch Video Solution

13. Derive an expression for fringe width in Young's double slit interference of light.

Watch Video Solution

14. Define coherent sources of light, fringe width and interference of light. Show that the width of dark fringe is equal to the width of bright fringe in Young's double slit experiment.

Watch Video Solution

15. Prove that the fringe width of both the bright and dark fringes in interference is same in Young's double slit experiment.

Watch Video Solution

16. Prove that the fringe width of both the bright and dark fringes in interference is same in Young's double slit experiment.

Watch Video Solution

17. In Young's double slit experiment what is the shape of interference fringes?

Watch Video Solution

18. Show that Lenz's law obeys the law of conservation of energy.

Watch Video Solution

19. Prove that the law of conservation of energy is obeyed during interference of light.

Watch Video Solution

20. Discuss the conditions for film to appear bright and dark,when viewed from the other side of the film.

Watch Video Solution

21. Explain the colour formation in a thin oil film.

Watch Video Solution

22. State the essential conditions for two light waves to be cohrent.

Watch Video Solution

23. Show that the superposition of the waves originating from the two coherent sources S_1 and S_2 having displacements $y_1 = a\cos\omega t$ and $y_2 = \cos(\omega t + \phi)$.at a point produce a result intensity $I_R = 4a^2\cos^2\frac{\phi}{2}$.

Hence,write the conditions for the appearance of bringt and dark fringes.

Watch Video Solution

24. Describe the condition for constructive and destructive interfernce.

Watch Video Solution

25. What is interference of light ? What is constructive and destructive interference of light ?

Watch Video Solution

26. Show that in Young's double slit experiment for interference of light, the widths of the bright and dark fringes are equal.

Watch Video Solution

27. Show that in Young's double slit experiment for interference of light, the widths of the bright and dark fringes are equal.

Watch Video Solution

28. Show that in Young's double slit experiment for interference of light, the widths of the bright and dark fringes are equal.

Watch Video Solution

29. Show that in Young's double slit experiment for interference of light, the widths of the bright and dark fringes are equal.

Watch Video Solution

30. Derive an expression for fringe width in Young's double slit interference of light.

Watch Video Solution

31. Obtain the condition for gettin dark and bright fringes in Young's experiment.Hence write the experssion for the fringe width.

Watch Video Solution

32. Show that in Young's double slit experiment for interference of light, the widths of the bright and dark fringes are equal.

Watch Video Solution

33. Derive an expression for fringe width in Young's double slit interference of light.

Watch Video Solution

34. What will be the effect on the fringes formed in Young's double slit experiment, if the apparatus is immersed in water,

Watch Video Solution

35. Describe the condition for constructive and destructive interfernce.

Watch Video Solution

36. Write the conditions on path difference under which

destructive interference occur in Young's double slit experiment.

Watch Video Solution

37. In a young 's double slit experiment, what chagne in the interfrence pattern do you observe,if the two slts S_1 and S_2 are taken as a point source?

Watch Video Solution

38. Draw a graph showing the variation of intensity verses the position on the screen in Young's experiment, when one of the slits is closed.

Watch Video Solution

39. In Young's double-slit experiment deduce the condition for constructive and destructive interference at a point on the screen. Draw the graph showing variation of the resultant intensity in the interference pattern against position 'X' on the screen.

Watch Video Solution

40. In Young's double-slit experiment deduce the condition for constructive and destructive interference at a point on the screen. Draw the graph showing variation of the resultant intensity in the interference pattern against position 'X' on the screen.

Watch Video Solution

41. What is interference of light? Write two essential condition for sustained interference pattern to be produced on the screen.

Watch Video Solution

42. What is interference of light? Write two essential condition for sustained interference pattern to be produced on the screen.

Watch Video Solution

43. In Young's double slit experiment, the widths of two slits are in the ratio $1:4$. Find at the ratio of maximum and minimum intensity in the interfernce pattern obtained.

Watch Video Solution

44. If the two slits in Young's double slit experiment have width ratio $16:1$, deduce the ratio of intensity at maxima and minima in the interfernce pattern.

Watch Video Solution

45. The widths of two slits in an interference experiment ar in the ratio 9:1.What is the ratio of amplitudes and intensitites of light waves from them?

Watch Video Solution

46. If the two slits in Young's double slit experiment have width ratio $16:1$, deduce the ratio of intensity at maxima and minima in the interfernce pattern.

Watch Video Solution

47. Two coherent sources whose intensity ratio is 81:1 produce interfrerence frines.Calculate th ratio of intenstiy of maxima and minima in the fringe system.

Watch Video Solution

48. Two coherent source of light,whose intensity ratio is 49:1 produces interference fringe.Calculate the ratio of intensity of maximum and minimum in the fringe system.

Watch Video Solution

49. In Young's interfernece experiment,the ratio of intensity at the maxima and minima in the iterference pattern is 25:9.What will be the ratio of widths of the two slits?

Watch Video Solution

50. In Young's interfernece experiment,the ratio of intensity at the maxima and minima in the iterference pattern is 25:9.What will be the ratio of widths of the two slits?

Watch Video Solution

51. In a Young's double slit experiment,interfernce fringes were produced on a screen placed at 1.5 m from the two slits

0.3 mm apar and illuminated by ligth of $6, 400\overset{\circ}{A}$.Find the fringe width.

Watch Video Solution

52. In a Young's double slit experiment ,light has a frequency of $6 \times 10^{14} s^{-1}$.The distance between the centres of adjacent brigth fringes is 0.75 mm. If the screen is 1.5m away then, find the distance between the slits.

Watch Video Solution

53. In young's double slit experiment,the two slits are 0.5 mm apart .The screen is placed 1 m away from the slits .The distance of 11th fringe from the first fringe is 1.0 cm.Calculate the wavelength of light used.

Watch Video Solution

54. Light of wavelength $5,000\overset{\circ}{A}$ is incident on a double slit.If the overall separation of 10 fringes on a screen 200 cm away is 1.0 cm,find the distance between the two slits.

Watch Video Solution

55. Green light of wavelength $5, 100\overset{\circ}{A}$ from a narrow silt is incident on a double slit.If the overall separation of 10 fringes on a screen 200 cm away is 2 cm,find slit separation.

Watch Video Solution

56. In Young's doule slit experiment,the slits are 3 m from the screen.The width of the fringes observed with ilght of wavelength $6,000\overset{\circ}{A}$ is 2 mm.What is the separation of the slits?

Watch Video Solution

57. In Young's experiment,the distance of screen from the two slits is 1.0 m.when a ligth of wavelength $6,000 \circ A$ is allowed to fall on the silts,the width of the fringes obtained on the screen is 2.0 mm.Determine distance between the two slits.

Watch Video Solution

58. In Young's doule slit experiment,the slits are 3 m from the screen.The width of the fringes observed with ilght of wavelength $6,000\overset{\circ}{A}$ is 2 mm.What is the separation of the slits?

Watch Video Solution

59. The fringe width in a Young's double slit inter pattern is $2.4 \times 10^{-4} m$,when a red ligth of wavelength $6,400\overset{\circ}{A}$ is used.By how much will it change,if blue ligth of wavelength $4,000\overset{\circ}{A}$ is used?

Watch Video Solution

60. In a Young's double slit experiment,the fringe width obtained is 0.6 cm,when light of wavelength $4,800\overset{\circ}{A}$ is used .If the distance between the screen and the slit is reduced to half,what should be the wavelength of light used to obtain fringes 0.0045 m wide?

Watch Video Solution

61. In Young's double slit experiment the width of the fringes obtained with ith of wavelength $4, 500\overset{\circ}{A}$ is 1.8 mm.If the distance between the two slits is 0.3 mm,find the distance of the screen from the slits.What will be the fringe width,if the enitre apparatus is immersed in water of refraction index $4/3$.

Watch Video Solution

62. In a Young 0.28 mm and the screen is placed 1.4 m away. The distance between the central bright fringe and the fourth bright fringe is measured to be 1.2 cm. Determine the wavelength of light used in he experiment.

Watch Video Solution

63. The two slits in Young's double slit experiment are seprated by a distance of 0.03 cm.When light of wavelength $5,000\overset{\circ}{A}$falls on the slits,nd interference pattern is produced on the screen 1.5 m away.Find the distance of 4th bright fringe from the central maximum.

Watch Video Solution

64. In Young's double slit experiment,light of wavelength$5, 000\mathring{A}$ is used.The screen on which fringes are projected is 1.5 m from the centre of the narrow slits. The third bright band on the screen is formed at a distance of 1 cm from the central bright band calculate the separation between the slits.

Watch Video Solution

65. Two parallel slits used for Young's interference experiment are .5 mm apart.The screen on which fringes are projected is 1.5 m from the slits . How far is the third dark fringe from the central bright one? Wavelength of light used is $6, 000\overset{\circ}{A}$.

Watch Video Solution

66. Young's double - slit experiment for interference is performed with two slits 3×10^{-3} m apart and light of wavelength $6, 600\overset{\circ}{A}$. If the screen is 1 m away from the the slits,find out the position of the fourth dark fringe.

Watch Video Solution

67. In Young's double - slit exp[eriment ,two slits are 0.15 mm apart and illuminated by ligth of wavelenth 450 nm.The screen is 1 m away from the slits.

Find the distance of the second bright fringe

Watch Video Solution

68. In Young's double - slit exp[eriment ,two slits are 0.15 mm apart and illuminated by ligth of wavelenth 450 nm.The screen is 1 m away from the slits.

Find the distance of the second

dark fringe from the central maximum.

Watch Video Solution

69. In Young's double - slit exp[eriment ,two slits are 0.15 mm apart and illuminated by ligth of wavelenth 450 nm.The screen is 1 m away from the slits.

How will the fringe pattern chang,if the screen is moved away from the slits?

Watch Video Solution

70. In Young's double slit experiment,two slits are separated by 3 mm distance and illuminated by ligth of wavelength 480 nm.The screen is at 2 m from the plane of the slits.Calculate the separtion between the 8th bright finge and the 3rd dark fringe obsrved with respect to the central brigth fringe.

Watch Video Solution

71. In a Young's double slit experimnet,red ligth of wavelength$6,000\mathring{A}$ is used and the nth bright fringe is obtained at a point P n the screen .Keeping the same setting,the source is replaced by green light of $5,000\mathring{A}$ and now (n+1) th brigth fringe is obtained at the point P .Calculate the value of n.

Watch Video Solution

72. Laser light of wavelength 630 nm incident on a pair of slits prodeuces an interference pattern in which the bright fringes are separated by 8.3 mm .A second light produces an interfernce pattern in which the bright fringes are separated by 7.6 mm .Find the wavelength of the second light.

Watch Video Solution

73. In Young's double slit experiment,ligth of wavelnegth $6,000\overset{\circ}{A}$ is used to get an interference pattern on a screen.The fringe width changes by 1.5 mm,when the screen is brougnt towards the double slit by 50 cm.Find the distance between the two slits.

Watch Video Solution

74. In Young's double slit experiment,the slits are 0.2 mm apart.The interfernce fringes for ligth of wavelength $6, 000\overset{\circ}{A}$ are formed on a screen distanct 1.5 m from the sits.Calculate the angular position of the third maxima,

Watch Video Solution

75. In Young's double slit experiment,the slits are 0.2 mm apart.The interfernce fringes for ligth of wavelength $6, 000\overset{\circ}{A}$ are formed on a screen distanct 1.5 m from the sits.Calculate the angular position of the fifth minima

Watch Video Solution

76. In Young's double slit experiment,the slits are 0.2 mm apart.The interfernce fringes for ligth of wavelength $6,000\overset{\circ}{A}$ are formed on a screen distanct 1.5 m from the sits.Calculate the fringe width.

Watch Video Solution

77. Find the minimum thickness of a film which wioll strongly relfect the ligth of wavelength 589 nm,when incident normally on it.the refractive index of the material of the film is 1.25.

Watch Video Solution

78. Light of wavelength $6,000\mathring{A}$ is incident on a thin film of refractive index 1.5 ,such that angle of refraction into the film in 60° .Calculate the smallest thickness of the film,which will make it appear dark by reflection.

Watch Video Solution

79. A soap flm of refractinve index $4/3$ is illuminated by white light incident at an angle 45°.The transmitted length is examined in a spectroscope and a brigth band is found to be at $6,000\overset{\circ}{A}$.Find the minimum thickness of the film.

Watch Video Solution

80. The width of one of the two slits in a Young's double slit experiment is double of the other slit.Assuming that the amplitude of the light coming rrom a slit is proportional to the slit width ,find the ratio fo the maximum to the minimum intenstiy in the interference pattern.

Watch Video Solution

81. Two coherent sources of intensity ratioβ interfere.Prove that in interference pattern,

$$\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}} = \frac{2\sqrt{\beta}}{1+\beta}.$$

Watch Video Solution

82. Two sources of intensities I and 4 I are used in an interference experiment.Obtain intensities at points,where the waves from two sources superimpose with a phase different of 0

Watch Video Solution

83. Consider interfernece between two sources of intejnsities I and 4 I.Obtain intesity at a point,where the phase difference is $\pi / 2$.

Watch Video Solution

84. Consider interference between waves from two sources of intensities I and 4I.find intensities at pints,where phase difference is π.

Watch Video Solution

85. Find the maximum intensity in case of interference of n identical waves each of intensity I_0,if the interference is from coherent sources

Watch Video Solution

86. Find the maximum intensity in case of interference of n identical waves each of intensity I_0,if the interference is incoherent.

87. In a double-slit experiment the angular width of a fringe is found to be 0.2° on a screen placed 1 m away. The wavelength of light used is 600 nm. What will be the angular width of the fringe if the entire apparatus is immersed in water? Take refractive indexof water to be $\frac{4}{3}$.

88. In Young' double slit experiment, the expriment, the angular width of a fringe formed on a distant screen is 0.5°. The wavelength of light used is $6000\overset{\circ}{A}$. What is the spacing between the slits?

Watch Video Solution

89. The optical path of a monochromatic ligth is the same,if it goes through 2.0 cm of glass or 2.25 cm of water.If the refractive index of water is $4/3$,what is the refractive index of glass?

Watch Video Solution

90. Monochromatic ligth of wavelgth $6,000\overset{\circ}{A}$ is used in a Young's double slit experiment.One of the slits is covered by a transparent film of thickness 1.2×10^{-5} m having refractive index 1.4.How many fringes will shift due to the introduction of the film?

Watch Video Solution

91. In Young's double slit experiment ,the central bright fringe produced by ligth of wavelength $5,600\overset{\circ}{A}$ shifts to the position of 5th brigth fringe,when thin transparent film of refractive index 1.28 is introduced in the path of light from one of two slits.Find the thickness of te film.

Watch Video Solution

92. A beam of ligth consisting of two wavelength $4, 800\overset{\circ}{A}$ and $6, 000\overset{\circ}{A}$ is used to obtain interfernce fringes in a double slit experiment.The distnce between the slits is 1.8 mm and the distance of screen from the plane of slits is 1.2 m

Find the distance of the third bright frings on the screen from the central maximum for the wavelength $6, 000\overset{\circ}{A}$.

Watch Video Solution

93. A beam of ligth consisting of two wavelength $4,800\overset{\circ}{A}$ and $6,000\overset{\circ}{A}$ is used to obtain interfernce fringes in a double slit experiment.The distnce between the slits is 1.8 mm and the distance of screen from the plane of slits is 1.2 m

What is the lest distance from the centre of the screen,where the brigth fringes due to both the wvelength coincide?

Watch Video Solution

94. Find the ratio of the intensity at the centre of a bright fringe to the intensity at the point on equarter of the distance between two fringes from the centre.

Watch Video Solution

95. In a Young's double slit experiment,two slits are 1.5 mm apart and a screen in placed at a distance 1.2 m from the plane of the slits .The slits are illuminated with light of wavelength $6,000\overset{\circ}{A}$.Find the inimum distance from the central maximum for which the intensity is half of the maximum intensity.

Watch Video Solution

96. A thin film is $4,000\overset{\circ}{A}$ thick. White light from an extended source falls normally on the film.If the refractive index of film is 1.5,what wavelength within the visible spectrum will be intenisifed in the reflected beam ,if visible range of the spectrum is $3,900\overset{\circ}{A}$ to $7,800\overset{\circ}{A}$?

Watch Video Solution

97. A soap film of refractinve index $4/3$ is illuminated by white light incident at an angle 45°.The transmitted length is examined in a spectroscope and a brigth band is found to be at $6,000\overset{\circ}{A}$.Find the minimum thickness of the film.

Watch Video Solution