PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

WAVE OPTICS

Exercise

1. By corpuscular theory of light, the phenomenon which can be explained is

A. Refraction

B. Interference

C. Diffraction

D. Polarisation

Answer: A

Watch Video Solution

2. According to corpuscular theory of light, the different colours of light are due to

A. Different electromagnetic waves

B. Different force of attraction among the corpuscles

C. Different size of the corpuscles

D. None of the above

Answer: C

Watch Video Solution

3. Huygen's principle of secondary waves

A. Allow us to find the focal length of a thick lens

B. Is a geometrical method to find a wavefront

C. Is used to determine the velocity of light

D. Is used to explain polarization

Answer: B

Watch Video Solution

4. The idea of the quantum nature of light has emerged in an attempt to explain

A. Interference

B. Diffraction

C. Radiation spectrum of a black body

D. Polarisation

Answer: C

Watch Video Solution

5. Two light sources are said to be coherent if they are obtained from

A. Two different lamps

B. Two different lamps but of the same power

C. Two different lamps of same power and having the same colour

D. None of the above

Answer: D

Watch Video Solution

6. By Huygen's wave theroy of light, we cannot explain the phenomenon of

A. Interference

B. Diffraction

C. Photoelectric effect

D. Polarisation

Answer: C

Watch Video Solution

7. The phenomenon of interference is shown by

A. Longitudinal mechanical waves only

B. Transverse mechanical waves only

C. Electromagnetic waves only

D. All the above types of waves

Answer: D

Watch Video Solution

8. Two coherent monochromatic light beams of intensities I and 4 I are superposed. The maximum and minimum possible intensities in the resulting beam are

A. 5 I and I

B. 5 I and 3 I

C. 9 I and I

D. 9 I and 3 I

Answer: C

Watch Video Solution

9. Light appears to travel in straight lines since

A. It is not absorbed by the atmosphere

B. It is reflected by the atmosphere

C. Its wavelength is very small

D. Its velocity is very large

Answer: C

Watch Video Solution

10. The idea of secondary wavelets for the propagation of a wave was first given by

A. Newton

B. Huygen

C. Maxwell

D. Fresnel

Answer: B

Watch Video Solution

11. By a monochromatic wave, we mean

A. A single ray

B. A single ray of a single colour

C. Wave having a single wavelength

D. Many rays of a single colour

Answer: C

Watch Video Solution

12. The similarity between the sound waves and light waves is

A. Both are electromagnetic waves

B. Both are longitudinal waves

C. Both have the same speed in a medium

D. They can produce interference

Answer: D

Watch Video Solution

13. The ratio of intensities of two waves is $9:1$ When they superimpose, the ratio of maximum to minimum intensity will become :-

A. $10:8$

B. $9:1$

C. $4:1$

D. $2:1$

Answer: C

Watch Video Solution

14. A wave can transmit ...... from one place to another

A. Energy

B. Amplitude

C. Wavelength

D. Matter

Answer: A

Watch Video Solution

15. If the ratio of intensities of two waves is 1 : 25, then the ratio of their amplitudes will be

A. $1:25$

B. $5:1$

C. $26:24$

D. $1:5$

Answer: D

Watch Video Solution

16. Two identical light sources S_1 and S_2 emit light of same wavelength λ. These light rays will exhibit interference if

A. Their phase differences remain constant

B. Their phases are distributed randomly

C. Their light intensities remain constant

D. Their light intensities change randomly

Answer: A

Watch Video Solution

17. Wave nature of light follows because

A. Light rays travel in a straight line

B. Light exhibits the phenomena of reflection and refraction

C. Light exhibits the phenomenon of interference

D. Light causes the phenomenon of photoelectric effect

Answer: C

Watch Video Solution

18. L is the coherence length and c the velocity of light, the coherent time is

A. cL

B. $\frac{L}{c}$

C. $\frac{c}{L}$

D. $\frac{1}{Lc}$

Answer: B

Watch Video Solution

19. If the amplitude ratio of two sources producing interference is 3 : 5, the ratio of intensities at maxima and minima is

A. $25:16$

B. $5:3$

C. $16:1$

D. $25:9$

Answer: C

Watch Video Solution

20. Colours of thin films result from

Or

On a rainy day, a small oil film on water show brilliant colours. This is due to

A. Dispersion of light

B. Interference of light

C. Absorption of light

D. Scattering of light

Answer: B

Watch Video Solution

21. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be

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

B. $(2n-1)\frac{\lambda}{2}$

C. $n\lambda$

D. $(2n+1)\frac{\lambda}{2}$

Answer: C

Watch Video Solution

22. Two sources of waves are called coherent if

A. Both have the same amplitude of vibrations

B. Both produce waves of the same wavelength

C. Both produce waves of the same wavelength having constant phase difference

D. Both produce waves having the same velocity

Answer: C

Watch Video Solution

23. Soap bubble appears coloured due to the phenomenon of

A. Interference

B. Diffraction

C. Dispersion

D. Reflection

Answer: B

Watch Video Solution

24. Which of the following statements indicates that light waves are transverse?

A. Light waves can travel in vacuum

B. Light waves show interference

C. Light waves can be polarized

D. Light waves can be diffracted

Answer: C

Watch Video Solution

25. If two light waves having same frequency have intensity ratio $4:1$ and they interfere, the ratio of maximum to minimum intensity in the pattern will be

A. $9:1$

B. $3:1$

C. $25:9$

D. $16:25$

Answer: A

Watch Video Solution

Watch Video Solution

26. Evidence for the wave nature of light cannot be obtained from

A. Reflection

B. Doppler effect

C. Interference

D. Diffraction

Answer: A

Watch Video Solution

27. Two light sources are said to be coherent if they are obtained from

A. Two independent point sources emitting light of the same wavelength

B. A single point source

C. A wide source

D. Two ordinary bulbs emitting light of different wavelengths

Answer: B

Watch Video Solution

28. Wavelength of light of frequency 100 Hz

A. $2 \times 10^6 m$

B. $3 \times 10^6 m$

C. $4 \times 10^6 m$

D. $5 \times 10^6 m$

Answer: B

Watch Video Solution

29. Two waves having intensity in the ratio $25 : 4$ produce interference. The ratio of the maximum to the minimum intensity is

A. $5 : 2$

B. $7 : 3$

C. $49 : 9$

D. $9 : 49$

Answer: C

Watch Video Solution

30. Wavefront means

A. All particles in it have same phase

B. All particles have opposite phase of vibrations

C. Few particles are in same phase, rest are in opposite phase

D. None of these

Answer: A

Watch Video Solution

31. Wavefront of a wave has direction with wave motion

A. Parallel

B. Perpendicular

C. Opposite

D. At an angle of θ

Answer: B

Watch Video Solution

32. Which one of the following phenomena is not explained by Huygens construction of wavefront?

A. Refraction

B. Reflection

C. Diffraction

D. Origin of spectra

Answer: D

33. 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 bright bands

C. Interference with dark bands

D. Interference in which width of the fringe will be slightly increased

Answer: D

Watch Video Solution

34. The ratio of intensities of two waves are given by $4:1$. The ratio of the amplitudes of the two waves is

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: A

Watch Video Solution

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

A. Have constant phase difference

B. Be narrow

C. Be close to each other

D. Of same amplitude

Answer: A

Watch Video Solution

36. If the ratio of amplitude of two waves is $4:3$, then the ratio of maximum and minimum intensity is

A. $16:18$

B. $18:16$

C. $49:1$

D. $94:1$

Answer: C

Watch Video Solution

37. Which of the following is conserved when light waves interfere

A. Intensity

B. Energy

C. Amplitude

D. Momentum

Answer: B

Watch Video Solution

38. Intensity of light depends upon

A. Velocity

B. Wavelength

C. Amplitude

D. Frequency

Answer: C

Watch Video Solution

39. Ray diverging from a point source from a wave front that is

A. Cylindrical

B. Spherical

C. Plane

D. Cubical

Answer: B

Watch Video Solution

40. Ratio of amplitude of interfering waves is $3:4$. Now ratio of their intensities will be

A. $\frac{16}{9}$

B. $49:1$

C. $\frac{9}{16}$

D. None of these

Answer: C

Watch Video Solution

41. Two coherent sources have intensity in the ratio of $\frac{100}{1}$. Ratio of (intensity) max/(intensity) min is

A. $\frac{1}{100}$

B. $\frac{1}{10}$

C. $\frac{10}{1}$

D. $\frac{3}{2}$

Answer: D

Watch Video Solution

42. If two waves represented by $y_1 = 4\sin\omega t$ and $y_2 = 3\sin\left(\omega t + \frac{\pi}{3}\right)$ interfere at a point, the amplitude of the resulting wave will be about

A. 7

B. 6

C. 5

D. 3.5

Answer: B

Watch Video Solution

43. Two waves are given by $y_1 = a\sin(\omega t - kx)$ and $y_2 = a\cos(\omega t - kx)$. The phase difference between the two waves is

A. 0

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

C. π

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

Answer: B

Watch Video Solution

44. In a wave, the path difference corresponding to a phase difference of ϕ is

A. $\frac{\pi}{2\lambda}\phi$

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

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

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

Answer: C

Watch Video Solution

45. Two coherent sources of intensities I_1 and I_2 produce an interference pattern. The maximum intensity in the interference pattern will be

A. $l_1 + l_2$

B. $l_1^2 + l_2^2$

C. $(l_1 + l_2)^2$

D. $\left(\sqrt{l_1} + \sqrt{l_2}^2\right)$

Answer: D

Watch Video Solution

46. Newton postulated his corpuscular theory on the basis of

A. Newton's rings

B. Colours of thin films

C. Rectilinear propagation of light

D. Dispersion of white light

Answer: C

Watch Video Solution

47. Dual nature of radiation is shown by

A. Photoelectric effect

B. Refraction and interference

C. Diffraction and reflection

D. Diffraction and photoelectric effect

Answer: D

Watch Video Solution

48. 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 π at point B. Then the difference between resultant intensities at A and B is : $(2001, 2M)$

A. 2I

B. 4l

C. 5l

D. 7l

Answer: B

Watch Video Solution

49. Coherent sources are those sources for which

A. Phase difference remain constant

B. Frequency remains constant

C. Both phase difference and frequency remains constant

D. None of these

Answer: C

Watch Video Solution

50. Two wave are represented by equation $y_1 = a \sin \omega t$ and $y_2 = a \cos \omega t$ the first wave :-

A. Leads the second by π

B. Lags the second by π

C. Leads the second by $\frac{\pi}{2}$

D. Lags the second by $\frac{\pi}{2}$

Answer: D

Watch Video Solution

51. Light waves producing interference have their amplitudes in the ratio $3:2$. The intensity ratio of maximum and minimum interference fringes is

A. $36 : 1$

B. $9 : 4$

C. $25 : 1$

D. $6 : 4$

Answer: C

Watch Video Solution

52. Laser beams are used to measure long distances because

A. They are monochromatic

B. They are highly polarised

C. They are coherent

D. They have high degree of parallelism

Answer: D

Watch Video Solution

53. 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. $25 : 16$

Answer: C

Watch Video Solution

54. The frequency of light ray having the wavelength 3000 Å is

A. 9×10^{13} cycles/sec

B. 10^{15} cycles /sec

C. 90 cycles/sec

D. 3000 cycles/sec

Answer: B

Watch Video Solution

55. Two waves have their amplitudes in the ratio $1:9$. The maximum and minimum intensities when they interfere are in the ratio

A. $\frac{25}{16}$

B. $\frac{16}{26}$

C. $\frac{1}{9}$

D. $\frac{9}{1}$

Answer: A

Watch Video Solution

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

A. Find the velocity of light in vacuum

B. Explain the particle behaviour of light

C. Find the new position of the wavefront

D. Explain photoelectric effect

Answer: C

Watch Video Solution

57. What is the path difference of destructive interference

A. $n\lambda$

B. $n(\lambda + 1)$

C. $\frac{(n+1)\lambda}{2}$

D. $\frac{(2n+1)\lambda}{2}$

Answer: D

Watch Video Solution

58. If an interference pattern have maximum and minimum intensities in $36:1$ ratio, then what will be the ratio of amplitudes?

A. $5:7$

B. $7:4$

C. $4:7$

D. $7:5$

Answer: D

Watch Video Solution

59. Intensities of the two waves of light are I and $4I$. The maximum intensity of the resultant wave their superposition is

A. 5 I

B. 9 I

C. 16 I

D. 25 I

Answer: B

Watch Video Solution

60. As a result of interference of two coherent sources of light, energy is

A. Increased

B. Redistributed and the distribution does not vary with time

C. Decreased

D. Redistributed and the distribution changes with time

Answer: B

Watch Video Solution

61. To deminstrate the phenimenon of interference, we require two sources which emit radiation

A. Of the same frequency and having a define phase relationship

B. Of nearly the same frequency

C. Of the same frequency

D. Of different wavelengths

Answer: A

Watch Video Solution

62. 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 wavelength

D. Of high intensity

Answer: C

Watch Video Solution

63. If the distance between a point source and screen is doubled, then intensity of light on the screen will become

A. Four times

B. Double

C. Half

D. One-fourth

Answer: D

Watch Video Solution

64. Huygens wave theory allows us to know

A. The wavelength of the wave

B. The velocity of the wave

C. The propagation of wave fronts

D.

Answer: D

Watch Video Solution

65. The wave theory of light was given by

A. Maxwell

B. Planck

C. Huygen

D. Young

Answer: C

Watch Video Solution

66. The phase difference between incident wave and reflected wave is 180° when light ray

A. Enters into glass from air

B. Enters into air from glass

C. Enters into glass from diamond

D. Enters into water from glass

Answer: A

Watch Video Solution

67. Which of the following phenomena can explain quantum nature of light?

A. Photoelectric effect

B. Interference

C. Diffraction

D. Polarisation

Answer: A

Watch Video Solution

68. Which of the following is not a property of light?

A. It requires a material medium for propagation

B. It can travel through vacuum

C. It involves transportation of energy

D. It has finite speed

Answer: A

Watch Video Solution

69. What causes changes in the colours of the soap or oil films for the given beam of light

A. Angle of incidence

B. Angle of reflection

C. Thickness of film

D. None of these

Answer: C

Watch Video Solution

70. Select the right option in the following

A. Christian Huygens a contemporary of Newton established the wave theory of light by assuming that light waves were transverse

B. Maxwell provided the compelling theoretical evidence that light is transverse wave

C. Thomas Young experimentally proved the wave behaviour of light and Huygens assumption

D. All the statements give above, correctly answers the question ,what is light'

Answer: B

Watch Video Solution

71. Two waves of intensity I undergo interference. The maximum intensity obtained is

A. $l/2$

B. l

C. 2l

D. 4l

Answer: D

Watch Video Solution

72. Young's experiment establishes that

A. Light consists of waves

B. Light consists of particles

C. Light consists of neither particles nor waves

D. Light consists of both particles and waves

Answer: A

Watch Video Solution

73. In the interference pattern, energy is

A. Created at the position of maxima

B. Destroyed at the position of minima

C. Conserved but is redistributed

D. None of the above

Answer: C

Watch Video Solution

74. Monochromatic green light of wavelength $5 \times 10^{-7} m$ illuminates a pair of slits 1 mm apart. The separation of bright lines on the interference pattern formed on a screen 2 m away is

A. $0.25mm$

B. $0.1mm$

C. $1.0mm$

D. $1.5mm$

Answer: C

Watch Video Solution

75. In Young's double slit experiment, if the slit widths are in the ratio $1:9$, then the ratio of the intensity at minima to that at maxima will be

A. 1

B. $1/9$

C. $1/4$

D. $1/3$

Answer: C

Watch Video Solution

Watch Video Solution

76. In Young's double slit interference experiment, the slit separation is made 3 fold. The fringe width becomes

A. 1/3 times

B. 1/9 times

C. 3 time

D. 9 times

Answer: A

Watch Video Solution

77. In a certain double slit experimental arrangement interference fringes of width $1.0mm$ each are observed when light of wavelength 5000Å is used. Keeping the set up unaltered, if the source is replaced by another source of wavelength 6000Å, the fringe width will be

A. $0.5mm$

B. $1.0mm$

C. $1.2mm$

D. $1.5mm$

Answer: C

Watch Video Solution

78. Two coherent light sources S_1 and $S_2 (\lambda = 6000 \text{Å})$ are $1mm$ apart from each other. The screen is placed at a distance of $25cm$ from the sources. The width of the fringes on the screen should be

A. $0.015cm$

B. $0.025cm$

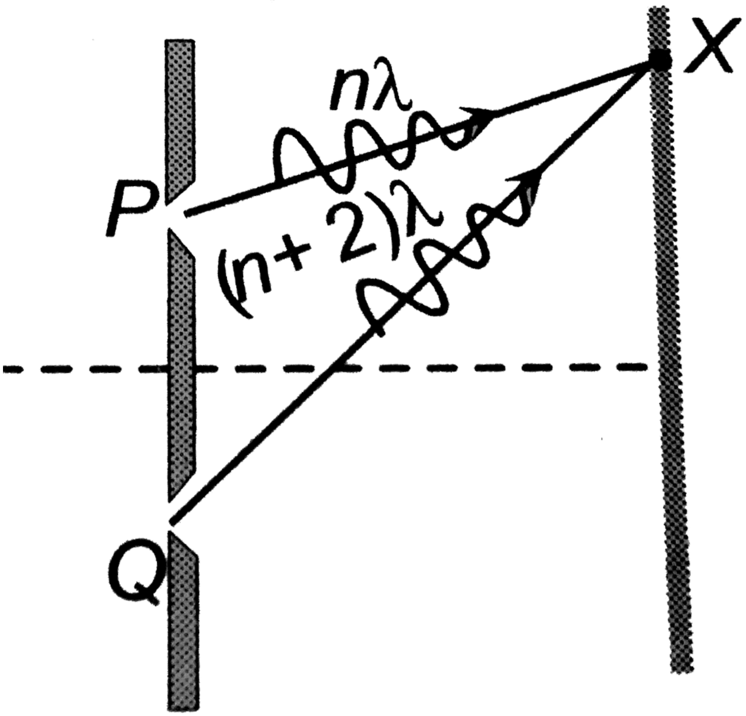
C. $0.010cm$

D. $0.030cm$

Answer: A

Watch Video Solution

79. The figure shows a double slit experiment with P and Q as the slits. The path lengths PX and QX are $n\lambda$ and $(n+2)\lambda$ respectively, where n is a whole number and λ is the wavelength. Taking the central fringe as zero, what is formed at X?



A. First bright

B. First dark

C. Second bright

D. Second dark

Answer: C

Watch Video Solution

80. In Young's double slit experiment, if one of the slit is closed fully, then in the interference pattern

A. A bright slit will be observed, no interference pattern will exist

B. The bright fringes will become more bright

C. The bright fringes will become fainter

D. None of the above

Answer: A

Watch Video Solution

81. In Young's double slit experiment, a glass plate is placed before a slit which absorbs half the intensity of light. Under this case

A. The brightness of fringes decreases

B. The fringe width decreases

C. No fringes will be observed

D. The bright fringes become fainter and the dark fringes have finite light intensity

Answer: D

Watch Video Solution

82. 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. Will not change

B. Will become half

C. Will be doubled

D. Will become four times

Answer: D

Watch Video Solution

83. The maximum intensity of fringes in Young's experiment is I. If one of the slit is closed, then the intensity at that place becomes I_o. Which of the following relation is true?

A. $l = l_0$

B. $l = 2l_0$

C. $l = 4_0$

D. There is no relation between l and l_0

Answer: C

Watch Video Solution

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

A. The intensities of individual sources are 5 and 4 units respectively

B. The intensities of individual sources are 4 and 1 units respectively

C. The ratio of their amplitudes is 3

D. The ratio of their amplitudes is 2

Answer: B::D

Watch Video Solution

85. Oil floating on water looks cloured due to interference of light. What should be the approximate thickness of the film for such effects to be visible ?

A. $100\AA$

B. $10000\AA$

C. 1 mm

D. 1 cm

Answer: B

Watch Video Solution

86. The Young's experiment is performed with the lights of blue $(\lambda = 4360 \text{Å})$ and green colour $(\lambda = 5460 \text{Å})$. If the distance of the 4th fringe from the centre is x, then

A. $x(\text{Blue}) = x(\text{Green})$

B. $x(\text{Blue}) > x(\text{Green})$

C. $x(\text{Blue}) < x(\text{Green})$

D. $\dfrac{x(\text{Blue})}{x(\text{Green})} = \dfrac{5460}{4360}$

Answer: C

Watch Video Solution

87. In the Young's double slit experiment, the spacing between two slits is $0.1mm$. If the screen is kept at a distance of $1.0m$ from the slits and the wavelength of ligth is 5000Å, then the fringe width is

A. $1.0cm$

B. $1.5cm$

C. $0.5cm$

D. $2.0cm$

Answer: C

Watch Video Solution

88. In Young's double slit experiement, if L is the distance between the slits and the screen upon which interference pattern is observed, x is the average distance between the adjacent fringes and d being the slit separation. The wavelength of light if given by

A. $\frac{xd}{L}$

B. $\frac{xL}{d}$

C. $\frac{Ld}{x}$

D. $\frac{1}{Ldx}$

Answer: A

Watch Video Solution

89. In a Young's double slit experiment, the central point on the screen is

A. Bright

B. Dark

C. First bright and then dark

D. First dark and then bright

Answer: A

Watch Video Solution

90. In a Young's double slit experiment, the fringe width is found to be $0.4mm$. If the whole apparatus is immersed in water of refractive index $4/3$ without disturbing the geometrical arrangement, the new fringe width will be

A. $0.30mm$

B. $0.40mm$

C. $0.53mm$

D. 450 micron

Answer: A

Watch Video Solution

91. Young's experiment is performed in air and then performed in water, the fringe width:

A. Will remain same

B. Will decrease

C. Will increase

D. Will be infinite

Answer: B

Watch Video Solution

92. In double slits experiment, for light of which colour the fringe width will be minimum

A. Violet

B. Red

C. Green

D. Yellow

Answer: A

Watch Video Solution

93. In a Young's expt., the width of the fringes obtained with the light of wavelength 6000Å is $2.00mm$. What will be the fringe width if the entire apparatus is immersed in a liquid of $\mu = 4/3$?

A. $0.2mm$

B. $0.3mm$

C. $0.4mm$

D. $1.2mm$

Answer: C

Watch Video Solution

94. In Young's double slit experiment, the phase difference between the light waves reaching third bright fringe from the central fringe will be $(\lambda = 6000\text{Å})$

A. Zero

B. 2π

C. 4π

D. 6π

Answer: D

Watch Video Solution

95. In Young's double slit experiment, if the widths of the slits are in the ratio $4:9$, the ratio of the intensity at maxima to the intensity at minima will be

A. $169 : 25$

B. $81 : 16$

C. $25 : 1$

D. $9 : 4$

Answer: C

Watch Video Solution

96. In Young's double slit experiement when wavelength used is 6000Å and the screen is $40cm$ from the slits, the fringes are $0.012cm$ wide. What is the distance between the slits?

A. $0.024cm$

B. $2.4cm$

C. $0.24cm$

D. $0.2cm$

Answer: D

Watch Video Solution

Watch Video Solution

97. In two separate set-ups of the Young's double slit experiment, fringes of equal width are observed when lights of wavelength in the ratio of $1:2$ are used. If the ratio of the slit separation in the two cases is $2:1$, the ratio of the distance between the plane of the slits and the screen in the two set-ups are

A. $4:1$

B. $1:1$

C. $1:4$

D. $2:1$

Answer: A

Watch Video Solution

98. In an interference experiment, the spacing between successive maxima or minima is

(Where the symbols have their usual meanings)

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

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

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

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

Answer: B

Watch Video Solution

99. If yellow light in the Young's double slit experiement is replaced by red light, the fringe width will

A. Decrease

B. Remain unaffected

C. Increase

D. First increase and then decrease

Answer: C

Watch Video Solution

100. In Young's double slit experiment, the fringe width is $1 \times 10^{-4} m$ if the distance between the slit and screen is doubled and the distance between the two slit is reduced to half and wavelength is changed from $6.4 \times 10^{7} m$ to $4.0 \times 10^{-7} m$, the value of new fringe width will be

A. $0.15 \times 10^{-4} m$

B. $2.0 \times 10^{-4} m$

C. $1.25 \times 10^{-4} m$

D. $2.5 \times 10^{-4} m$

Answer: D

Watch Video Solution

101. In Young's experiment one slit is covered with a blue filter and the other (slit) with a yellow filter then the interference pattern

A. Will be blue

B. Will be yellow

C. Will be green

D. Will not be formed

Answer: D

Watch Video Solution

102. Two sources give interference pattern which is observed on a screen, D distance apart from the sources. The fringe width is 2 w . If the distance D is now doubled, the fringe width will

A. Become w /2

B. Remain the same

C. Become w

D. Become 4 w

Answer: D

Watch Video Solution

103. In double slit experiment, the angular width of the fringes is 0.20° for the sodium light $(\lambda = 5890\text{Å})$. In order to increase the angular width of the fringes by 10%, the necessary change in the wavelength is

A. Increase of 589Å

B. Decrease of 589 Å

C. Increase of 6479Å

D. Zero

Answer: A

Watch Video Solution

104. In a biprism experiement, by using light of wavelength 5000Å, $5mm$ wide fringes are obtained on a screen $1.0m$ away from the coherent sources. The separation between the two coherent sources is

A. $1.0mm$

B. $0.1mm$

C. $0.05mm$

D. 0.01 mm

Answer: B

Watch Video Solution

105. The slits in a Young's double slit experiemnt have equal width and the source is placed symmetrically with respect to the slits.

The Intensty ast the central fringe is I_0. If one of the slits is closed, the intensit at this point will

A. l_0

B. $l_0 / 4$

C. $l_0 / 2$

D. $4l_0$

Answer: B

Watch Video Solution

106. A thin mica sheet of thickness $2 \times 10^{-6} m$ and refractive index $(\mu = 1.5)$ is introduced in the path of the first wave. The wavelength of the wave used is $5000 Å$. The central bright maximum will shift

A. 2 fringes upward

B. 2 fringes downward

C. 10 fringes upward

D. None of these

Answer: A

Watch Video Solution

107. In a Young's double slit experiment, the fringe width will remain same, if (D = distance between screen and plane of slits, d = separation between two slits and λ = wavelength of light used)

A. Both λ and D are doubled

B. Both d and D are doubled

C. D is doubled but d is halved

D. λ is doubled but d is halved

Answer: B

Watch Video Solution

108. In Young's double slit experiment, the slits are $0.5mm$ apart and interference pattern is observed on a screen placed at a distance of $1.0m$ from the plane containg the slits. If wavelength of the incident light is 6000Å, then the separation between the third bright fringe and the central maxima is

A. $4.0mm$

B. $3.5mm$

C. $3.0mm$

D. $2.5mm$

Answer: B

Watch Video Solution

109. In Young's double slit experiment, 62 fringes are seen in visible region for sodium light of wavelength 5893Å. If violet light of wavelength 4358Å, is used in place of sodium light, then number of fringes seen will be

A. 54

B. 64

C. 74

D. 84

Answer: D

Watch Video Solution

110. In Young's double slit experiment, angular width of fringes is 0.20° for sodium light of wavelength $5890 Å$. If complete system is dipped in water, then angular width of fringes becomes

A. 0.11°

B. 0.15°

C. 0.22°

D. 0.30°

Answer: B

Watch Video Solution

111. In Young's double slit experiment, the distance between the slits is 1 mm and that between slit and screen is 1 meter and 10th fringe is 5 mm away from the central bright fringe, then wavelength of light used will be

A. 5000Å

B. 6000Å

C. 7000Å

D. 8000Å

Answer: A

Watch Video Solution

112. The Young's double slit experiment is carried out with light of wavelength 5000Å. The distance between the slits is $0.2 mm$ and the screen is at $200 cm$ from the slits. The central maximum is at $y = 0$. The third maximum will be at y equal to

A. $1.67 cm$

B. $1.5 cm$

C. $0.5 cm$

D. $5.0 cm$

Answer: B

Watch Video Solution

113. In a Young's experiment, two coherent sources are placed $0.90 mm$ apart and the fringes are observed one metre away. If is produces the second dark fringe at a distance of $1mm$ from the central fringe, the wavelength of monochromatic light used would be

A. $60 \times 10^{-4} cm$

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

C. $10 \times 10^{-5} cm$

D. $6 \times 10^{-5} cm$

Answer: D

Watch Video Solution

114. In Young's double slit experiment, the distance between the two slits is $0.1 mm$ and the wavelength of light used is $4 \times 10^{-7} m$. If the width of the fringe on the screen is 4 mm , the distance between screen and slit is

A. $0.1 mm$

B. 1 cm

C. $0.1 cm$

D. 1 m

Answer: D

Watch Video Solution

115. In Young's double slit experiment, the distance between sources is $1mm$ and distance between the screen and source is 1 m . If the fringe width on the screen is $0.06cm$, then $\lambda =$

A. 6000Å

B. 4000Å

C. 1200Å

D. 2400Å

Answer: A

Watch Video Solution

116. In the Young's double slit experiment , a mica slip of thickness t and refractive index μ 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

117. In Young's double slit experiment using sodium light ($\lambda = 5898 Å$) 92 fringes are seen if given colour $(\lambda = 5461 Å)$ is used how many fringes will be seen

A. 62

B. 67

C. 85

D. 99

Answer: D

Watch Video Solution

Watch Video Solution

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

A. Fringe will appear for a moment then it will disappear

B. Fringes will occur as from monochromatic light

C. Only bright fringes will appear

D. No fringes will appear

Answer: D

Watch Video Solution

119. When a thin metal plate is placed in the path of one of the interfering beams of light

A. Fringe width increases

B. Fringes disappear

C. Fringes become brighter

D. Fringes becomes blurred

Answer: B

Watch Video Solution

120. In Young's experiement, the distance between slits is $0.28mm$ and distance between slits and screen is $1.4m$. Distance between central bright fringe and third bright fringe is $0.9cm$. What is the wavelength of used light?

A. 5000Å

B. 6000Å

C. 7000Å

D. 9000Å

Answer: B

Watch Video Solution

121. Two parallel slits $0.6mm$ apart are illuminated by light source of wavelength 6000Å. The distance between two consecutive dark fringe on a screen $1m$ away from the slits is

A. 1 mm

B. $0.01mm$

C. $0.1mm$

D. 10 m

Answer: A

Watch Video Solution

122. In young's double slit experiment with a source of light of wavelength 6320Å, the first maxima will occur when

A. Path difference is 9480Å

B. Phase difference is 2π radian

C. Path difference is6320Å

D. Phase difference is π radian

Answer: B::C

Watch Video Solution

123. If a transparent medium of refractive index $\mu = 1.5$ and thickness $t = 2.5 \times 10^{-5} m$ is inserted in front of one of the slits of Young's Double Slit experiment, how much will be the shift in the interference patten? The distance between the slits is $0.5 mm$ and that between slits and screen is $100 cm$

A. 5 cm

B. $2.5 cm$

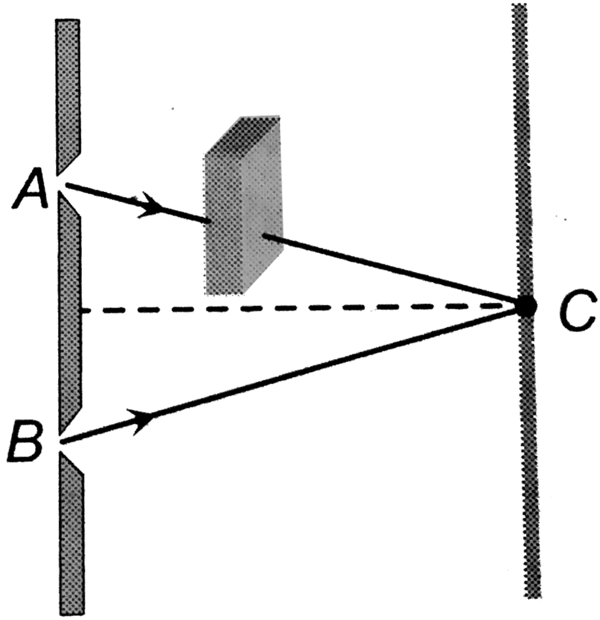
C. $0.25 cm$

D. $0.1cm$

Answer: B

Watch Video Solution

124. In Young's experiment, monochromatic light is used to illuminate the two slits A and B. Interference fringes are observed on a screen placed in front of the slits. Now if a thin glass plate is placed normally in the path of the beam coming from the slit



A. The fringes will disappear

B. The fringe width will increase

C. The fringe width will increase

D. There will be no change in the fringe width but the pattern shifts

Answer: D

Watch Video Solution

125. The fringe width in Young's double slit experiment increases when

A. Wavelength increases

B. Distance between the slits increases

C. Distance between the source and screen decreases

D. The width of the slits increases

Answer: A

Watch Video Solution

126. 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 maxima increases and the minima has zero intensity

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

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

Answer: A

Watch Video Solution

127. Two slits, 4 mm apart, are illuminated by light of wavelength $6000Å$. What will be the fringe width on a screen placed 2 m from the slits

A. $0.12mm$

B. $0.3mm$

C. $3.0mm$

D. $4.0mm$

Answer: B

Watch Video Solution

128. In the Young's double slit experiment, for which colour the fringe width is least

A. Red

B. Green

C. Blue

D. Yellow

Answer: C

Watch Video Solution

129. In a Young's double slit experiment, the separation of the two slits is doubled. To keep the same spacing of fringes, the distance D of the screen from the slits should be made

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

B. $\frac{D}{\sqrt{2}}$

C. 2 D

D. 4 D

Answer: C

Watch Video Solution

130. Young's double slit experiment is performed with light of wavelength 550 nm . The separation between the slits is $1.10mm$ and screen is placed at distance of 1 m . What is the distance between the consecutive bright or dark fringes

A. $1.5mm$

B. $1.0mm$

C. $0.5mm$

D. None of these

Answer: C

Watch Video Solution

131. In Young's experiment, the ratio of maximum to minimum intensities of the fringe system is $4:1$. The amplitudes of the coherent sources are in the ratio

A. $4:1$

B. $3:1$

C. $2:1$

D. $1:1$

Answer: B

Watch Video Solution

132. An interference pattern was made by using red light. If the red light changes with blue light, the fringes will become

A. Wider

B. Narrower

C. Fainter

D. Brighter

Answer: B

Watch Video Solution

133. If a white light is used in Young's double slit experiments then a very large number of coloured fringes can be seen

A. With first order violet fringes being closer to the central white fringes

B. First order red fringes being closer to the central white fringes

C. With a central white fringe

D. With a central black fringe

Answer: C

Watch Video Solution

134. 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

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

A. $\sin^{-1}(0.33 \times 10^{8})$

B. $\sin^{-1}(0.33 \times 10^{-6})$

C. $\sin^{-1}(3 \times 10^{-8})$

D. $\sin^{-1}(3 \times 10^{-6})$

Answer: D

Watch Video Solution

136. In Young's double slit experiment, the distance between the two slits is made half, then the fringe width will become

A. Half

B. Double

C. One fourth

D. Unchanged

Answer: B

Watch Video Solution

137. In Young's double slit experiment, the central bright fringe can be identified

A. By using white light instead of monochromatic light

B. As it is narrower than other bright fringes

C. As it is wider than other bright fringes

D. As it has a greater intensity than the other bright fringes

Answer: A

Watch Video Solution

138. In Young's double slit experiment, the wavelength of the light used is doubled and distance between two slits is half of initial distance, the resultant fringe width becomes

A. 2 times

B. 3 times

C. 4 times

D. $1/2$ times

Answer: C

Watch Video Solution

139. In a Young's double slit experiment, the source illuminating the slits is changed from blue to violet. The width of the fringes

A. Increases

B. Decreases

C. Becomes unequal

D. Remains constant

Answer: B

Watch Video Solution

140. The intensity of the light coming from one of the slits in a Young's double slit experiment is double the intensity from the other slit. Find the ratio of the maximum intensity to the minimum intensity in the interference fringe pattern observed.

A. 34

B. 40

C. 25

D. 38

Answer: A

Watch Video Solution

141. If the sodium light in Young's double slit experiment is replaced by red light, the fringe width will

A. Decrease

B. Increase

C. Remain unaffected

D. First increase, then decrease

Answer: B

Watch Video Solution

142. In Young's double-slit experiment, the wavelength of light was changed from 7000Å to 3500 Å`. While doubling the separation between the slits, which of the following is not true for this experiment?

A. The width of the fringes changes

B. The colour of bright fringes changes

C. The separation between successive bright fringes changes

D. The separation between successive dark fringes remains unchanged

Answer: D

Watch Video Solution

143. When a transparent parallel plate of uniform thickness t and refractive index μ is interposed normally in the path of a beam of light, the optical path is

A. $(\mu + 1)t$

B. $(\mu - 1)t$

C. $\frac{(\mu + 1)}{t}$

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

Answer: B

Watch Video Solution

Watch Video Solution

144. In Young's double slit experiment, an interference pattern is obtained on a screen by a light of wavelength 6000Å, 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

145. In a Young's double slit experiment, the slit separation is $1mm$ and the screen is $1m$ from the slit. For a monochromatic light of wavelength $500nm$, the distance of 3rd minima from the central maxima is

A. $0.50mm$

B. $1.25mm$

C. $1.50mm$

D. $1.75mm$

Answer: B

Watch Video Solution

146. In a Young's double-slit experment, the fringe width is β. If the entire arrangement is now placed inside a liquid of refractive index μ

, the fringe width will become

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

B. $n\beta$

C. $\frac{\beta}{n}$

D. $\frac{\beta}{n-1}$

Answer: C

Watch Video Solution

147. In an interference experiment, third bright fringe is obtained at a point on the screen with a light of 700 nm . What should be the wavelength of the light source in order to obtain 5th bright fringe at the same point

A. 500 nm

B. 630 nm

C. 750 nm

D. 420 nm

Answer: D

Watch Video Solution

148. If the separation between slits in Young's double slit experiment is reduced to $\frac{1}{3}$ rd, the fringe width becomes n times. The value of n

A. 3

B. $\frac{1}{3}$

C. 9

D. $\frac{1}{9}$

Answer: A

Watch Video Solution

149. 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

150. Two slits at a distance of $1mm$ are illuminated by a light of wavelength $6.5 \times 10^{-7}m$. The interference fringes are observed on a screen placed at a distance of $1m$. The distance between third dark fringe and fifth bright fringe will be

A. $0.65mm$

B. $1.63mm$

C. $3.25mm$

D. $4.88mm$

Answer: B

Watch Video Solution

151. In a Young's double-slit experiment the fringe width is $0.2mm$. If the wavelength of light used is increased by 10% and the separation between the slits if also increased by 10%, the fringe width will be

A. $0.20mm$

B. $0.401mm$

C. $0.242mm$

D. $0.165mm$

Answer: A

Watch Video Solution

152. Two coherent sources of intensity ratio $1:4$ produce an interference pattern. The fringe visibility will be

A. 1

B. 0.8

C. 0.4

D. 0.6

Answer: B

Watch Video Solution

153. In Young's double slit experiment the amplitudes of two sources are $3a$ and a respectively. The ratio of intensities of bright and dark fringes will be

A. $3:1$

B. $4:1$

C. $2:1$

D. $9:1$

Answer: B

Watch Video Solution

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

A. 0.08°

B. 0.16°

C. 0.20°

D. 0.313°

Answer: D

Watch Video Solution

155. In a Young's double slit experiment, the slit separation is $0.2cm$, the distance between the screen and slit is 1 m . Wavelength of the light used is 5000Å. The distance between two consecutive dark fringes (in mm) is

A. 0.25

B. 0.26

C. 0.27

D. 0.28

Answer: A

Watch Video Solution

156. A light of wavelength 5890Å falls normally on a thin air film. The minimum thickness of the film such that the film appears dark in reflected light is

A. $2.945 \times 10^{-7} m$

B. $3.945 \times 10^{-7} m$

C. $4.95 \times 10^{-7} m$

D. $1.945 \times 10^{-7} m$

Answer: A

Watch Video Solution

157. In Young's double slit experiment, a minimum is obtained when the phase difference of super imposing waves is

A. Zero

B. $(2n - 1)\pi$

C. $n\pi$

D. $(n + 1)\pi$

Answer: B

Watch Video Solution

158. In Fresnel's biprism $(\mu = 1.5)$ experiment the distance between source and biprism is $0.3m$ and that between biprism and screen is

$0.7m$ and angle of prism is 1°. The fringe width with light of wavelength 6000Å will be

A. 3 cm

B. $0.011cm$

C. 2 cm

D. 4 cm

Answer: B

Watch Video Solution

159. In Young's double slit experiment, when two light waves form third minimum, they have

A. Phase difference of 3π

B. Phase difference of $\frac{5\pi}{2}$

C. Path difference of 3λ

D. Path difference of $\frac{5\lambda}{2}$

Answer: D

Watch Video Solution

160. In Fresnel's biprism experiment, on increasing the prism angle, the fringe width will

A. Increase

B. Decrease

C. Remain unchanged

D. Depend on the position of object

Answer: B

Watch Video Solution

161. If prism angle $\alpha = 1^\circ$, $\mu = 1.54$, distance between screen and prism $(b) = 0.7m$, distance between prism and source $a = 0.3m$, $\lambda = 180\pi nm$ then in Fresnel biprism find the value of β (fringe width).

A. $10^{-4}m$

B. $10^{-3}mm$

C. $10^{-4} \times \pi m$

D. $\pi \times 10^{-3}m$

Answer: A

Watch Video Solution

162. If Fresnel's biprism experiement as held in water in spite of air, then what will be the effect on fringe width?

A. Decrease

B. Increase

C. No effect

D. None of these

Answer: A

Watch Video Solution

163. What is the effect on Fresnel's biprism experiment when the use of white light is made?

A. Fringe are affected

B. Diffraction pattern is spread more

C. Central fringe is white and all are coloured

D. None of these

Answer: C

Watch Video Solution

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

A. Shrinks

B. Disappear

C. Unchanged

D. Enlarged

Answer: A

Watch Video Solution

165. 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. Increases

B. Decreases

C. Remains unchanged

D. None of these

Answer: A

Watch Video Solution

166. In Young's double slit experiment, the aperture screen distance is $2m$. The fringe width is $1mm$. Light of $600nm$ is used. If a thin plate of glass $(\mu = 1.5)$ of thickness $0.06mm$ is placed over one of the slits, then there will be a lateral displacement of the fringes by

A. 0 cm

B. 5 cm

C. 10 cm

D. 15 cm

Answer: B

Watch Video Solution

167. In which of the following is the interference due to the division of wave front

A. In which of the following is the interference due to the division of wave front

B. Fresnel's biprism experiment

C. Lloyd's mirror experiment

D. Demonstration colours of thin film

Answer: B

Watch Video Solution

168. Two slits are separated by a distance of $0.5mm$ and illuminated with light of $\lambda = 6000Å$. If the screen is placed $2.5m$ from the slits. The distance of the third bright image from the centre will be

A. $1.5mm$

B. $3mm$

C. 6 mm

D. 9 mm

Answer: D

Watch Video Solution

169. The wavelength of light coming from a distant galaxy is found to be 0.5% more than that coming from a source on earth. Calculate the velocity of galaxy.

A. Stationary with respect to the earth

B. Approaching the earth with velocity of light

C. Receding from the earth with the velocity of light

D. Receding from the earth with a velocity equal to $1.5 \times 10^6 m / s$

Answer: D

Watch Video Solution

170. A star is moving away from the earth with a velocity of $100 km / s$. If the velocity of light is

$3 \times 10^8 m/s$ then the shift of its spectral line of wavelength $5700 A$ due to Doppler effect is

A. 0.1Å

B. 0.05Å

C. 0.2Å

D. 1Å

Answer: A

Watch Video Solution

171. 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

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

A. There will be no change

B. The spectrum will move to infrared region

C. The spectrum will seems to shift to ultraviolet side

D. None of the above

Answer: B

Watch Video Solution

173. Does the change in frequency due to Doppler effect depend on (i) distance between source and observer? (ii) the fact that source is moving towards observer or observer is moving towards the source?

A. Einstein mass - energy relation

B. Einstein theory of relativity

C. Photoelectric effect

D. None of these

Answer: B

Watch Video Solution

174. A rocket is moving away from the earth at a speed of $6 \times 10^7 m/s$. The rocket has blue light in it. What will be the wavelength of light recorded by an observer on the earth (wavelength of blue light $= 4600 \text{Å}$)

A. 4600Å

B. 5520Å

C. 3680Å

D. 3920Å

Answer: B

Watch Video Solution

175. The spectral line of wavelength $\lambda = 5000\text{Å}$ in the light coming from a distant star is observed as 5200 Å.Determine the recession velocity of the star.

A. $1.15 \times 10^{7} cm / \sec$

B. $1.15 \times 10^{7} m / \sec$

C. $1.15 \times 10^{7} km / \sec$

D. $1.15 km / \sec$

Answer: B

Watch Video Solution

176. The apparent wavelength of the light from a star, moving away from the earth is 0.01% more than its real wavelength. The speed of the star with respect to earth is

A. 60 km/sec

B. 15 km/sec

C. 150 km/sec

D. 30 km/sec

Answer: D

Watch Video Solution

Watch Video Solution

177. A star emits light of 5500Å wavelength. Its appears blue to an observer on the earth, it means

A. Star is going away from the earth

B. Star is stationary

C. Star is coming towards earth

D. None of the above

Answer: C

Watch Video Solution

178. The velocity of light emitted by a source S observed by an observer O , who is at rest with respect to S is c . If the observer moves towards S with velocity v , the velocity of light as observed will be

A. c+v

B. c-v

C. c

D. $\sqrt{1-\frac{v_2}{v_2}}$

Answer: C

Watch Video Solution

179. 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

180. The sun is rotating about its own axis. The spectral lines imitted from the two ends of its equator, for an bserver on the earth will show

A. Shift towards red end

B. Shift towards violet end

C. Shift towards red end by one line and towards violet end by other

D. No shift

Answer: C

Watch Video Solution

181. A star is moving away from the earth with a velocity of $100 km / s$. If the velocity of light is $3 \times 10^8 m / s$ then the shift of its spectral line of wavelength $5700 A$ due to Doppler effect is

A. $0.63 Å$

B. 1.90Å

C. 3.80Å

D. 5.70Å

Answer: B

Watch Video Solution

182. If a source of light is moving away from a stationary observer, then the frequency of light wave appears to change because of

A. Doppler's effect

B. Interference

C. Diffraction

D. None of these

Answer: A

Watch Video Solution

183. A star which is emitting radiation at a wavelength of 5000A is approaching the earth with a velocity of $1.50 \times 10^6 m/s$ The change in wavelegth of the radiation as received on the earth is

A. $25Å$

B. $Zero$

C. $100Å$

D. $2.5Å$

Answer: A

Watch Video Solution

184. star emitting light of wavelength 5896Å is moving away from the earth with a speed of 3600 km / sec . The wavelength of light observed on earth will

$(c = 3 \times 10^8 m / \sec$ is the speed of light)

A. Decrease by 5825.25Å

B. Increase by 5966.75Å

C. Decrease by70.75Å

D. Increase by 70.75Å

Answer: D

Watch Video Solution

185. A star moves away from earth at speed 0.8 c while emitting light of frequency 6×10^{14} Hz . What frequency will be observed on the earth (in units of 10^{14} Hz) (c= speed of light)

A. 0.24

B. 1.2

C. 30

D. 3.3

Answer: B

Watch Video Solution

186. A light source approaches the observer with velocity $0.8c$. The doppler shift for the light of wavelength 5500Å is

A. 4400Å

B. 1833Å

C. 3167Å

D. 7333Å

Answer: C

Watch Video Solution

187. Light coming from a star is observed to have a wavelength of 3737Å, while its real wavelength is 3700Å. The speed of the star relative to the earth is [Speed of light $3 \times 10^8 m/s$]

A. $3 \times 10^5 m/s$

B. $3 \times 10^6 m/s$

C. $3.7 \times 10^{7} m / s$

D. $3.7 \times 10^{6} m / s$

Answer: B

Watch Video Solution

188. In the spectrum of light of a luminous heavenly body the wavelength of a spectral line is measured to be $4747 \AA$ while actual wavelength of the line is $4700 \AA$. The relative velocity of the heavenly body with respect to earth will be (velocity of light is $3 \times 10^8 m/s$)

A. $3 \times 10^5 m/s$ moving towards the earth

B. $3 \times 10^5 m/s$ moving away from the earth

C. $3 \times 10^6 m/s$ moving towards the earth

D. $3 \times 10^6 m/s$ moving away from the earth

Answer: D

Watch Video Solution

189. The wavelength of light observed on the earth, from a moving star is found to decrease by 0.05%. Relative to the earth the star is

A. Moving away with a velocity of $1.5 \times 10^5 m / s$

B. Coming closer with a velocity of $1.5 \times 10^5 m / s$

C. Moving away with a velocity of $1.5 \times 10^4 m / s$

D. Coming closer with a velocity of

$1.5 \times 10^4 m / s$

Answer: B

Watch Video Solution

190. 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

191. A star is moving towards the earth with a speed of $9 \times 10^6 m/s$. If the wavelength of a particular spectral line emitted by star is $600 nm$, find the apparent wavelength.

A. 5890Å

B. 5978Å

C. 5802Å

D. 5896Å

Answer: C

Watch Video Solution

192. Due to Doppler's effect, the shift in wavelength observed is 0.1Å for a star producing wavelength 6000 Å. Velocity of recession of the star will be

A. $2.5 km / s$

B. $10 km / s$

C. $5 km / s$

D. $20 km / s$

Answer: C

Watch Video Solution

Watch Video Solution

193. A rocket is going away from the earth at a speed 0.2 c , where c = speed of light. It emits a signal of frequency $4 \times 10^7 Hz$. What will be the frequency observed by an observer on the earth

A. $4 \times 10^6 Hz$

B. $3.2 \times 10^7 Hz$

C. $3 \times 10^6 Hz$

D. $5 \times 10^7 Hz$

Answer: C

Watch Video Solution

194. If a star is moving towards the earth, then the lines are shifted towards

A. Red

B. Infrared

C. Blue

D. Green

Answer: C

Watch Video Solution

195. When the wavelength of light coming from a distant star is measured it is found shifted towards red. Then the conclusion is

A. The star is approaching the observer

B. The star recedes away from earth

C. There is gravitational effect on the light

D. The star remains stationary

Answer: B

Watch Video Solution

196. A heavenly body is receding from earth such that the fractional change in λ is 1, then its velocity is

A. C

B. $\frac{3C}{5}$

C. $\frac{C}{5}$

D. $\frac{2C}{5}$

Answer: A

Watch Video Solution

197. The $6563 \text{Å} H_2$ line emitted by hydrogen in a star is found to be red shifted by 15Å. Estimate the speed with which the star is receding from earth.

A. $17.29 \times 10^9 m / s$

B. $4.29 \times 10^7 m / s$

C. $3.39 \times 10^5 m / s$

D. $2.29 \times 10^5 m/s$

Answer: D

Watch Video Solution

198. Three observers A, B and C measure the speed of light coming from a source to be v_A, v_B and v_C. The observer A moves towards the source and C moves away from the soure at the same speed. The observer B stays stationary. The surrounding space is vacuum everywhere.

A. $v_A > v_B > v_C$

B. $v_A < v_B < v_C$

C. $v_A = v_B = v_C$

D. $v_A = v_B > v_C$

Answer: C

Watch Video Solution

199. Certain characteristic wavelength in the light from a galaxy in the constellation virgo are observed to be increased in wavelength, as compared with terrestrial sources, by about 0.4%. What is the radial speed of this galaxy with respect to earth ? Is it approacing or receding ?

A. Moving away with velocity $1.2 \times 10^6 m/s$

B. Coming closer with velocity $1.2 \times 10^6 m / s$

C. Moving away with velocity $4 \times 10^6 m / s$

D. Coming closer with velocity $4 \times 10^6 m / s$

Answer: A

Watch Video Solution

200. It is believed that the universe is expanding and hence the distant stars are receding from us. Light from such a star will show

A. Shift in frequency towards longer wavelengths

B. Shift in frequency towards shorter wavelength

C. No shift in frequency but a decrease in intensity

D. A shift in frequency sometimes towards longer and sometimes towards shorter wavelengths

Answer: A

Watch Video Solution

201. A slit of width is illuminated by white light. For red light $(\lambda = 6500 Å)$, the first minima is obtained at $\theta = 30^{\circ}$. Then the value of will be

A. $3250 Å$

B. $6.5 \times 10^{-4} mm$

C. 1.24 microns

D. $2.6 \times 1^{-4} cm$

Answer: C

Watch Video Solution

202. Light of wavelength 6328 Å is incident normally on a slit of width 0.2 mm. Calculate the angular width of central maximum on a screen distance 9 m?

A. 0.36°

B. 0.18°

C. 0.72°

D. 0.09°

Answer: A

Watch Video Solution

203. The bending of light about corners of an obstacle is called

A. Reflection

B. Diffraction

C. Refraction

D. Interference

Answer: B

Watch Video Solution

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

A. Polarisation

B. Interference

C. Diffraction

D. Refraction

Answer: C

Watch Video Solution

205. A slit of size $0.15m$ is placed at $2.1m$ from a screen. On illuminated it by a light of wavelength $5 \times 10^{-5} cm$. The width of central maxima will be

A. 70 mm

B. 0.14 mm

C. 1.4 mm

D. 0.14 cm

Answer: C

Watch Video Solution

206. A diffraction is obtained by using a beam of red light. What will happen if the red light is replaced by the blue light?

A. Bands will narrower and crowd full together

B. Bands become broader and further apart

C. No change will take place

D. Bands disappear

Answer: A

Watch Video Solution

207. What will be the angle of diffracting for the first minimum due to Fraunhofer diffraction with sources of light of wavelength $550nm$ and slit of width $0.55mm$?

A. 0.001 rad

B. 0.01 rad

C. 1 rad

D. 0.1 rad

Answer: A

Watch Video Solution

208. Angular width (β) of central maximum of a diffraction pattern on a single slit does not depend upon

A. Distance between slit and source

B. Wavelength of light used

C. Width of the slit

D. Frequency of light used

Answer: A

Watch Video Solution

209. A single slit of width $0.20mm$ is illuminated with light of wavelength $500nm$. The observing screen is placed $80cm$ from the slit. The width of the central bright fringe will be

A. 1 mm

B. 2 mm

C. 4 mm

D. 5 mm

Answer: C

Watch Video Solution

210. 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 maxima is narrower

B. No diffraction pattern

C. More number of fringes

D. Less number of fringes

Answer: B

Watch Video Solution

211. In Fresnel diffraction, if the distance between the disc and the screen is decreased, the intensity of central bright spot will

A. Increase

B. Decrease

C. Remain constant

D. None of these

Answer: B

Watch Video Solution

212. A plane wavefront $(\lambda = 6 \times 10^{-7} m)$ falls on a slit $0.4m$ wide. A convex lens of focal length $0.8m$ placed behind the slit focuses the light on a screen. What is the linear diameter of second maximum?

A. 6 mm

B. 12 mm

C. 3 mm

D. 9 mm

Answer: A

Watch Video Solution

213. A zone plate of focal length , 60cm behaves as a convex lens, If wavelength of incident light is , 6000Å then radius of first half period zone will be

A. $36 \times 10^{-8} m.$

B. $6 \times 10^{-8} m.$

C. $\sqrt{6} \times 10^{-8} m.$

D. $6 \times 10^{-4} m.$

Answer: D

Watch Video Solution

214. Red light is generally used to observe diffraction pattern from single slit. If blue light is used instead of red light, then diffraction pattern.

A. Will be more clear

B. Will contract

C. Will expanded

D. Will not be visualized

Answer: B

Watch Video Solution

215. Angular width of central maximum in diffraction at a single slit is................ .

A. Increases in both Fresnel and Fraunhofer diffraction

B. Decreases both in Fresnal and Fraunhofer diffraction

C. Increases in Fresnel diffraction but decreases in Fraunhofer diffraction

D. Decreases in Fresnel diffraction but increases is Fraunofer diffraction.

Answer: A

Watch Video Solution

216. Conditions of diffraction is

A. $\frac{a}{\lambda} = 1$

B. $\frac{a}{\lambda} > > 1$

C. $\frac{a}{\lambda} < < 1$

D. None of these

Answer: A

Watch Video Solution

217. Light of wavelength $589.3nm$ is incident normally on the slit of width $0.1mm$. What will be the angular width of the central diffraction maximum at a distance of $1m$ from the slit?

A. 0.68°

B. 1.02°

C. 0.34°

D. None of these

Answer: A

Watch Video Solution

Watch Video Solution

218. The phenomenon of diffraction of light was discovered by-

A. Hygens

B. Newton

C. Fresnel

D. Grimaldi

Answer: D

Watch Video Solution

219. The radius r of half period zone is proportional to

A. $\sqrt{n}$

B. $\frac{1}{\sqrt{n}}$

C. n^2

D. $\frac{1}{n}$

Answer: A

Watch Video Solution

220. In a diffraction pattern by a wire, on increasing diameter of wire, fringe width

A. Decreases

B. Increases

C. Remains unchanged

D. Increasing or decreasing will depend on wavelength

Answer: A

221. What will be the angular width of central maxima in Fraunhofer diffraction when light of wavelength 6000Å is used and slit width is $12 \times 10^{-5} cm$?

A. 2 rad

B. 3 rad

C. 1 rad

D. 8 rad

Answer: C

Watch Video Solution

222. When a compact disc is illuminated by a source of white light, coloured lines are observed. This is due to

A. Dispersion

B. Diffraction

C. Interference

D. Refraction

Answer: B

Watch Video Solution

223. The diffraction effect can be observed in

A. Only sound waves

B. Only light waves

C. Only ultrasonic waves

D. Sound as well as light waves

Answer: D

Watch Video Solution

224. When light is incident on a diffraction grating, the zero order principal maximum will be

A. One of the component colours

B. Absent

C. Spectrum of the colours

D. White

Answer: D

Watch Video Solution

225. 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. $1.2mm$

B. $1.2cm$

C. $2.4cm$

D. $2.4mm$

Answer: D

Watch Video Solution

226. In order to see diffraction the thickness of the film is

A. 100Å

B. $10, 000\text{Å}$

C. 1 mm

D. 1 cm

Answer: B

Watch Video Solution

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

A. Sound waves are longitudinal

B. Sound is perceived by the ear

C. Sound waves are mechanical waves

D. Sound waves are of longer wavelength

Answer: D

Watch Video Solution

228. Direction of the first secondary maximum in the Fraunhofer diffraction pattern at a single slit is given by (a is the width of the slit)

A. $a \sin \theta = \frac{\lambda}{2}$

B. $a \cos \theta = \frac{3\lambda}{2}$

C. $a \sin \theta = \lambda$

D. $a \sin \theta = \frac{3\lambda}{2}$

Answer: D

Watch Video Solution

229. A parallel monochromatic beam of light is incident normally on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of the incident beam. At the first minimum of the diffraction pattern, the phase difference between the rays coming from the two edges of the slit is

A. 0

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

C. π

D. 2π

Answer: D

Watch Video Solution

230. Distinguish between interference and diffraction of light.

A. Nature of light is electro-magnetic

B. Wave nature

C. Nature is quantum

D. Nature of light is transverse

Answer: B

Watch Video Solution

231. A light wave is incident normally over a slit of width $24 \times 10^{-5} cm$. The angular position of second dark fringe from the central maxima

is 30°. What is the wavelength of light?

A. 6000 Å

B. 5000 Å

C. 3000 Å

D. 1500 Å

Answer: A

Watch Video Solution

232. A parallel beam of monochromatic light of wavelength 5000Å is incident normally on a single narrow slit of width $0.001 mm$. The light is focused by a convex lens on a screen placed on the focal plane. The first minimum will be formed for the angle of diffraction equal to

A. 0°

B. 15°

C. 30°

D. 60°

Answer: C

Watch Video Solution

233. The condition for observing Fraunhofer diffraction from a single slit is that the light wavefront incident on the slit should be

A. Spherical

B. Cylindrical

C. Plane

D. Elliptical

Answer: C

Watch Video Solution

234. To observe diffraction, the size of the obstacle

A. Should be of the same order as wavelength

B. Should be much larger than the wavelength

C. Have no relation to wavelength

D. Should be exactly $\frac{\lambda}{2}$

Answer: A

Watch Video Solution

235. In the far field diffraction pattern of a single slit under polychromatic illumination, the first minimum with the wavelength λ_1 is found to be coincident with third maximum at λ_2. So

A. $3\lambda_1 = 0.3\lambda_2$

B. $3\lambda_1 = \lambda_2$

C. $\lambda_1 = 3.5\lambda_2$

D. $0.3\lambda_1 = 3\lambda_2$

Answer: C

Watch Video Solution

236. Light of wavelength $\lambda = 5000\text{Å}$ falls normally on a narrow slit. A screen is placed at a distance of $1m$ from the slit and perpendicular to the direction of light. The first minima of the diffraction pattern is situated at $5mm$ from the centre of central maximum. The width of the slit is

A. $0.1mm$

B. $1.0mm$

C. $0.5mm$

D. $0.2mm$

Answer: A

Watch Video Solution

237. The width of the n th HPZ will be

A. $\sqrt{nb\lambda}$

B. $\sqrt{b\lambda}\left[\sqrt{n}-\sqrt{n-1}\right]$

C. $\left(\sqrt{n}-\sqrt{n-1}\right)$

D. $\dfrac{\sqrt{b\lambda}}{\left[\sqrt{n}-\sqrt{n-1}\right]}$

Answer: B

Watch Video Solution

238. A single slit of width a is illuminated by violet light of wavelength $400nm$ and the width of the diffraction pattern is measured as y. When half of the slit width is covered and illuminated by yellow light of wavelength $600nm$, the width of the diffraction pattern is

A. The pattern vanishes and the width is zero

B. $y/3$

C. $3y$

D. None of these

Answer: C

Watch Video Solution

239. A polariser in used to

A. Reduce intensity of light

B. Produce polarised light

C. Increase intensity of light

D. Produce unpolarised light

Answer: B

Watch Video Solution

240. Light waves can be polarised as they are

A. Transverse

B. Of high frequency

C. Longitudinal

D. Reflected

Answer: A

Watch Video Solution

241. Through which character we can distiguish the light waves from sound waves

A. Interference

B. Refraction

C. Polarisation

D. Reflection

Answer: C

Watch Video Solution

242. The angle of polarisation for any medium is 60° , what will be critical angle for this

A. $\sin^{-1}\sqrt{3}$

B. $\tan^{-1}\sqrt{3}$

C. $\cos^{-1}\sqrt{3}$

D. $\sin^{-1}.\ \frac{1}{\sqrt{3}}$

Answer: D

Watch Video Solution

243. 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. $\sin^{-1}\left(\frac{1}{n}\right)$

C. $\tan^{-1}\left(\frac{1}{n}\right)$

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

Answer: D

Watch Video Solution

244. Which of the following cannot be polarised?

A. Radio waves

B. Ultraviolet rays

C. Infrared rays

D. Ultrasonic waves

Answer: D

Watch Video Solution

245. A polaroid is placed at 45° 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

246. Plane polarised light is passed through a polaroid. On viewing through the polaroid we find that when the polaroid is given one complete rotation about the direction of light

A. The intensity of light gradually decreases to zero and remains at zero

B. The intensity of light gradually increases to a maximum and remains at maximum

C. There is no change in intensity

D. The intensity of light is twice maximum and twice zero

Answer: D

Watch Video Solution

247. Out of the following statements which is not correct

A. When unpolarised light passes through a Nicol's prism, the emergent light is elliptically polarised

B. Nicol's prism works on the principle of double refraction and total internal reflection

C. Nicol's prism can be used to produce and analyse polarised light

D. Calcite and Quartz are both doubly refracting crystals

Answer: A

Watch Video Solution

248. A ray of light is incident on the surface of a glass plate at an angle of incidence equal to Brewster's angle ϕ. If μ represents the refractive index of glass with respect to air, then the angle between reflected and refracted rays is

A. $90+\phi$

B. $\sin^{-1}(\mu \cos \phi)$

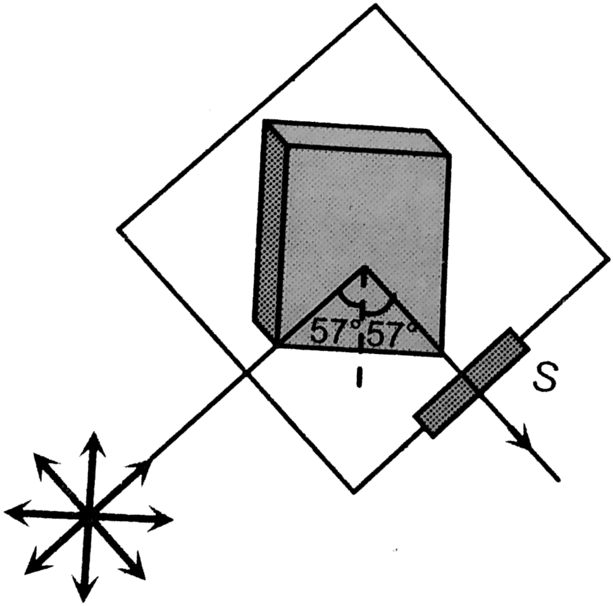
C. 90°

D. $90^{\circ} - \sin^{-1}(\sin \phi / \mu)$

Answer: C

Watch Video Solution

249. Figure represents a glass plate placed vertically on a horizontal table with a beam of unpolarised light falling on its surface at the polarising angle of 57° with the normal. The electric vector in the reflected light on screen S will vibrate with respect to the plane of incidence in a



A. Vertical plane

B. Horizontal plane

C. Plane making an angle of 45° with the vertical

D. Plane making an angle of 57° with the horizontal

Answer: A

Watch Video Solution

250. 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 reduced down to zero and remains zero

B. The intensity reduces down some what 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

251. Polarised glass is used in sum glasses because:

A. It reduces the light intensity to half an account of polarisation

B. It is fashionable

C. It has good colour

D. It is cheaper

Answer: A

Watch Video Solution

252. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarisation is

A. 0°

B. 45°

C. 90°

D. 180°

Answer: A

Watch Video Solution

253. A calcite crystal is placed over a dot on a piece of paper and rotated, on seeing through the calcite one will be see

A. One dot

B. Two stationary dots

C. Two rotating dots

D. One dot rotating about the other

Answer: D

Watch Video Solution

254. A light has amplitude A and angle between analyser and polariser is 60°. Light is reflected by analyser has amplitude

A. $A\sqrt{2}$

B. $A/\sqrt{2}$

C. $\sqrt{3}A/2$

D. $A/2$

Answer: D

Watch Video Solution

255. When light is incident on a doubly refracting crystal, two refracted rays-ordinary ray (O -ray) and extra ordinary ray (E -ray) are produced. Then

A. Both O -ray and E -ray are polarised perpendicular to the plane of incidence

B. Both O -ray and E -ray are polarised in the plane of incidence

C. E -ray is polarised perpendicular to the plane of incidence and O -ray in the plane of incidence

D. E -ray is polarised in the plane of incidence and O -ray perpendicular to the plane of incidence

Answer: D

Watch Video Solution

256. Light passes successively through two polarimeters tubes each of length $0.29m$. The first tube contains dextro rotatory solution of concentration $60kgm^{-3}$ and specific rotation

$0.01 rad m^2 kg^{-1}$. The second tube contains laevo rotatory solution of concentration $30 kg/m^3$ and specific rotation $0.02 rad m^2 kg^{-1}$. The net rotation produced is

A. 15°

B. 0°

C. 20°

D. 10°

Answer: B

Watch Video Solution

257. V_0 and V_E represent the velocities, m0 and mE the refractive indices of ordinary and extraordinary rays for a doubly refracting crystal. Then

A. $V_O \geq V_E, \mu_O \leq \mu_E$ if the crystal is calcite

B. $V_O \leq V_E, \mu_O \leq \mu_E$ if the crystal is quartz

C. $V_O \leq V_E, \mu_O \geq \mu_E$ if the crystal is calcite

D. $V_O \geq V_E, \mu_O \geq \mu_E$ if the crystal is quartz

Answer: C

Watch Video Solution

258. Polarising angle for water is $53^\circ 4'$. If light is incident at this angle on the surface of water and reflected, the angle of refraction is

A. $53^\circ 4'$

B. $126^\circ 56'$

C. $36^\circ 56'$

D. $30^\circ 4'$

Answer: C

Watch Video Solution

259. When a plane polarised light is passed through an analyser and analyser is rotated through 90°, the intensity of the emerging light

A. Varies between a maximum and minimum

B. Become zero

C. Does not vary

D. Varies between a maximum and zero

Answer: D

Watch Video Solution

260. 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 but B is wrong

D. A is wrong but B is correct

Answer: A

Watch Video Solution

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

A. 50%

B. 100%

C. 12.5%

D. 37.5%

Answer: C

Watch Video Solution

262. Unpolarised 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 final transmitted light is one-third the maximum intensity of the first transmitted beam?

A. 75°

B. 55°

C. 35°

D. 15°

Answer: B

Watch Video Solution

263. 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. $32Wm^{-2}$

B. $3Wm^{-2}$

C. $8Wm^{-2}$

D. $4Wm^{-2}$

Answer: B

Watch Video Solution

264. In the visible region of the spectrum the rotation of the place of polarization is given by $\theta = a + \frac{b}{\lambda^2}$. The optical rotation produced by a particular material is found to be 30° per mm at $\lambda = 5000\text{Å}$ and 50° per mm at $\lambda = 4000\text{Å}$. The value of constant a will be

A. $+\frac{50^{\circ}}{9}$ per mm

B. $-\frac{50^{\circ}}{9}$ per mm

C. $+\frac{9^{\circ}}{50}$ per mm

D. $-\frac{9^{\circ}}{50}$ per mm

Answer: B

Watch Video Solution

265. 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. Zero

B. I_0

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

D. $\frac{1}{4}I_0$

Answer: C

Watch Video Solution

266. Refractive index of material is equal to tangent of polarising angle. It is called

A. Brewster's law

B. Lambert's law

C. Malus's law

D. Bragg's law

Answer: A

Watch Video Solution

267. In case of linearly polarised light, the magnitude of the electric field vector

A. Does not change with time

B. Varies periodically with time

C. Increases and decreases linearly with time

D. Is parallel to the direction of propagation

Answer: B

Watch Video Solution

268. When unpolarised light beam is incident from air onto glass (n = 1.5) at the polarising angle

A. Reflected beam is polarised 100 percent

B. Reflected and refracted beams are partially polarised

C. The reason for (a) is that almost all the light is reflected

D. All of the above

Answer: A

Watch Video Solution

269. An optically active compound

A. Rotates the plane polarised light

B. Changing the direction of polarised light

C. Do not allow plane polarised light to pass through

D. None of the above

Answer: A

Watch Video Solution

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

A. 3×10^8

B. $\left(\frac{3}{\sqrt{2}}\right) \times 10^8$

C. $\sqrt{3} \times 10^8$

D. 0.5×10^8

Answer: C

Watch Video Solution

271. 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 θ 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. $\left(\frac{I_0}{2}\right)\cos^4 \theta$

D. $I_0 \cos^4 \theta$

Answer: A

Watch Video Solution

272. For the study of the helical structure of nucleic acids, the property of electromagnetic radiation generally used is

A. Reflection

B. Interference

C. Diffraction

D. Polarization

Answer: D

Watch Video Solution

273. Which of the following statement is wrong

A. Infrared photon has more energy than the photon of visible light

B. Photographic plates are sensitive to ultraviolet rays

C. Photographic plates can be made sensitive to infrared rays

D. Infrared rays are invisible but can cast shadows like visible light rays

Answer: A

Watch Video Solution

274. Pick out the longest wavelength from the following types of radiations

A. Blue light

B. γ-rays

C. X-rays

D. Red light

Answer: D

Watch Video Solution

275. Wave which cannot travel in vacumm is

A. X rays

B. Infrasonic

C. Ultraviolet

D. Radiowaves

Answer: B

Watch Video Solution

276. Light is an electromagnetic wave. Its speed in vacuum is given by the expression

A. $\sqrt{\mu_0 \varepsilon_0}$

B. $\sqrt{\dfrac{\mu_0}{\varepsilon_0}}$

C. $\sqrt{\dfrac{\varepsilon_0}{\mu_0}}$

D. $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$

Answer: D

Watch Video Solution

277. The range of wavelength of the visible light is

A. 10Å to 100Å

B. $4,000\text{Å}$ to $8,000\text{Å}$

C. $8,000\text{Å}$ to $10,000\text{Å}$

D. $10,000\text{Å}$ to $15,000\text{Å}$

Answer: B

Watch Video Solution

278. Which radiation in sunlight causes heating effect?

A. Ultraviolet

B. Infrared

C. Visible light

D. All of these

Answer: B

Watch Video Solution

279. Which of the following represents an infrared wavelength

A. $10^{-4}cm$

B. $10^{-5}cm$

C. $10^{-6}cm$

D. $10^{-7}cm$

Answer: A

Watch Video Solution

280. The wavelength of light visible to eye is of the order of

A. $10^{-2}m$

B. $10^{-10}m$

C. $1m$

D. $6 \times 10^{-7} m$

Answer: D

Watch Video Solution

281. The speed of electromagnetic wave in vacuum depends upon the source of radiation. It

A. Increases as we move from γ -rays to radio waves

B. Decreases as we move from γ-rays to radio waves

C. Is same for all of them

D. None of these

Answer: C

Watch Video Solution

282. Which of the following radiation has the least wavelength ?

A. γ-rays

B. β-rays

C. α-rays

D. X-rays

Answer: A

Watch Video Solution

283. The maximum distance upto which TV transmission from a TV tower of height h can be received is proportional to

A. $h^{1/2}$

B. h

C. h

D. h^{2}

Answer: A

Watch Video Solution

284. Which of the following are not electromagnetic waves ?

A. Cosmic rays

B. Gamma rays

C. β-rays

D. X-rays

Answer: C

Watch Video Solution

285. Ozone layer exist in

A. Stratosphere

B. Ionosphere

C. Mesosphere

D. Troposphere

Answer: A

Watch Video Solution

286. The electromagnetic wave travel with a velocity

A. Equal to velocity of sound

B. Equal to velocity of light

C. Less than velocity of light

D. None of these

Answer: B

Watch Video Solution

287. The ozone layer absorbs

A. Infrared radiations

B. Ultraviolet radiations

C. X-rays

D. γ-rays

Answer: B

Watch Video Solution

288. Electromagnetic radiation of highest frequency is

A. Infrared radiations

B. Visible radiation

C. Radio waves

D. γ-rays

Watch Video Solution

289. What is the cause of "Green house effect"?

A. Ultraviolet rays

B. Infrared rays

C. X -rays

D. None of these

Answer: B

Watch Video Solution

290. Which of the following waves have the maximum wavelength?

A. X -rays

B. I.R. rays

C. UV rays

D. Radio waves

Answer: D

Watch Video Solution

291. Electrimagnetic waves are transverse is nature is evident by

A. Polarization

B. Interference

C. Reflection

D. Diffraction

Answer: A

Watch Video Solution

292. If $\vec{E}$ and $\vec{B}$ be the electric and magnetic field of E.M. wave then the direction of propogation of E.M. wave is along the direction.

A. $\vec{E}$

B. $\vec{B}$

C. $\vec{E} \times \vec{B}$

D. None of these

Answer: C

Watch Video Solution

293. Biological importance of Ozone layer is

A. It stops ultraviolet rays

B. Ozone rays reduce green house effect

C. Ozone layer reflects radio waves

D. Ozone layer controls O_2 / H_2 radio in atmosphere

Answer: A

Watch Video Solution

294. What is ozone hole?

A. Hole in the ozone layer

B. Formation of ozone layer

C. Thinning of ozone layer in troposphere

D. Reduction in ozone thickness in stratosphere

Answer: D

Watch Video Solution

295. Which rays are not the portion of electro-magnetic spectrum?

A. X-rays

B. Microwaves

C. α-rays

D. Radio waves

Answer: C

Watch Video Solution

296. Radio wave diffract around building although light waves do not. The reason is that radio waves

A. Travel with speed larger than c

B. Have much larger wavelength than light

C. Carry news

D. Are not electromagnetic waves

Answer: B

Watch Video Solution

297. The frequencies of X-rays, γ-rays and ultraviolet rays are respectively a, b and c .Then

A. $a < b, b > c$

B. $a > b, b > c$

C. $a > b, b < c$

D. $a < b, b < c$

Answer: A

Watch Video Solution

298. Radio waves and visible light in vacuum have

A. Same velocity but different wavelength

B. Continuous emission spectrum

C. Band absorption spectrum

D. Line emission spectrum

Answer: A

Watch Video Solution

299. Energy stored in electromagnetic osicllations is in the form of

A. Electrical energy

B. Magnetic energy

C. Both (a) and (b)

D. None of these

Answer: C

Watch Video Solution

300. Heat radiations propagate with the speed of

A. α-rays

B. β-rays

C. Light waves

D. Sound waves

Answer: C

Watch Video Solution

301. If a source is transmiting electric wave of frequency 8.2×10^6 Hz, then wavelength of the electromagnetic waves transmitted from the source will be

A. $36.6m$

B. $40.5m$

C. $42.3m$

D. $50.9m$

Answer: A

Watch Video Solution

302. In an apparatus the electric field was found to oscillate with an amplitude of 18 V/m. The magnitude of the oscillating magnrtic field will be

A. $4 \times 10^{-6} T$

B. $6 \times 10^{-8} T$

C. $9 \times 10^{-9} T$

D. $11 \times 10^{-11} T$

Answer: B

Watch Video Solution

Watch Video Solution

303. According to Maxwell's hypothesis, a changing electrio field gives rise to

A. An e.m.f.

B. Electric current

C. Magnetic field

D. Pressure radiant

Answer: C

Watch Video Solution

304. In an electromagnetic wave, the electric and magnetising fields are $100Vm^{-1}$ and $0.265Am^{-1}$. The maximum energy flow is

A. $26.5W/m^2$

B. $36.5W/m^2$

C. $46.7W/m^2$

D. $765W/m^2$

Answer: A

Watch Video Solution

305. The 21 cm radio wave emitted by hydrogen in interstellar space is due to the interaction called the hyperfine interaction is atomic hydrogen. the energy of the emitted wave is nearly

A. 10^{-17} Joule

B. $1 joule$

C. $7 \times 10^{-8} Joule$

D. $10^{-24} Joule$

Answer: D

Watch Video Solution

306. TV waves have a wavelength range of $1 - 10$ meter. Their frequency range in MHz is

A. $30 - 300$

B. $3 - 30$

C. $300 - 3000$

D. $3 - 3000$

Answer: A

Watch Video Solution

307. Maxwell's equations describe the fundamental laws of

A. Electricity only

B. Magnetism only

C. Mechanics only

D. Both (a) and (b)

Answer: D

Watch Video Solution

308. The oscillating electric and magnetic vectors of an electromagnetic wave are oriented along

A. The same direction but differ in phase by 90°

B. The same direction and are in phase

C. Mutually perpendicular directions and are in phase

D. Mutually perpendicular directions and differ in phase by 90°

Answer: C

Watch Video Solution

309. In which one of the following regions of the electromagnetic spectrum will the vibrational motion of molecules give rise to absorption

A. Ultraviolet

B. Microwaves

C. Infrared

D. Radio waves

Answer: B

Watch Video Solution

310. An electromagnetic wave travels along z - axis. Which of the following pairs of space and time varying fields would generate such a wave

A. E_x, B_y

B. E_y, B_x

C. E_z, B_x

D. E_y, B_z

Answer: A

Watch Video Solution

Watch Video Solution

311. Which of the following rays has the maximum frequency?

A. Gamma rays

B. Blue light

C. Infrared rays

D. Ultraviolet rays

Answer: A

Watch Video Solution

312. A signal emitted by an antenna from a certain point can be received at another point of the surface in the form of

A. Sky wave

B. Ground wave

C. Sea wave

D. Both (a) and (b)

Answer: D

Watch Video Solution

313. Ozone layer is atmosphere exist at the height of

A. 60 to $70km$

B. $59km$ to $80km$

C. $70km$ to $100km$

D. $100km$ to $200km$

Answer: A

Watch Video Solution

314. The electromagnetic waves do not transport

A. Energy

B. Charge

C. Momentum

D. Information

Answer: B

Watch Video Solution

315. A plane electromagnetic wave is incident on a material surface. The wave delivers momentum p and energy E.

A. $p = 0, E = 0$

B. $p \neq 0, E \neq 0$

C. $P \neq 0, E = 0$

D. $p = 0, E \neq 0$

Answer: B

Watch Video Solution

316. An electromagnetic wave going through vacuum is described by $E = E_0 \sin(kx - \omega t)$. Which of the following is/are independent of the wavelength?

A. k

B. ω

C. k / ω

D. $k\omega$

Answer: C

Watch Video Solution

317. An electromagnetic wave going through vacuum is described by

$E = E_0 \sin(kx - \omega t), B = B_0 \sin(kx - \omega t)$.

Then

A. $E_0 k = B_0 \omega$

B. $E_0 \omega = B_0 k$

C. $E_0 B_0 = \omega k$

D. None of these

Answer: A

Watch Video Solution

318. An LC resonant circuit a $400 pF$ capacitor and a $100 \mu H$ inductor. It is set into oscillation coupled to an antenna. The wavelength of the radiated electormagetic wave is

A. $377 mm$

B. 377 metre

C. $377 cm$

D. $3.77 cm$

Answer: B

Watch Video Solution

319. A radio receiver antenna that is $2m$ long is oriented along the direction of the electromagnetic wave and receives a signal of intensity $5 \times 10^{-16} W / m^2$. The maximum instaneous potential difference across the two ends of the antenna is

A. $1.23 \mu V$

B. $1.23 mV$

C. $1.23 V$

D. $12.3 mV$

Answer: A

Watch Video Solution

320. Television signals broadcast from the moon can be received on the earth while the TV broadcast from Delhi cannot be received at places about 100 km distant from Delhi. This is because

A. There is no atmosphere around the moon

B. Of strong gravity effect on TV signals

C. TV signals travel straight and cannot follow the curvature of the earth

D. There is atmosphere around the earth

Answer: C

Watch Video Solution

321. A TV tower has a height of $100m$. How much population is covered by TV broadcast? Given radius of the earth $= 6.4 \times 10^6 m$ and average density of population $= 10^3 km^{-2}$.

A. 2×10^6

B. 3×10^6

C. 4×10^6

D. 6×10^6

Answer: C

Watch Video Solution

322. The wavelength 21 cm emitted by atomic hydrogen in interstellar space belongs to

A. Radio waves

B. Infrared waves

C. Microwaves

D. γ-rays

Answer: A

Watch Video Solution

323. Which of the following are electromagnetic waves?

A. Sir J.C. Bose

B. Maxwell

C. Marconi

D. Hertz

Answer: C

Watch Video Solution

324. An electromagnetic wave of frequency $v = 3.0 MHz$ passes from vacuum into a dielectric medium with permittivity $\varepsilon = 4.0$. Then

A. Wavelength is doubled and the frequency remains unchanged

B. Wavelength is doubled and frequency becomes half

C. Wavelength is halved and frequency remains unchanged

D. Wavelength and frequency both remain unchanged

Answer: C

Watch Video Solution

325. Frequency of a wave is 6×10^{15} Hz. The wave is

A. Radiowave

B. Microwave

C. X-rays

D. None of these

Answer: D

Watch Video Solution

326. The region of the atmosphere above troposphere is known as

A. Lithosphere

B. Uppersphere

C. Ionosphere

D. Stratosphere

Answer: D

Watch Video Solution

327. Which of the following electromagnetic waves has minimum frequency ?

A. Microwaves

B. Audible waves

C. Ultrasonic waves

D. Radiowaves

Answer: B

Watch Video Solution

328. Which one of the following have minimum wavelength

A. Ultraviolet rays

B. Cosmic rays

C. X -rays

D. γ-rays

Answer: B

Watch Video Solution

329. Radiations of intensity $0.5W/m^2$ are striking a metal plate. The pressure on the plate is

A. $0.166 \times 10^{-8} N/m^2$

B. $0.332 \times 10^{-8} N/m^2$

C. $0.111 \times 10^{-8} N/m^2$

D. $0.083 \times 10^{-8} N/m^2$

Answer: A

Watch Video Solution

330. Electromagnetic waves travel in a medium which has relative permeability 1.3 and relative permittivity 2.14. Then the speed of the electromagnetic wave in the medium will be

A. $13.6 \times 10^{6} m / s$

B. $1.8 \times 10^{2} m / s$

C. $3.6 \times 10^{8} m / s$

D. $1.8 \times 10^{8} m / s$

Answer: D

Watch Video Solution

331. The intensity of gamma radiation from a given source is I. On passing through 27 mm of lead, it is reduced to $I/8$. The thickness of lead which will reduce the intensity to $I/2$ will be:

A. $18mm$

B. $12mm$

C. $6mm$

D. $9mm$

Answer: B

Watch Video Solution

332. if λ_v ', λ_x and λ_m represent the wavelengths of visible light X-rays and microwaves respectively then:

A. $\lambda_m > \lambda_x > \lambda_v$

B. $\lambda_v > \lambda_m > \lambda_y$

C. $\lambda_m > \lambda_v > \lambda_v$

D. $\lambda_v > \lambda_x > \lambda_m$

Answer: C

Watch Video Solution

333. For sky wave propagation of a $10MHz$ signal, what should be the minimum electron density in ionosphere?

A. ~$1.2 \times 10^{12} m^{-3}$

B. ~$10^{6} m^{-3}$

C. ~$10^{14} m^{-3}$

D. ~$10^{22} m^{-3}$

Answer: A

Watch Video Solution

334. Show that the radiation pressure exerted by an EM wave of intensity I on a surface kept in vacuum is I/c.

A. Ic

B. Ic^2

C. I/c

D. I/c^2

Answer: C

Watch Video Solution

335. Which of the following is correct regarding electromagnetic wave?

A. X rays and light waves

B. Cosmic rays and sound waves

C. Beta rays and sound waves

D. Alpha rays and sound waves

Answer: A

Watch Video Solution

336. which of the following in not true for electromagnetic waves ?

A. X-rays

B. Gamma rays

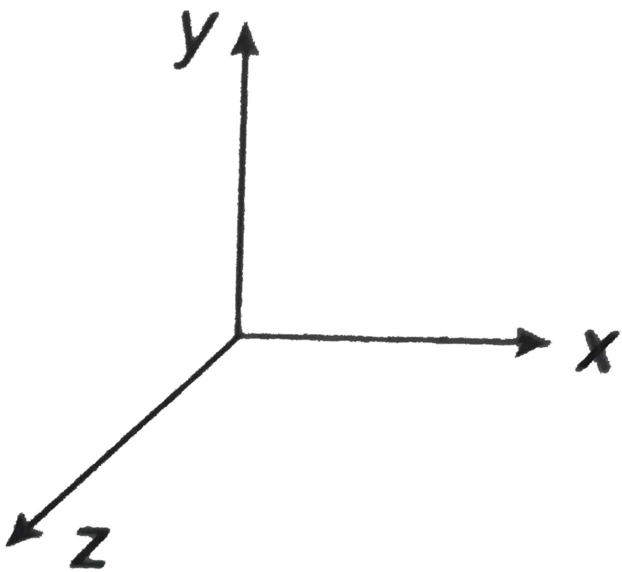
C. Cathode rays

D. Infrared rays

Answer: C

Watch Video Solution

337. Light wave is travelling along y-direction. If the corresponding $\overrightarrow{E}$ vector at any time is along the$x$-axis, the direction of $\overrightarrow{B}$ vector at that time is along



A. y-axis

B. x-axis

C. $+z$-axis

D. $-z$-axis

Answer: D

Watch Video Solution

338. If c is the speed of electromagnetic waves in vacuum, its speed in a medium of dielectric K and relative permeability μ_r is

A. $v = \frac{1}{\sqrt{\mu_r K}}$

B. $v = c\sqrt{\mu_r K}$

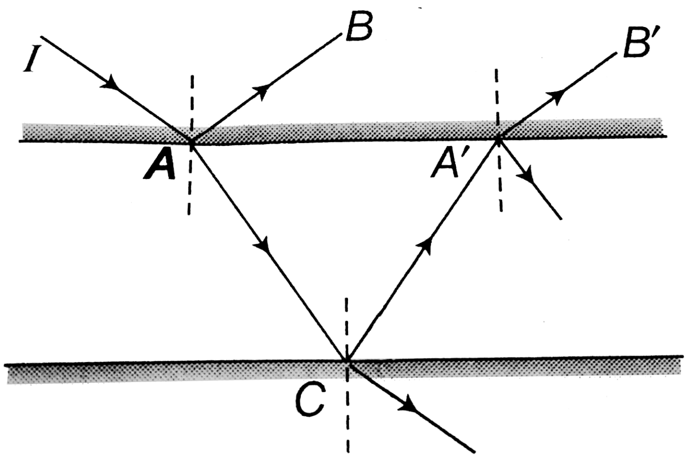
C. $v = \frac{c}{\sqrt{\mu_r K}}$

D. $v = \frac{K}{\sqrt{\mu_r C}}$

Answer: C

Watch Video Solution

339. A ray of light intensity I is incident on a parallel glass-slab at a point A as shown in figure. It undergoes partial reflection and refraction. At each reflection 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. $8:1$

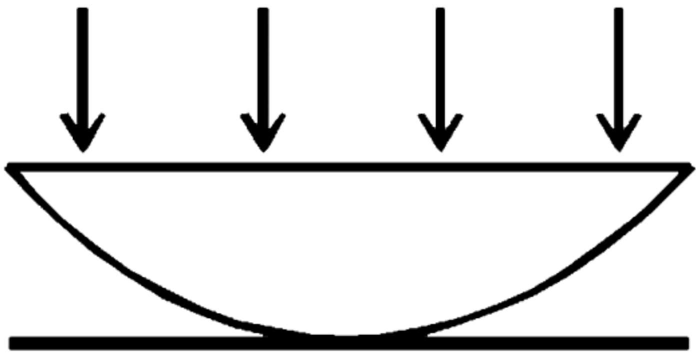
C. $7:1$

D. $49 : 1$

Answer: D

Watch Video Solution

340. A thin slice is cut out of a glass cylinder along a plane parallel to its axis. The slice is placed on a flat glass plate as shown in Figure. The observed interference fringes from this combination shall be



A. Straight

B. Circular

C. Equally spaced

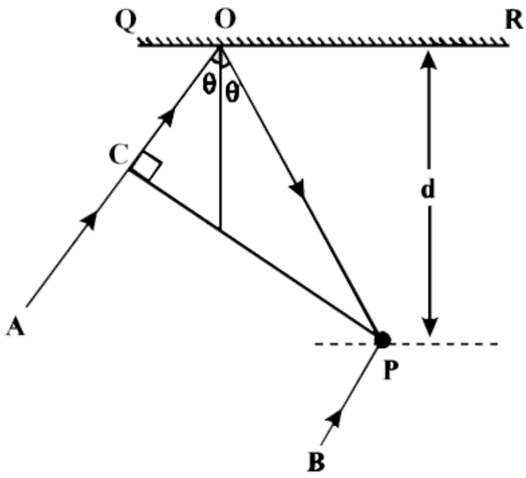
D. Having fringe spacing which increases as we go outwards

Answer: A

Watch Video Solution

341. In the adjacent diagram, CP represents a wavefront and AO & BP, the corresponding two rays. Find the condition on θ for constructive interference at P between the ray

BP and reflected ray OP.



A. $\cos\theta = 3\lambda / 2d$

B. $\cos\theta = \lambda / 4d$

C. $\sec\theta - \cos\theta = \lambda / d$

D. $\sec\theta - \cos\theta = 4\lambda / d$

Answer: B

Watch Video Solution

342. In Young's double slit experiment if monochromatic light is replaced by white light

A. All bright fringes become white

B. All bright fringes have colours between violet and red

C. only the central fringe is white, all other fringes are coloured

D. No fringes are observed

Answer: C

Watch Video Solution

343. In Young's double slit experiment, if the two slits are illuminated with separate sources, no interference pattern is observed because

A. There will be no constant phase difference between the two waves

B. The wavelengths are not equal

C. The amplitudes are not equal

D. None of the above

Answer: A

Watch Video Solution

344. 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

345. In a Young's double-silt experiment the source slit S and the two slits A and B are horizontal with slit A above slit B. The fringe are observed on a vertical screen. The optical path length from S to B is increased slightly by introducing a tranparent slab. As a result the fringe pattern on the screen moves

A. Vertically downwards slightly

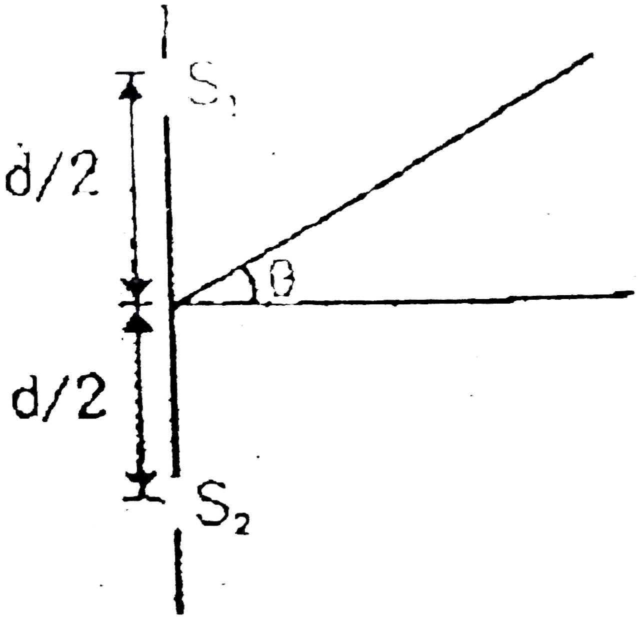
B. Vertically upwards slightly

C. Horizontally, slightly to the left

D. Horizontally, slightly to the right

Answer: A

Watch Video Solution



346.

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=150.0m. The intensity $I(\theta)$ is measured as a funtion of θ, where θ is defined as shown. if I_0 is the maximum intensity then $I(\theta)$ for $0 \leq \theta \leq 90^\circ$ is given by:

A. $I(\theta) = I_0 \text{ for } \theta = 0^\circ$

B. $I(\theta) = I_0/2 \text{ for } \theta = 30^\circ$

C. $I(\theta) = I_0/4 \text{ for } \theta = 90^\circ$

D. $I(\theta)$ is constant for all values of θ

Answer: A::B

Watch Video Solution

347. In the Young's double slit experiment, if the phase difference between the two waves interfering at a point is ϕ, the intensity at that point can be expressed by the expression

A. $I=\sqrt{A^2+B^2\cos^2\phi}$

B. $I=\frac{A}{B}\cos\phi$

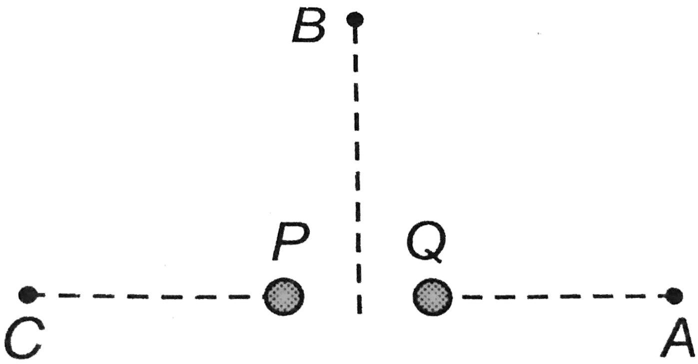
C. $I=A+B\cos.\frac{\phi}{2}$

D. $I=A+B\cos\phi$

Answer: D

Watch Video Solution

348. Figure here shown P and Q as two equally intense coherent sources emitting radiations of wavelength 20 m. The separation PQ is 5.0 m and phase of Q is ahead of the phase of P by 90°. A,B and C are three distant points of observation equidistant from the mid-point of PQ. The intensity of radiations at A,B and C will bear the ratio



A. $0:1:4$

B. $4:1:0$

C. $0:1:2$

D. $2:1:0$

Answer: D

Watch Video Solution

349. In Young's double slit experiment, the intensity on the screen at a point where path difference is λ is K. What will be the intensity at the point where path difference is $\lambda/4$?

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

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

C. K

D. Zero

Answer: B

Watch Video Solution

350. When one of the slits of Young's experiment is covered with a transparent sheet of thickness $4.8mm$, the central fringe shifts to a position originally occupied by the 30th bright fringe. What should be the thickness of the sheet if the central fringe has to shift to the position occupied by 20th bright fringe?

A. 3.8 mm

B. 1.6 mm

C. 7.6 mm

D. 3.2 mm

Answer: D

Watch Video Solution

351. In the ideal double-slit experiment, when a glass-plate (refractive index 1.5) of thickness t is introduced in the path of one of the interfering beams (wavelength λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is

A. 2λ

B. $\frac{2\lambda}{3}$

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

D. λ

Answer: A

Watch Video Solution

352. The time period of rotation of the sun is 25 days and its radius is $7 \times 10\&(8)m$. The Doppler shift for the light of wavelength 6000Å emitted from the surface of the sun will be

A. 0.04Å

B. 0.40Å

C. 4.00Å

D. 40.0Å

Answer: A

Watch Video Solution

353. In hydrogen spectrum the wavelength of H_a line is $656nm$, where in the spectrum of a distance galaxy H_a line wavelength is $706nm$. Estimated speed of the galaxy with respect to earth is ,

A. $2 \times 10^8 m/s$

B. $2 \times 10^7 m/s$

C. $2 \times 10^6 m / s$

D. $2 \times 10^5 m / s$

Answer: B

Watch Video Solution

354. A rocket is going towards moon with a speed v . The astronaut in the rocket sends signals of frequency v towards the moon and receives them back on reflection from the moon. What will be the frequency of the signal received by the astronaut (Take $v < < c$)

A. $\frac{c}{c - v}v$

B. $\frac{c}{c - 2v}v$

C. $\frac{2v}{c}v$

D. $\frac{2c}{v}v$

Answer: B

Watch Video Solution

355. The periodic time of rotation of a certain star is 22 days and its radius is 7×10^{8} metres . If the wavelength of light emitted by its surface be $4320 Å$, the Doppler shift will be (1 day = 86400 sec)

A. $0.033 Å$

B. $0.33 Å$

C. $3000 Å$

D. $4500 Å$

Answer: A

Watch Video Solution

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

A. $6000 \AA$

B. $5000 \AA$

C. 3000Å

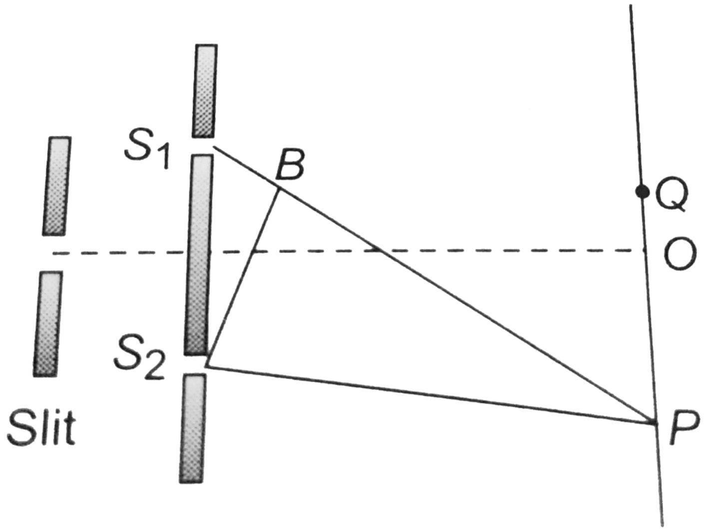
D. 4500Å

Answer: A

Watch Video Solution

357. In the figure is shown Young's double slit experiment. Q is the position of the first bright fringe on the right side of O. P is the 11^{th} bright fringe on the other side, as measured from Q. If the wavelength of the light used is

$600 nm$. Then S_1B will be equal to



A. $6 \times 10^{-6} m$

B. $6.6 \times 10^{-6} m$

C. $3.138 \times 10^{-7} m$

D. $3.144 \times 10^{-7} m$

Answer: A

Watch Video Solution

358. In Young's double slit experiment, the two slits acts as coherent sources of equal amplitude A and wavelength λ. In another experiment with the same set up the two slits are of equal amplitude A and wavelength λ but are incoherent. The ratio of the intensity of light at the mid-point of the screen in the first case to that in the second case is

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:1$

Answer: B

Watch Video Solution

359. Four light waves are represented by

(i) $y = a_1 \sin \omega t$

(ii) $y = a_2 \sin(\omega t + \varphi)$

(iii) $y = a_1 \sin 2\Omega t$

(iv) $y = a_2 \sin 2(\omega t + \varphi)$

Interference fringes may be observed due to superposition of

A. (i) and (ii)

B. (i) and (iii)

C. (ii) and (iv)

D. (iii) and (iv)

Answer: A::D

Watch Video Solution

360. 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

A. 2 cm, 7.5 cm

B. 3 cm, 6 cm

C. 2 cm, 4 cm

D. $4/3cm, 10/3cm$

Answer: C

Watch Video Solution

361. The maximum intensity in young's double-slit experiment is I_0. Distance between the slit is $d = 5\lambda$, where λ is the wavelength of monochromatic light used in the experiment. What will be the intensity of light in front of one of the slits on a screen at a distance $D = 10d$?

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

B. $\frac{3}{4}I_0$

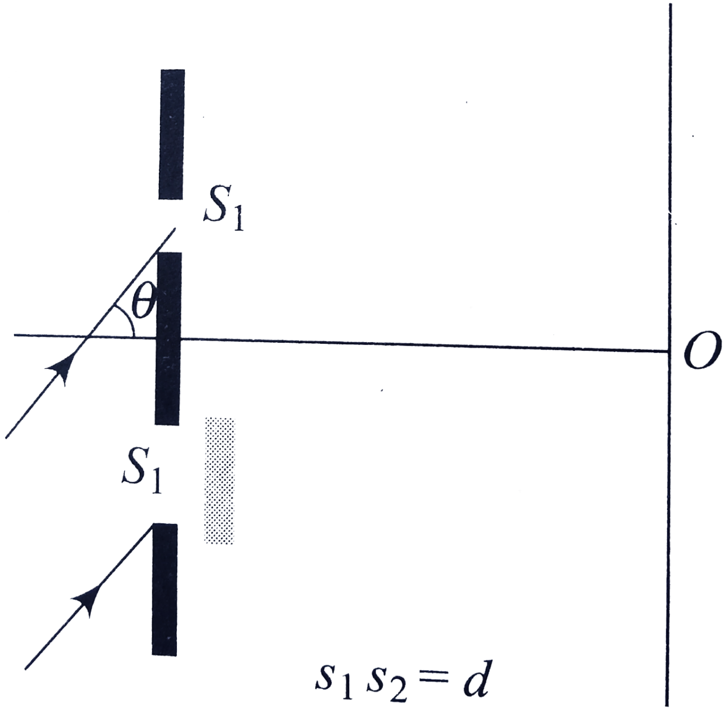
C. I_0

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

Answer: A

Watch Video Solution

362. A monochromatic beam of light fall on YDSE apparatus at some angle (say θ) 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. Above O

C. Below O

D. Anywhere depending on angle θ, thickness of plate t and refractive index of glass μ

Answer: D

Watch Video Solution

363. 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 $d = 7000\text{Å}$?

A. 12

B. 7

C. 18

D. 4

Answer: B

Watch Video Solution

364. In a Young's double slit experiment, the slits are $2mm$ apart and are illuminated with a mixture of two wavelength $\lambda_0 = 750nm$ and $\lambda = 900nm$. The minimum distance from the common central bright fringe on a screen $2m$ from the slits where a bright fringe from one interference pattern coincides with a bright fringe from the other is

A. 1.5 mm

B. 3 mm

C. 4.5 mm

D. 6 mm

Answer: C

Watch Video Solution

365. A flake of glass (refractive index 1.5) is placed over one of the openings of a double slit apparatus. The interference pattern displaces itself through seven succesive maxima towards the side where the flake is placed. If wavelength of the diffracted light is $\lambda = 600 nm$, then the thickness of

A. 2100 nm

B. 4200 nm

C. 8400 nm

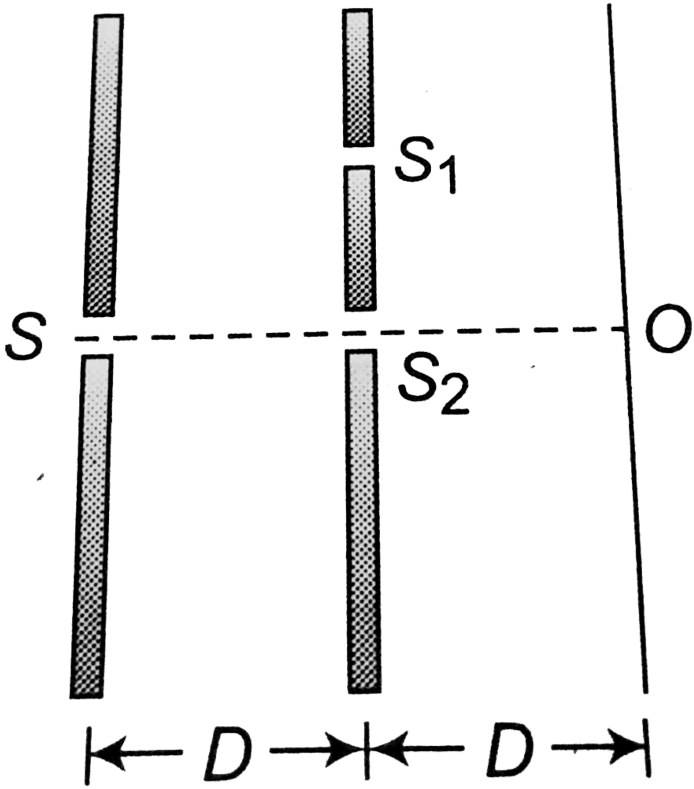
D. None of these

Answer: C

Watch Video Solution

366. Two ideal slits S_1 and S_2 are at a distance d apart, and illuninated by light of wavelength λ passing through an ideal source slit S placed on the line through S_2 as shown. The distance between the planes of slits and the source slit is D. A screen is held at a distance D from the plane of the slits. The minimum value of d for which there is darkness at O is

$(d < < D)$



A. $\sqrt{\frac{3\lambda D}{2}}$

B. $\sqrt{\lambda D}$

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

D. $\sqrt{3\lambda D}$

Answer: C

Watch Video Solution

367. In double slit experiment fringes are obtained using light of wavelength 4800Å 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. $8\mu m$

B. $6\mu m$

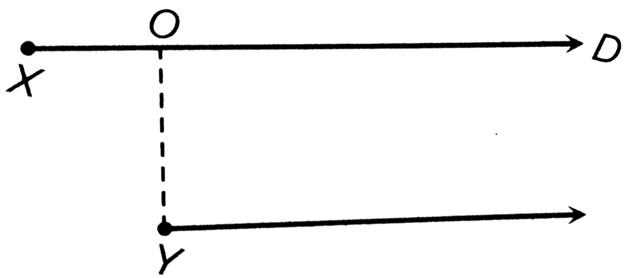
C. $4\mu m$

D. $10\mu m$

Answer: A

Watch Video Solution

368. Two point sources X and Y emit waves of same frequency and speed but Y lags in phase behind X by $2\pi / radian.$ If there is a maximum in direction D the distance XO using n as an integer is given by



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

B. $\lambda(n+1)$

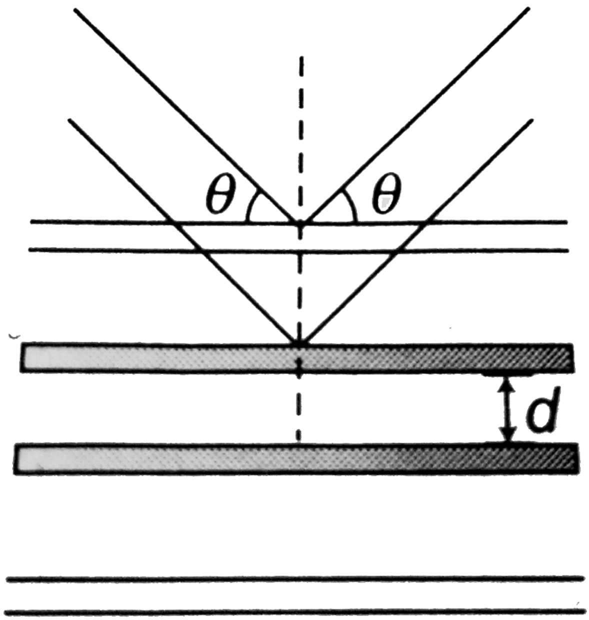
C. $\frac{\lambda}{2}(n+1)$

D. $\lambda(n-1)$

Answer: B

Watch Video Solution

369. A beam with wavelength λ falls on a stack of partially reflecting planes with separation d. The angle θ that the beam should make with planes so that the beams reflected from successive planes may interfere constructively is (where n=1, 2, ...)



A. $\sin^{-1}\left(\frac{n\lambda}{d}\right)$

B. $\tan^{-1}\left(\frac{n\lambda}{d}\right)$

C. $\sin^{-1}\left(\frac{n\lambda}{2d}\right)$

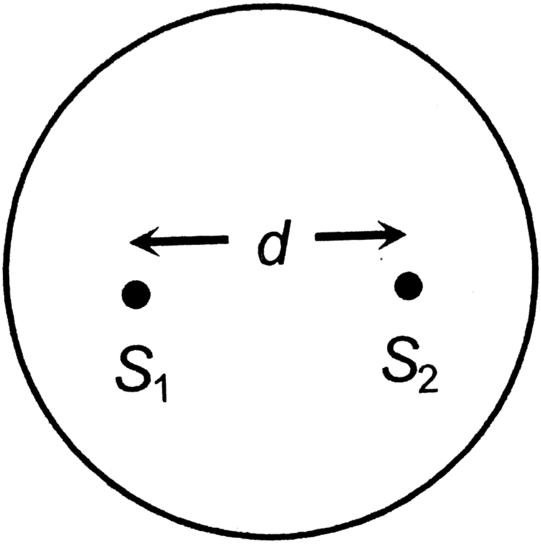
D. $\cos^{-1}\left(\frac{n\lambda}{2d}\right)$

Answer: C

Watch Video Solution

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

interference maxima is given as



A. $\sin^{-1}.\ \frac{n\lambda}{d}$

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

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

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

Answer: B

Watch Video Solution

371. Two coherent sources S_1 and S_2 area separated by a distance four times the wavelength λ of the source. The sources lie along y axis whereas a detector moves along +x axis. Leaving the origin and far off points the number of points where maxima are observed is

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

372. In Young's double slit experiment the amplitudes of two sources are $3a$ and a

respectively. The ratio of intensities of bright and dark fringes will be

A. $169 : 16 : 256$

B. $256 : 16 : 169$

C. $256 : 16 : 196$

D. $256 : 196 : 16$

Answer: B

Watch Video Solution

373. In a single slit diffraction of light of wavelength λ by a slit of width e, the size of the central maximum on a screen at a distance b is

A. $2b\lambda + e$

B. $\frac{2b\lambda}{e}$

C. $\frac{2b\lambda}{e} + e$

D. $\frac{2b\lambda}{e} - e$

Answer: C

Watch Video Solution

Watch Video Solution

374. Angular width of central maxima in the Fraunhofer diffraction pattern of a slit is measured. The slit is illuminated by light of wavelength 6000Å. When the slit is illuminated by light of another wavelength, the angular width decreases by 30%. The wavelength of this light will be

A. 6000Å

B. 4200Å

C. 3000Å

D. 1800Å

Answer: B

Watch Video Solution

375. In a single slit different experiment fist minimum for red light (660 nm) coincides with first maximum of some other wavelength λ. The value of λ is

A. 4400Å

B. 6600Å

C. 2000Å

D. 3500Å

Answer: A

Watch Video Solution

376. The ratio of intensities of consecutive maxima in the diffraction pattern due to a single slit is

A. $1 : 4 : 9$

B. $1 : 2 : 3$

C. $1 : \frac{4}{9\pi^2} : \frac{4}{25\pi^2}$

D. $1 : \frac{1}{\pi^2} : \frac{9}{\pi^2}$

Answer: C

Watch Video Solution

377. Light is incident normally on a diffraction grating through which the first order diffraction is seen at 32°. The second order diffraction will be seen at

A. 48°

B. 64°

C. 80°

D. There is no second order diffraction in this case

Answer: D

Watch Video Solution

378. White light may be considered to be mixture of waves of λ ranging between 3900Å and 7800Å. 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. $4308\text{Å}, 5091\text{Å}, 6222\text{Å}$

B. $4000\text{Å}, 5091\text{Å}, 5600\text{Å}$

C. $4667\text{Å}, 6222\text{Å}, 7000\text{Å}$

D. $4000\text{Å}, 4667\text{Å}, 5600\text{Å}, 7000\text{Å}$

Answer: A

Watch Video Solution

379. Among the two interfering monochromatic sources A and B, A is ahead of B in phase by 66°. If the observation be taken from point P, such that $PB - PA = \lambda/4$. Then the phase difference between the waves from A and B reaching P is

A. 156°

B. 140°

C. 136°

D. 126°

Answer: A

Watch Video Solution

380. The ratio of the intensity at the centre of a bright fringe to the intensity at a point one-quarter of the distance between two fringe from the centre is

A. 2

B. $1/2$

C. 4

D. 16

Answer: A

Watch Video Solution

381. A parallel plate capacitor of plate separation 2 mm is connected in an electric circuit having source voltage 400 V . if the plate area is $60cm^2$, then the value of displacement current for 10^{-6}sec will be

A. $1.062amp$

B. $1.062 \times 10^{-2}amp$

C. $1.062 \times 10^{-3}amp$

D. $1.062 \times 10^{-4}amp$

Answer: B

Watch Video Solution

382. A long straigth wire of resistance R, radius a and length l carries a constant current I.The poynting vector for the wire will be

A. $\frac{IR}{2\pi al}$

B. $\frac{IR^2}{al}$

C. $\frac{I^2R}{al}$

D. $\frac{I^2R}{2\pi al}$

Answer: D

Watch Video Solution

Watch Video Solution

383. In an electromagnetic wave, the amplitude of electric firld is $1\frac{V}{m}$. The frequency of wave is $5 \times 10^{14} Hz$. The wave is propagating along z-axis. The average energy density of electric field, in joule/m^3,will be

A. 1.1×10^{-11}

B. 2.2×10^{-12}

C. 3.3×10^{-13}

D. 4.4×10^{-14}

Answer: B

Watch Video Solution

384. A lamp emits monochromatic green light uniformly in all directions. The lamp is 3% efficient in converting electrical power to electromagnetic waves and consumes $100W$ of power. The amplitude of the electric field associated with the electromagnetic. radiation at a distance of $10m$ from the lamp will be

A. 1.34 V/m

B. 2.68 V/m

C. 5.36 V/m

D. 9.37 V/m

Answer: A

Watch Video Solution

385. A point source, of electromagnetic radiation has average power output of 800 W.

The maximum value electric at a distance 4.0 m from the source is:

A. 64.7 V / m

B. 57.8 V / m

C. 56.72 V / m

D. 54.77 V / m

Answer: D

Watch Video Solution

386. A wave is propagating in a medium of electric dielectric constant 2 and relative magnetic permeability $50.$ The wave impeldance of such a medium is

A. 5Ω

B. 376.6Ω

C. 1883Ω

D. 3776Ω

Answer: C

Watch Video Solution

Watch Video Solution

387. A plane electromagnetic wave of wave intensity $6W/m^2$ strikes a small mirror of area $40cm(2)$, held perpendicular to the approaching wave. The momentum transferred by the wave to the mirror each second will be

A. $6.4 \times 10^{-7} kg - m/s^2$

B. $4.8 \times 10^{-8} kg - m/s^2$

C. $3.2 \times 10^{-9} kg - m/s^2$

D. $1.6 \times 10^{-10} kg - m / s^2$

Answer: D

Watch Video Solution

388. Specific rotation of sugar solution is $0.01 SI$ units. $200 kg - m^{-3}$ of impure sugar solution is taken in a polarimeter tube of length $0.25 m$ and an optical rotation of 0.4 rad is observed. The percentage of purity of sugar in the sample is

A. 80%

B. 89%

C. 11%

D. 20%

Answer: A

Watch Video Solution

389. A $20cm$ length of a certain solution causes right-handed rotation of 38°. A $30cm$ length of another solution causes left-handed rotation of 24°. The optical rotation caused by $30 cm$ length of a mixture of the above solutions in the volume ratio $1:2$ is

A. Left handed rotation of 14°

B. Right handed rotation of 14°

C. Left handed rotation of 3°

D. Right handed rotation of 3°

Answer: D

Watch Video Solution

390. A beam of natural light falls on a system of 6 polaroids, which are arranged in succession such that each polaroid is turned through 30° with respect to the preceding one. The percentage of incident intensity that passes through the system will be

A. $100\ \%$

B. $50\ \%$

C. $30\ \%$

D. $12\ \%$

Answer: D

Watch Video Solution

391. A beam of plane polarized light falls normally on a polarizer of cross sectional area $3 \times 10^{-4} m^2$. Flux of energy of incident ray in $10^{-3} W$. The polarizer rotates with an angular frequency of $31.4 rad / \sec$. The energy of light passing through the polarizer per revolution will be

A. 10^{-4}Joule

B. 10^{-3}Joule

C. 10^{-2}Joule

D. 10^{-1}Joule

Answer: A

Watch Video Solution

392. 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. 4 mm

B. 5.6 mm

C. 14 mm

D. 28 mm

Answer: D

Watch Video Solution

393. 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

394. 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

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

C. $2I_0$

D. $4I_0$

Answer: D

Watch Video Solution

396. 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. $\sin(\lambda / d)$

B. $\sin(\lambda / 2d)$

C. $\sin(\lambda / 3d)$

D. $\sin(\lambda / 4d)$

Answer: C

Watch Video Solution

397. A beam of electron is used $YDSE$ experiment . The slit width is d when the velocity of electron is increased ,then

A. No interference is observed

B. Fringe width increases

C. Fringe width decreases

D. Fringe width remains same

Answer: B

Watch Video Solution

398. Assertion: When a light wave travels from a rarer to a denser medium, it loses speed. The reduction in speed imply a reduction in energy carried by the light wave.

Reason: The energy of a wave is proportional to velocity of wave.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

399. Assertion: A narrow pulse of light is sent through a medium. The pulse will retain its shape as it travels through the medium.

Reason: A narrow pulse is made of harmonic waves with a large range of wavelengths.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

Watch Video Solution

400. 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. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

401. Assertion : Newton's rings are formed in the reflected system. When the space between the lens and the glass plate is filled with a liquid of refractive index greater than that of glass, the central spot of the pattern is bright.

Reason : This is because the reflections in these cases will be from a denser to a rarer medium and the two interfering rays are reflected under similar conditions.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

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

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

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

403. 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. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

404. Statement-1 : In Young's double slit experiment, the fringes become indistinct if one of the slits is covered with cellophane paper. Statement-2 : The cellophane paper decreases the wavelength of light.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

405. 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. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

406. Assertion: Nicol prism is used to produce and analyse plane polarised light.

Reason: Nicol prism reduces the intensity of light to zero.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

407. Assertion: In everyday life to Doppler's effect is observed readily for sound waves than light waves.

Reason: Velocity of light is greater than that of sound.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

408. Statement-1 : In Young's experiment, the fringe width for dark fringes is same as that for white fringes. Statement-2 : In Young's double slit experiment performed with a source of white light, only black and bright fringes are observed.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

409. Assertion: Coloured spectrum is seen when we look through a muslim cloth.

Reason: It is due to the diffraction of white light on passing through fine slits.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

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

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

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

411. Statement I: Thin films such as soap bubble or a thin layer of oit on watar show beautiful colors when illuminated by white light.

Statement II: It happens due to the

interference of light reflected form the upper surface of thin film.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

412. Assertion: Microwave communication is preferred to optical communication

Reason: Microwaves provide large number of channels and bandwidths as compared to optical signals.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.
B. If both assertion and reason are true but reason is not the correct explanation of the assertion.
C. If assertion is true but reason is false.
D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

413. Assertion : Corpuscular theory fails to explain the velocities of light in air and water.

Reason : According to corpuscular theory, light should travel faster in denser media than in rarer media.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

414. 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. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

415. Assertion : The clouds in the sky generally appear to be whitish.

Reason : Diffraction due to clouds is efficient in equal measures its all wavelengths.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

416. Statement-I : Television signals are received through sky-wave propagation

Statement-II : The ionosphere reflects electromagnetic waves of frequencies greater than a certain critical frequency.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

417. Statemet-1: the electrical conductivity of earth's atmosphere increases with altitude.

Statement -2: The high energy particles (i.e., γ-rays and cosmic rays) coming from outer space while entering our earth's atmosphere cause ionization of the atoms of the gases present in the atmosphere and their energy decreases as they approach to earth.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

Watch Video Solution

418. Assertion: Only microwaves are used in radar.

Reason: Because microwaves have very small wavelength.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

419. Assertion: X-ray astronomy is possible only from satellites orbiting the earth.

Reasion: Efficiency of X-rays telescope is large as compared to any other telescope.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

420. Statement-1: Short wave band are used for transmission fo radiowaves to a large distance.

Statement-2: Short waves are reflected from ionosphere.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

421. Assertion: Ultraviolet radiation are of higher frequency waves are dangerous to huhman beaing.

Reasion: Ultraviolet radiation are absorbed by the atmosphere

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

422. Assertion: Environment damage has increased the amount of ozone in the atmosphere.

Reason: Increase of ozone increases the amount of ultraviolet radiation on earth.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

423. Assertion: Radio waves can be polarised.

Reason: Sound waves in air are longitudinal in nature.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

wave Nature and Interference of Light

1. Wave nature of light is verified by

A. Interference

B. Photoelectric effect

C. Reflection

D. Refraction

Answer: A

View Text Solution

Doppler s Effect of Light

1. A rocket is going away from the earth at a speed of $10^6 m/s$. If the wavelength of the light wave emitted by it be 5700Å, what will be its Doppler's shift

A. 200Å

B. 19Å

C. 20Å

D. 0.2Å

Answer: B

View Text Solution

Diffraction of Light

1. Which statement is correct for a zone plate and a lens

A. Zone plate has multi focii whereas lens has one

B. Zone plate has one focus whereas lens has multiple focii

C. Both are correct

D. Zone plate has one focus whereas a lens has infinite

Answer: A

View Text Solution

2. Radius of central zone of circular zone plate is . 2.3 mm Wavelength of incident light is . 5893 Å Source is at a distance of .6 m Then the distance of first image will be

A. 9 m

B. 12 m

C. 24 m

D. 36 m

Answer: A

View Text Solution

3. If we observe the single slit Fraunhofer diffraction with wavelength λ and slit width e , the width of the central maxima is 2θ . On decreasing the slit width for the same λ

A. θ increases

B. θ remains unchanged

C. θ decreases

D. θ increases or decreases depending on the intensity of light

Answer: A

View Text Solution

Polarization of Light

1. The transverse nature of light is shown by

A. Interference of light

B. Refraction of light

C. Polarisation of light

D. Dispersion of light

Answer: C

View Text Solution

EM Waves

1. Infrared radiation was discovered in 1800 by

A. William Wollaston

B. William Herschel

C. Wilhelm Roentgen

D. Thomas Young

Answer: B

View Text Solution

Critical Thinking Question

1. A circular disc is placed in front of a narrow source. When the point of observation is at a distance of 1 meter from the disc, then the disc covers first HPZ. The intensity at this point is I_0 . The intensity at a point distance 25 cm from the disc will be

A. $I_1 = 0.531 I_0$

B. $I_1 = 0.053 I_0$

C. $I_1 = 53 I_0$

D. $I_1 = 5.03 I_0$

Answer: A

View Text Solution

2. A circular disc is placed in front of a narrow source. When the point of observation is 2 m from the disc, then it covers first HPZ. The intensity at this point is I . When the point of observation is 25 cm from the disc then intensity will be

A. $\left(\frac{R_6}{R_2}\right)^2 I$

B. $\left(\frac{R_7}{R_2}\right)^2 I$

C. $\left(\frac{R_8}{R_2}\right)^2 I$

D. $\left(\frac{R_9}{R_2}\right)^2 I$

Answer: D

View Text Solution

3. A laser beam can be focussed on an area equal to the square of its wavelength A He - Ne laser radiates energy at the rate of 1 mW and its wavelength is 632.8 nm . The intensity of focussed beam will be

A. $1.5 \times 10^{13} W / m^2$

B. $2.5 \times 10^{9} W / m^2$

C. $3.5 \times 10^{17} W/m^2 W/m^2$

D. None of these

Answer: B

View Text Solution

4. The k line of singly ionised calcium has a wavelength of 393.3 nm as measured on earth. In the spectrum of one of the observed galaxies, this spectral line is located at 401.8

nm . The speed with which the galaxy is moving away from us, will be

A. 6480 km/s

B. 3240 km/s

C. 4240 km/sec

D. None of these

Answer: A

View Text Solution

Assertion and Reason

1. Assertion : It is necessary to use satellites for long distance T.V. transmission.

Reason : The television signals are low frequency signals.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

View Text Solution

2. Assertion : In Hertz experiment, the electric vector of radiation produced by the source gap is parallel to the gap.

Reason : Production of sparks between the detector gap is maximum when it is placed perpendicular to the source gap.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

View Text Solution

3. Assertion : For cooking in a microwave oven, food is always kept in metal containers.

Reason : The energy of microwave is easily transferred to the food in metal container.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

View Text Solution

4. Assertion : The earth without atmosphere would be inhospitably cold.

Reason : All heat would escape in the absence of atmosphere.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

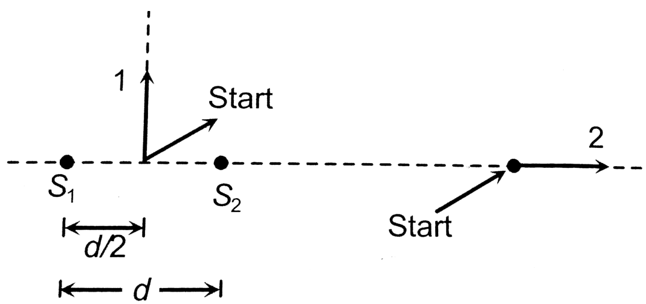
D. If the assertion and reason both are false.

Answer: A

View Text Solution

SET

1. Following figures shows sources S_1 and S_2 that emits light of wavelength λ in all directions. The sources are exactly in phase and are separated by a distance equal to 1.5λ. If we start at the indicated start point and travel along path 1 and 2, the interference produce a maxima all along



A. Path 1

B. Path 2

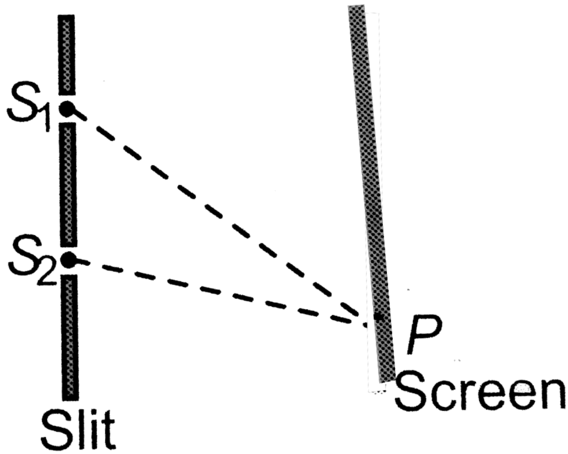
C. Any path

D. None of these

Answer: A

Watch Video Solution

2. In a Young's double slit experimental arrangement shown here, if a mica sheet of thickness t and refractive indec μ is placed in front of the slit S_1, then the path difference $(S_1P - S_2P)$ is



A. Decreases by $(\mu - 1)t$

B. Increases by $(\mu - 1)t$

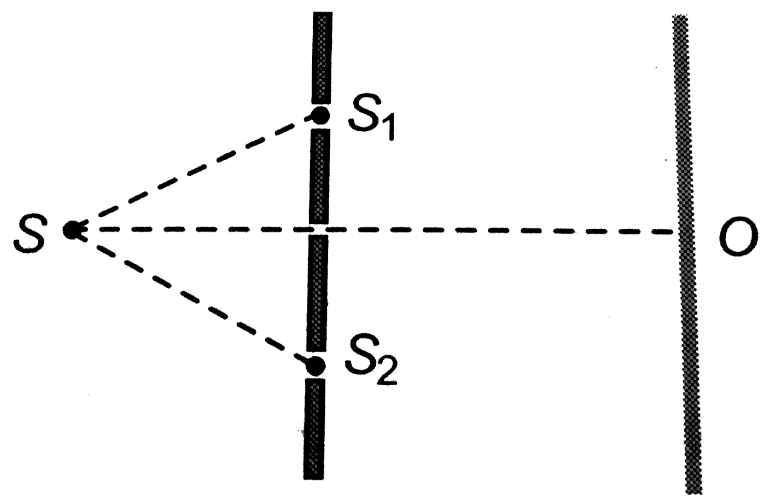
C. Does not change

D. Increases by μt

Answer: B

Watch Video Solution

3. 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

4. The intensity ratio of two coherent sources of light is p. They are interfering in some region and produce interference patten. Then the fringe visibility is

A. $\frac{1+p}{2\sqrt{p}}$

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

C. $\frac{p}{1+p}$

D. $\frac{2p}{1+p}$

Answer: B

Watch Video Solution

Watch Video Solution

5. Three waves of equal frequency having amplitudes $10\mu m$, $4\mu m$, $7\mu m$ arrive at a given point with successive phase difference of $\pi/2$, the amplitude of the resulting wave in μm is given by

A. 4

B. 5

C. 6

D. 7

Answer: B

Watch Video Solution

6. Four different independent waves are represented by

(i) $y_1 = a_1 \sin \omega t$, (ii) $y_2 = a_2 \sin 2\omega t$

(iii) $y_3 = a_3 \cos \omega t$, (iv) $y_4 = a_4 \sin\left(\omega t + \frac{\pi}{3}\right)$

With which two waves interference is possible

A. In (i) and (iii)

B. In (i) and (iv)

C. In (iii) and (iv)

D. Insufficient data to predict.

Answer: D

View Text Solution

7. A beam of light consisting of two wavelength $650nm$ and $520nm$ is used to illuminate the slit of a Young's double slit experiment. Then the order of the bright firnge of the longer wavelength that coincide with a bright fringe of the shorter wavelength at the least distance from the central maximum is

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

8. Two identical radiators have a separation of $d=\lambda/4$ where λ is the wavelength of the waves emitted by either source. The initial phase difference between the sources is $\lambda/4$. Then the intensity on the screen at a distant point situated at an angle $\theta=30^{\circ}$ from the radiators is (here I_0 is intensity at that point due to one radiator alone)

A. I_0

B. $2I_0$

C. $3I_0$

D. $4I_0$

Answer: B

Watch Video Solution

9. In Young's double slit experiment, the 8 th maximum with wavelength λ_1 is at a distance d_1 from the central maximum and the 6 th maximum with a wavelength λ_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

View Text Solution

10. Light of wavelength $500nm$ is used to form interference pattern in Young's double slit experiment. A uniform glass plate of refractive index 1.5 and thickness $0.1mm$ is introduced in the path of one of the interfering beams. The number of fringes which will shift the cross wire due to this is

A. 100

B. 200

C. 300

D. 400

Answer: A

Watch Video Solution

11. Two coherent sources of equal intensity produce maximum intensity of 100 units at a point. If the intensity of one of the sources is reduced by 36% reducing its width, then the intensity of light at the same point will be

A. 90

B. 89

C. 67

D. 81

Answer: D

Watch Video Solution

12. The path difference between two interfering waves of equal intensities at a point on the screen is $\lambda / 4$. The ratio of intensity at this point and that at the central fringe will be

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:4$

Answer: B

Watch Video Solution

13. In a Young's double slit experiment, I_0 is the intensity at the central maximum and β is the fringe width. The intensity at a point P distant x from the centre will be

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

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

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

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

Answer: C

Watch Video Solution

14. In a Fresnel's diffraction arrangement, the screen is at a distance of 2 meter from a circular aperture. It is found that for light of wavelengths λ_1 and λ_2 the radius of 4 th zone for λ_1 coincides with the radius of 5th zone for λ_2. Then the ratio $\lambda_1 : \lambda_2$ is

A. $\sqrt{4/5}$

B. $\sqrt{5/4}$

C. $5/4$

D. $4/5$

Answer: C

View Text Solution

15. If n represents the order of a half period zone, the area of this zone is approximately proportional to n^m where m is equal to

A. Zero

B. Half

C. One

D. Two

Answer: A

View Text Solution

16. A screen is placed $50 cm$ from a single slit, which is illuminated with 6000Å 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. $0.1mm$

B. $0.2mm$

C. $0.3mm$

D. $0.4mm$

Answer: B

Watch Video Solution

17. 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. 1.75

B. 1.50

C. 1.25

D. 1.00

Answer: B

Watch Video Solution

18. Two waves of equal amplitude and frequency interfere each other. The ratio of intensity when the two waves arrive in phase to that when they arrive 90° out of phase is

A. $1:1$

B. $\sqrt{2}:1$

C. $2:1$

D. $4:1$

Answer: C

Watch Video Solution

19. In Young's double-slit experiment , we get 60 fringes in the field of view if we use light of wavelength 4000Å. The number of fringes we will get in the same field of view if we use light of wavelength 6000Å is

A. 60

B. 90

C. 40

D. 1.5

Answer: C

Watch Video Solution

20. A parallel- plate capacitor with plate area A and separation between the plates d, is charged by a constant current i. Consider a plane surface of area A/2 parallel to the plates and drawn summetrically between the plates.

Find the displacement current through this area.

A. i

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

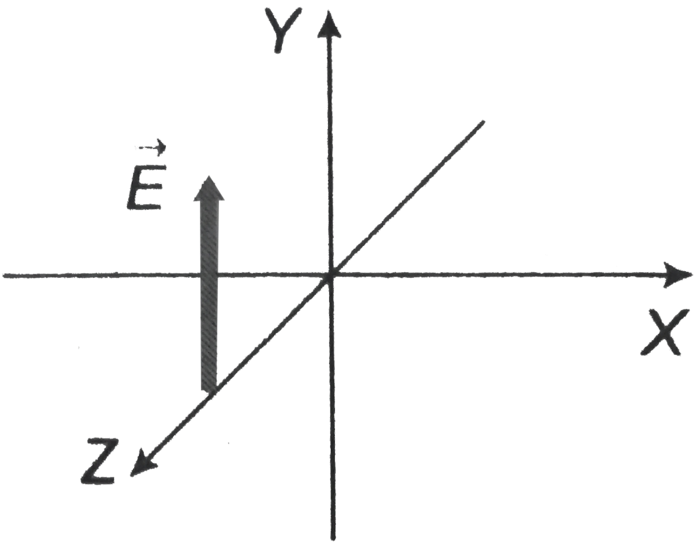
C. $\frac{i}{4}$

D. None of these

Answer: B

Watch Video Solution

21. The figure here gives the electric field of an EM wave at a certain point and a certain. The wave is transporting energy in the negative z direction. What is the direction of the magnetic field of the wave at the point and instant?



A. Towards + X direction

B. Towards – X direction

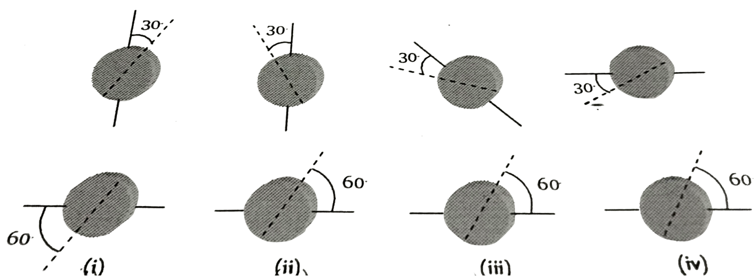
C. Towards + Z direction

D. Towards – Z direction

Answer: A

Watch Video Solution

22. The figure shows four pairs of polarizing sheets, seen face-on. Each pair is mounted in the path of initially unpolarized light. The polarizing direction of each sheet (indicated by the dashed line) is referenced to either a horizontal x -axis or a vertical y axis. Rank the pair according to the fraction of the initial intensity that they pass, greatest first



A. $(i) > (ii) > (iii) > (iv)$

B. $(i) > (iv) > (ii) > (iii)$

C. $(i) > (iii) > (ii) > (iv)$

D. $(iv) > (iii) > (ii) > (i)$

Answer: B

View Text Solution

23. An astronaut floating freely in space decides to use his flash light as a rocket. He shines a 10 watt light beam in a fixed direction so that he acquires momentum in the opposite direction. If his mass is 80 kg , how long must he need to reach a velocity of $1ms^{-1}$

A. $9\,\text{sec}$

B. $2.4 \times 10^3\,\text{sec}$

C. $2.4 \times 10^6\,\text{sec}$

D. $2.4 \times 10^9\,\text{sec}$

Answer: D

View Text Solution