Wave Optics Practice MCQs

1. Newton has postulated his corpuscular theory on the basis of :
   (a) Newton's ring (b) Colour due to thin film
   (c) Dispersing of light (d) Rectilinear propagation of light
2. The wave front is a surface in which :
   (a) all points are in the same phase
   (b) there are pairs of points in opposite phase
   (c) there are pairs of points with phase difference ($\pi / 2$)
   (d) there is no relation between the phases
3. The concept of secondary wavelets from all points on a wave front was first proposed by :
   (a) Newton (b) Huygen (c) Faraday (d) Raman
4. Huygen's concepts of secondary waves :
   (a) allow us to find the focal length of a thin lens
   (b) gives the magnifying power of a microscope
   (c) is a geometrical method to find a wave front
   (d) is used to determine the velocity of light
5. Interference proves :
   (a) transverse nature of waves (b) longitudinal nature of waves
   (c) wave nature (d) particle nature
6. When interference of light takes place :
   (a) energy is created in the region of maximum intensity
   (b) energy is destroyed in the region of maximum intensity
   (c) conservation of energy holds good and energy is redistributed
   (d) conservation of energy does not hold good
7. Two identical waves (each of intencity amplitudes are same I_0) superpose at a point in space. Then they are said to be constructively interfering if the resultant intensity I is :
   (a) equal to $4I_0$ (b) equal to $2I_0$ (c) greater than $2I_0$ (d) less than $2 I_0$
8. Two identical waves (each of intensity I_0) superpose at a point in space. Then they are said to be destructively interfering if the resultant I is :
   (a) equal to zero (b) equal to $2I_0$ (c) greater than $2I_0$ (d) less than $2I_0$
9. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be :

(a) $(2n - 1)\frac{\lambda}{4}$ (b) $(2n - 1)\frac{\lambda}{2}$ (c) $n\lambda$ (d) $(2n + 1)\frac{\lambda}{2}$

10. Two light sources are coherent when :
(a) their amplitudes are equal (b) their frequencies are equal
(c) their wavelengths are equal
(d) their frequencies are equal and their phase difference is constant

11. Which of the following produces coherent sources ?
(a) Ordinary prism (b) Biprism (c) Nichol prism (d) Achromatic prism

12. Light waves coming from two closely spaced pinholes, placed in front of a laser light source are :
(a) coherent (b) incoherent (c) neither coherent nor incoherent
(d) nothing can be predicted

13. Two waves of equal amplitude and wavelength but differing in phase are superimposed. Amplitude of resultant wave is maximum when phase difference is :
(a) zero (b) $\pi/12$ (c) π (d) $3\pi/2$

14. Ratio of intensities of two waves is given by 4 : 1. The ratio of the amplitudes of the waves is :
(a) 2 : 1 (b) 1 : 2 (c) 4 : 1 (d) 1 : 4

15. In the Young's double slit experiment, if monochromatic light used is replaced by white light, then
(a) no fringes are observed (b) all bright fringes become white
(c) all bright fringes have colours between violet and red
(d) only central fringe is white and all other fringes are coloured

16. Two coherent monochromatic light beams of intensities I and 4I are superposed; the maximum and minimum possible intensities in the resulting beam are :
(a) 5I and I (b) 5I and 3I (c) 9I and I (d) 9I and 3I

17. When two light waves have crossed each other, then just after crossing, the following quantities of each wave change :
(a) amplitude (b) frequency (c) velocity (d) none of these

18. If two waves, each of intensity I_0, have the same frequency and same phase, superimpose at a point, then the resultant wave intensity is :
(a) I_0 (b) $2I_0$ (c) $4I_0$ (d) $\sqrt{2}\ I_0$

19. It two waves, each of intensity I_0, having the same frequency but differing by a constant phase angle of 60^0, superpose at a certain point in space, then the intensity of resultant wave is :
(a) 2I0 (b) $\sqrt{3}\ I_0$ (c) $3I_0$ (d) 4I0

20. Two monochromatic waves each of intensity I have a constant phase difference of ϕ. If these waves superpose, then the intensity of the resultant wave is :
(a) 4I (b) $4I \cos \phi$ (c) $4I \cos^2 \phi$ (d) $4I \cos^2 (\phi/2)$

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

(a) fringe width (b) wavelength (c) intensity ratio of the sources

(d) distance between the sources

22. Using monochromatic light source Young's double slit interference fringes have been obtained for a certain separation of the slits. As the slit separation increases the fringes will become

(a) circular in shape (b) wider (c) unchanged in width (d) narrower

23. In Young's double slit interference experiment if the distance between the slits is made 3-fold, the fringe width becomes :

(a) (1/3) fold (b) 3 fold (c) (1/9) fold (d) 9 fold

24. In Young's double slit experiment the separation between the slits is halved and the distance between the slits and screen is doubled. The fringe width is :

(a) unchanged (b) halved (c) doubled (d) quadrupled

25. The necessary condition for an interference by two sources of light is that :

(a) two light sources must have the same wavelength

(b) two point sources should have the same amplitude and same wavelength

(c) two sources should have the same wavelength, nearly the same amplitude and have a constant phase angle difference

(d) the two point sources should have a randomly varying phase difference

26. The phenomenon of interference of light was first studied and explained by :

(a) Newton (b) Fresnel (c) Huygens (d) Young

27. For most distinct interference patterns to be observed the necessary condition is that the ratio of intensities of light waves from the two coherent sources should be :

(a) 1 : 1 (b) 1 : 2 (c) 1 : 3 (d) 1 : 4

28. Yellow light emitted by sodium lamp in Young's double slit experiment is replaced by monochromatic blue light of the same intensity :

(a) fringe width will decrease (b) fringe width will increase

(c) fringe width will remain unchanged (d) fringes will become less intense

29. In a certain double slit experimental arrangement, interference friges of width 1.0 mm each are observed when light of wavelength $5000 \overset{0}{A}$ is used. Keeping the setup unaltered if the source is replaced by replaced by another of wavelength $6000 \overset{0}{A}$, the fringe width will be :

(a) 0.5 mm (b) 1.0 mm (c) 1.2 mm (d) 1.5 mm

30. The Young's double slit experiment is performed with blue and with green light of wavelengths $4360 \overset{0}{A}$ and $5460 \overset{0}{A}$ respectively. If x is the distance of 4th maximum from the central one, then :

(a) x (blue) = x (green) (b) x (blue) > x (green)

(c) x (blue) < x (green) (d) $\frac{x(\text{blue})}{x(\text{green})} = \frac{5460}{4360}$

31. In a Young's double slit experiment, the fringe width is found to be 0.4 mm. 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) 0.30 mm (b) 0.40 mm (c) 0.53 mm (d) 450 microns

32. In an interference experiment monochromatic light is replaced by white light; we will see :

(a) uniform illumination on the screen (b) uniform darkness on the screen

(c) equally spaced white and dark bands (d) a few coloured bands and then uniform illumination

33. The fringe width in Young's double slit experiment on a screen which is placed at a distance of 1 m from the slits 10^{-3} m apart when the light used has wavelength 6×10^{-7} m, is equal to :

(a) 3×10^{-10} m (b) 3×10^{-4} m (c) 6×10^{-10} m (d) 6×10^{-4} m

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

(a) 0.25 mm (b) 0.1 mm (c) 1.0 mm (d) 0.01 mm

35. In Young's double slit experiment the angular width of a fringe formed on a distant screen is 1^0. The wavelength of light used is $6000\ \overset{0}{A}$. The spacing between the slits is approximately :

(a) 1 mm (b) 0.05 mm (c) 0.03 mm (d) 0.01 mm

36. The destructive interference at a certain point is produced when two coherent light waves superpose at that point with a phase difference of :

(a) zero (b) $\pi / 2$ (c) π (d) 2π

37. The path difference equivalent to a phase difference of 270^0 (given wavelength of wave $= \lambda$) is :

(a) zero (b) $\lambda/2$ (c) $3\lambda/4$ (d) λ

38. The light waves from two independent monochromatic light sources are given by $y_1 = 2 \sin \omega t$ and $y_2 = 3 \cos \omega t$ Then the correct statement is :

(a) both the waves are coherent (b) both the waves are incoherent

(c) both die waves have different time periods (d) none of the above

39. Four independent waves are represented by the equations :

$y_1 = a_1 \sin \omega t,\ y_2 = a_2 \sin \omega t,$

$y_3 = a_3 \cos \omega t,\ y_2 = 0.4 \sin \left(\omega t + \frac{\pi}{3}\right)$

Then the waves for which the phenomenon of interference will be observed are :

(a) 1 and 3 (b) 1 and 4 (c) all 1, 2, 3 and 4 (d) none of these

40. Two waves are said to be coherent if they have :

(a) same amplitude (b) same wavelength (c) same amplitude and same wavelength

(d) same wavelength and constant phase difference

41. In Young's double slit experiment, the intensity of a bright fringe is :

(a) equal to the intensity of light wave from any one slit

(b) twice the intensity of light wave from any slit

(c) three times the intensity of wave from any slit

(d) four times the intensity of wave from any slit

42. In Young's double slit experiment; if width (aperture) of the slit S is increased keeping other parameters constant, then the interference fringes will :

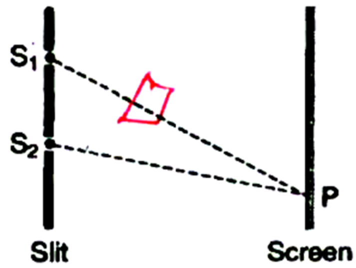
(a) remain unchanged (b) form closer (c) form further away (d) gradually disappear

43. In a Young's double slit experiment, fringe width equal to 1 mm is observed. Then the distance of first nearest bright fringe from the central fringe will be :

(a) 1 mm (b) 0.5 mm (c) 2 mm

(d) insufficient data, cannot be determined

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



(a) decreases by $(\mu - 1)\,t$ (b) increases by $(\mu - 1)\,t$

(c) does not change (d) increases by μt

45. In double slit experiment, the phase difference between the two waves reaching at the location of the third dark fringe is :

(a) π (b) 6π (c) 5π (d) 7π

46. Interference fringes of light are observed in an interference chamber containing pure water ($\mu = 4/3$) .Now, if the water is drained out first and then the chamber is evacuated, then :

(a) no interference fringe pattern is observed

(b) same interference fringe pattern is observed

(c) interference pattern with smaller fringe width is observed

(d) interference pattern with larger fringe width is observed

47. It is found that when waves from two coherent sources superpose at a certain point, then the resultant intensity is equal to the intensity of one wave only. This means that the phase difference between the two waves at that point is :

(a) zero (b) $\pi/3$ (c) $2\pi/3$ (d) π

48. For interference, the two light sources must be :

(a) coherent, narrow and monochromatic (b) coherent, wide and monochromatic

(c) coherent, wide and of equal intensity (d) incoherent, wide but monochromatic

49. Interference of light waves from two coherent sources is possible for :

(a) un polarised light waves only

(b) polarised light waves only if their polarisation is in the same direction

(c) both of the above

(d) none of the above

50. The following sources are coherent sources :

(a) two mercury lamps of same wattage (b) two sodium lamps of same wattage

(c) two fluorescent lamps of the same wavelength and same power

(d) two phase locked He-Ne lasers

51. In Young's double slit experiment carried out with light of wavelength $\lambda = 5000\ \overset{0}{A}$, the distance between the slits is 0.2 mm and the screen is at 200 cm from the plane of slits. The central maximum is at x = 0. The third maximum will be at x equal to :

(a) 1.67 cm (b) 1.5 cm (c) 0.5 cm (d) 5.0 cm

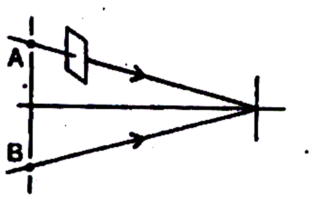
52. In Young's experiment, two coherent sources are placed 0.90 mm apart and the fringes are observed one metre away. If it produces the second order dark fringe at a distance of 1 mm from the central fringe the wavelength of monochromatic light used would be :

(a) 60×10^{-4} cm (b) 10×10^{-4} cm (c) 10×10^{-5} cm (d) 6×10^{-5} cm

53. Two slits separated by a distance of 1 mm are illuminated with red light of wavelength 6.5×10^{-7} m. The interference fringes are observed on a screen placed 1 m from the slits. The distance between the thid dark fringe and the fifth bright fringe is equal to :

(a) 0.65 mm (b) 1.63 mm (c) 3.25 mm (d) 4.88 mm

54. In Young's experiment monochromatic light 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, then :



(a) the fringes will disappear (b) the fringe width will increase

(c) the fringe width will decrease (d) there will be no change in fringe width

55. The central fringe of the interference pattern produced by light of wavelength $6000\ \overset{0}{A}$ is found to shift to the position of 4^{th} bright fringe after a glass plate of refractive index 1.5 is introduced. The thickness of the glass plate would be :

(a) 4.8 μm (b) 8.23 μm (c) 14.98 μm (d) 3.78 μm

56. In Young's experiment when sodium light of wavelength $5893\ \overset{0}{A}$ is used, then 62 fringes are seen in the field of view. Instead, if violet light of wavelength $4358\ \overset{0}{A}$ is used then the number of fringes that will be seen in the field of view will be :

(a) 54 (b) 64 (c) 74 (d) 84

57. Interference was observed in an interference chamber, when air was present. Now, the chamber is evacuated and if the same light is used, a careful observation will show :

(a) no interference (b) interference with bright bands (c) interference with dark bands

(d) interference in which breadth of the fringe will be slightly increased

58. In Young's two slit experiment the distance between the two coherent sources is 2 mm and the screen is at a distance of 1 m. If the fringe width is found to be 0.03 cm, then the wave-length of the light used is :

(a) $4000\ \overset{0}{A}$ (b) $5000\ \overset{0}{A}$ (c) $5890\ \overset{0}{A}$ (d) $6000\ \overset{0}{A}$

59. Instead of using two slits as in Young's experiment, if we use two separate but identical sodium lamps, which of the following occurs?

(a) General illumination (b) Widely separate interference

(c) Very bright maximum (d) Very dark minimum

60. 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 :

(a) equal (b) double (c) small (d) large

61. The path difference between two interfering waves at a point on a screen is 11.5 times the wavelength. The point is :

(a) dark (b) bright (c) neither bright nor dark (d) data is inadequate

62. If white light is used in a biprism experiment then :

(a) fringe pattern disappears (b) all fringes will be coloured

(c) central fringe will be white others will be coloured

(d) central fringe will be dark

63. In interference of two waves if the amplitude ratio $(r_1/r_2) = (1/2)$, then the intensity ratio (I_1/I_2) for the two waves will be :

(a) (1/2) (b) (1/4) (c) (9/1) (d) (1/9)

64. Light appears to travel in a straight line because :

(a) Its velocity is very large (b) it is not absorbed by the surroundings

(c) its wavelength is very small (d) it is reflected by the surroundings

65. According to modern theory for nature of light, the light has :

(a) wave nature only (b) particle nature only

(c) both particle and wave (dual) nature (d) neither particle nature nor wave nature

66. Colours appear on a thin soap film and on soap bubbled due to the phenomenon of :

(a) refraction (b) dispersion (c) interference (d) diffraction

67. If the two waves represented by $y_1 = 4 \sin \omega t$ and $y_2 = 3 \sin (\omega t + \pi/3)$ interfere at a point, the amplitude of the resulting wave will be about :

(a) 7 (b) 5 (c) 6 (d) 3.5

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

(a) wavelength increase (b) distance between source and screen decreases

(c) distance between slits increases (d) the width of the slits increases

69. If the ratio of amplitude of two interfering 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

70. If the ratio of intensities of two waves causing interference be 9 : 4, then the ratio of the resultant maximum and minimum intensities will be :

(a) 9 : 4 (b) 3 : 2 (c) 25 : 1 (d) 5 : 1

71. Two waves of same frequency and same amplitude from two monochromatic sources are allowed to superpose at a certain point. If in one case the phase difference is 0_0 and in other case it is $\pi/2$, then the ratio of the intensities in the two cases will be :

(a) 1 : 1 (b) 2 : 1 (c) 4 : 1 (d) none of these

72. In interference pattern, the energy is :

(a) created at the maximum (b) destroyed at the minimum

(c) conserved but redistributed (d) all of the above

73. The interference fringe pattern. In young's double slit experiment, will not be observed if :

(a) the separation d between the two slits is of the order of λ

(b) the separation d between the two slits

(c) the width of the slit S is large of the order of a few mm

(d) all of the above

74. In the Young's double slit experiment, initially equal intensities were coming out of the two slits S_1, and S_2. Now if in front of one slit, a glass sheet which absorbs half of the intensity is placed, then

(a) the brighter fringes will become comparatively darker

(b) the darker fringes will become comparatively brighter

(c) the central fringe will shift on the side of the glass plate

(d) all of the above

75. In Young's double slit experiment, white light source is used to obtain a white central fringe and a few coloured fringes. Now if a filter allowing only red light is used in front of slit A_1 and another filter allowing only blue light is used in front of second slit S_2, then

(a) only red coloured fringes will be observed

(b) only blue coloured fringes will be observed

(c) both red coloured and blue coloured fringes will be observed

(d) Two indepent soures will not form interference

76. In Young's experiment monochromatic light through a single slit S is used to illuminated the two slits S1 and S2. Interference fringes are obtained on the screen. The fringe width is found to be β . Now a thin sheet of mica (thickness t and refractive index μ) is placed near and in front of one of the two slits. Now the fringe width is found to be β '. Then :

(a) $\beta' = \beta/\mu$ (b) $\beta' = \beta\mu$ (c) $\beta' = (\mu - 1)\beta$ (d) $\beta' = \beta$

77. Keeping the experiment setup same, if a biprism experiment is repeated inside water then the fringe width will :

(a) decrease (b) increase (c) remain the same (d) become zero

78. If Young's double slit experiment is immersed in water then the fringe width :

(a) decreases (b) increases (c) remains unchanged (d) becomes infinite

79. Two beams of monochromatic light whose intensities are in the ratio of 4 : 1 are supermposed to form interference fringes. The ratio of the maximum to minimum intensity in this pattern is :

(a) 5 : 1 (b) 5 : 3 (c) 9 : 1 (d) 9 : 3

80. In an experiment to demonstrate the interference of light using Young's slits, the separation of two narrow slits is doubled in order to maintain the same spacing of the fringes. The distance D of the screen from the slits must now be altered to about :

(a) 2 D (b) D (c) $D/\sqrt{2}$ (d) D/2

81. In a biprism experiment, by using light of wavelength $5000 \overset{0}{A}$, 5 mm wide fringes are obtained on a screen 1.0 m away from the coherent sources. The separation between the two coherent sources is

(a) 1.0 mm (b) 0.1 mm (c) .05 mm (d) 0.01 mm

82. If the distance between the coherent sources is reduced to half and the distance of the screen is doubled then the fringe width will :

(a) become four times (b) become one-fourth

(c) become two times (d) remain unchanged

83. If the refracting angle of a biprism is increased then the effect on the interference pattern is :

(a) fringes will be formed closer (b) fringes pattern will disappear

(c) fringe width will increase (d) fringes pattern will not be affected

84. The most essential characteristic of two coherent sources is :

(a) their amplitudes are the same (b) their wavelengths are the same

(c) their frequencies are the same (d) the phase difference between them is constant

85. If a thin mica sheet of thickness t and refractive index μ is placed in the path of one of the waves producing interference, then the whole interference pattern shifts towards the side of the sheet by a distance :

(a) $\frac{d}{D}(\mu - 1)t$ (b) $\frac{D}{d}(\mu - 1)t$ (c) $Dd(\mu - 1)t$ (d) $(\mu - 1)t$

86. If in an interference pattern, Imax represents the intensity maximum value and represents the intensity minimum value, then the fringes visibility is defined as :

(a) $V = \frac{I_{max}}{I_{min}}$ (b) $V = \frac{I_{max.} + I_{min.}}{I_{max.} - I_{min.}}$ (c) $V = \frac{I_{max.} - I_{min.}}{I_{max.} + I_{min.}}$ (d) $V = \frac{\sqrt{I_{max.}} - \sqrt{I_{min.}}}{\sqrt{I_{max.}} + \sqrt{I_{min.}}}$

87. Find the thickness of a plate which produce a change in optical path equal to half the wavelength λ, of the light passing through it normally. The refractive index of the plate μ is :

(a) $\frac{\lambda}{4(\mu - 1)}$ (b) $\frac{2\lambda}{4(\mu - 1)}$ (c) $\frac{\lambda}{(\mu - 1)}$ (d) $\frac{\lambda}{2(\mu - 1)}$

88. In Young's double slit experiment, the 7^{th} maximum with wavelength λ_1. is at a distance d_1 and that with wavelength λ_2 is at a distance d_2. Then (d_1/d_2) is :

(a) (λ_1 / λ_2) (b) (λ_2 / λ_1) (c) $(\lambda_1^2 / \lambda_2^2)$ (d) $(\lambda_2^2 / \lambda_1^2)$

89. In Young's double slit experiment we get 60 fringes in the field of view of monochromatic light of wavelength $4000\ \overset{0}{A}$. If we use monochromatic light of wavelength $6000\ \overset{0}{A}$, then the number of fringes obtained in the same field of view are :

(a) 60 (b) 90 (c) 40 (d) 1.5

90. Waves from two different sources overlap a particular point. The amplitude and frequency of the two waves are same. The ratio of the 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

91. In Young's experiment the wavelength of red light is 7.8×10^{-5} cm and that of blue light 5.2×10^{-5} cm. The value of n for which (n + 1) th blue bright coincides with nth red band is :

(a) 4 (b) 3 (c) 2 (d) 1

92. If one of the two slits of a Young's double slit experiment is painted over so that it transmits half the light intensity of the other, then :

(a) the fringe system would disappear

(b) the bright fringes will be more bright and dark fringes will be more dark

(c) the dark fringes would be brighter and bright fringes would be darker

(d) bright as well as dark fringes would be darker

93. In Young's double slit experiment, illuminated by yellow light, one slit is covered with plane transparent thin glass plate and the other slit by blue filter. Then :

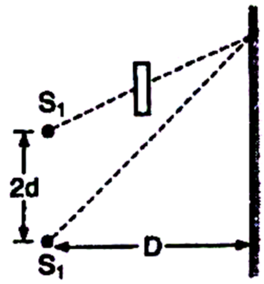
(a) there will be yellow and blue interference fringes formed on the screen

(b) there will be uniform illumination on the screen

(c) the maximum intensity fringes will be doubly coloured

(d) the minimum intensity fringes will be dark

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



(a) $\frac{Dt}{3d}$ (b) $\frac{Dt}{5d}$ (c) $\frac{Dt}{4d}$ (d) $\frac{2Dt}{5d}$

95. In the 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 path difference is $(\lambda/4)$?

(a) K/4 (b) K/2 (c) K (d) Zero

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

(a) 4 : 1 (b) 1 : 1 (c) 1 : 4 (d) 2 : 1

97. Light travels faster in air than an glass according to :

(a) wave theory of light (b) corpuscular theory of light

(c) both (a) and (b) (d) neither (a) nor (b)

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

(a) Refraction (b) Reflection (c) Diffraction (d) Origin of spectra

99. In an experiment similar to Young's experiment, interference is observed using waves associated with electrons. The electrons are being produced in an electron gun. In order to increase the fringe width :

(a) electron gun voltage be increased (b) electron gun voltage be decreased

(c) the slits be moved away (d) the screen be moved closer to interfering slits

100. Interference fringes were produced in Young's double slit experiment using light of wavelength $5000\ \overset{0}{A}$. When a film of material 2.5×10^{-3} cm thick was placed over one of the slits, the fringe pattern shifted by a distance equal to 20 fringe widths. The refractive index of the material of the film is

(a) 1.25 (b) 1.33 (c) 1.4 (d) 1.5

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

(a) 0.30 mm (b) 0.40 mm (c) 0.53 mm (d) 0.2 mm

102. Diffraction effects are easily observable for :

(a) microwaves (b) sound waves (c) radio waves (d) all of the above

103. To observe diffraction, the size of an obstacle

(a) should be much larger than the wavelength

(b) should be of the same order as the wavelength

(c) have no relation to wavelength (d) should be exactly $\lambda / 2$

104. The phenomenon of diffraction may be thought of as interference, where the number of coherent sources are :

(a) zero (b) two (c) infinite (d) none of these

105. The phenomenon of diffraction can be exhibited by :

(a) infrared waves (b) microwaves (c) X-rays (d) all of these

106. The phenomenon of diffraction can be exhibited by :

(a) polarised waves only (b) unpolarised waves only

(c) longitudinal waves only

(d) all, polarised or unpolarised, longitudinal or transverse Waves

107. A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?

(a) No change (b) Diffraction bands become narrower and crowded together

(c) Bands become broader and farther apart (d) Bands disappear

108. Diffraction and refraction indicate :

(a) wave nature (b) particle nature (c) both (a) and (b) (d) none of the above

109. 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

110. In Fresnel's class of diffraction, the :

(a) obstacle-screen distance is small (b) the diffracted wavefront is considered as spherical

(c) no convex lens is used to focus the diffraction fringes on the screen

(d) all of the above

111. In Young's double slit experiment, the type of diffraction is :

(a) Fresnel (b) Fraunhofer (c) both of the above (d) none of the above

112. The first diffraction minimum due to a single slit diffraction is at $\theta = 30^0$ for a light of wavelength $5000\ \overset{0}{A}$. The width of the slit is :

(a) 5×10^{-5} cm (b) 1.0×10^{-4} cm (c) 2.5×10^{-5} cm (d) 1.25×10^{-5} cm

113. A slit of width a is illuminated by white light. The first minimum for red light $(\lambda = 6500\ AU)$. will fall at $\theta = 30^0$, when a will be :

(a) $3250\ \overset{0}{A}$ (b) 6.5×10^{-4} cm (c) 1.3 micron (d) 2.6×10^{-4} cm

114. Light of wavelength λ is incident on a slit of width d. The resulting diffraction pattern is observed on a screen at a distance D. The linear width of the principal maximum is then equal to the width of the slit if D equals :

(a) (d/λ) (b) $(2\lambda/d)$ (c) $(d^2/2\lambda)$ (d) $(2\lambda^2/d)$

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

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

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

(c) diffraction is due to interaction of source, whereas the interference is the bending of light from the same wavefront

(d) diffraction is from a source whereas interference is caused due to refraction of waves from a source

116. A beam of light of wavelength 600 nm from a distant source falls on a single slit 1.00 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringes on either side of the central bright fringe is :

(a) 1.2 cm (b) 1.2 mm (c) 2.4 cm (d) 2.4 mm

117. In case of diffraction at single slit if the wavelength of light becomes equal to the aperture of slit, on the screen we shall observe :

(a) image of slit (b) diffraction band (c) uniform illumination

(d) nonuniform illumination

118. Polarisation of light proves the :

(a) corpuscular nature of light (b) quantum nature of light

(c) transverse wave nature of light (d) longitudinal wave nature of light

119. The fact that light is transverse, wave phenomenon derives its evidential support from the observation that :

(a) light is a wave motion (b) light is characterised by interference

(c) light shows polarising effects (d) light can be diffracted

120. The phenomenon which does not take place in sound waves is :

(a) scattering (b) diffraction (c) interference (d) polarization

121. One of the devices to produce plane polarized light is :

(a) nicol prism (b) a crystal (c) a biprism (d) a half wave plate

122. If light is polarised by reflection, then the angle between reflected and refracted light is :

(a) π (b) $\pi/2$ (c) 2π (d) $\pi/4$

123. Polaroid glass is used in sun glasses because because :

(a) it reduces the light intensity to half on account of polarisation

(b) it is fashionable (b) it has good colour (d) it is cheaper

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

(a) 0^0 (b) 45^0 (c) 90^0 (d) 18^0

125. A beam of light strikes a piece of glass at an angle of incidence of 60^0 and the reflected beam is completely plane polarised. The refractive index of the glass is :

(a) 1.5 (b) $\sqrt{3}$ (c) $\sqrt{2}$ (d) (3/2)

126. A ray of unpolarised light is incident on a glass plate at the polarising angle 57^0. Then :

(a) the reflected ray and the transmitted ray both will be completely polarised

(b) the reflected ray will be completely polarised and the transmitted ray will be partially polarised

(c) the reflected ray will be partially polarised and the transmitted ray will be completely polarised

(d) the reflected and transmitted both rays will be partially polarised

127. 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, the angle between the reflected and refracted rays is :

(a) $(90^0 + \phi)$ (b) $\sin^{-1}(\mu \cos\phi)$ (c) 90^0 (d) $\sin^{-1}\left(\frac{\sin\phi}{\mu}\right)$

128. The polaroid is a :

(a) celluloid film (b) big crystal (c) cluster of small crystals arranged in regular way

(d) cluster of small crystals arranged in haphazard way

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

(a) wider (b) narrower (c) fainter (d) brighter

130. 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 600 nm is used. If the wavelength of light is changed to 400 nm, number of fringes observed in the same segment of the screen is given by :

(a) 12 (b) 18 (c) 24 (d) 30

131. Two beams of light having intensities I and 4I interfere to produce a fringe pattern on a screen. The phase difference between the beams is $\pi / 2$ at point A and π at point B. Then the difference between the resultant intensities at A and B is :

(a) 2I (b) 4I (c) 5I (d) 7I

132. Which of these waves can be polarised ?

(a) sound waves (b) longitudinal waves on a string

(c) transverse waves on a string (d) light waves

133. The two interfering beams have intensities in the ratio 9 : 4. The ratio of intensities of maxima and minima in the interference pattern will be :

(a) 1 : 25 (b) 25 : 1 (c) 9 : 4 (d) 4 : 9

134. The intensities of two superimposing waves are in the ratio 9 : 1. Then find the ratio of maximum and minimum intensities :

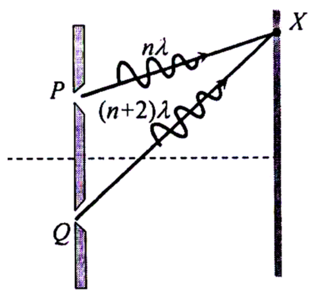
(a) 1 : 9 (b) 9 : 1 (c) 4 : 1 (d) 1 : 4

135. Which of the following statement indicates that light waves are transverse **[MP PMT 1995]**

(a) Light waves can travel in vacuum (b) Light waves show interference

(c) Light waves can be polarized (d) Light waves can be diffracted

136. The figure shows a double slit experiment P and Q are 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

137. 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

138. 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

139. In Young's experiment, light of wavelength $4000\ \overset{0}{A}$ is used to produce bright fringes of width 0.6 mm, at a distance of 2 meters. If the whole apparatus is dipped in a liquid of refractive index 1.5, then fringes width will be **[MP PMT 1994]**

(a) 0.2 mm (b) 0.3 mm (c) 0.4 mm (d) 1.2 mm

140. 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 **[Manipal MEE 1995]**

(a) 169 : 25 (b) 81 : 16 (c) 25 : 1 (d) 9 : 4

141. In Young's d double slit experiment, the fringe width is $1 \times 10^{-4}\ m$ if the distance between the slit and screen is double 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) $2.5 \times 10^{-4}\ m$

142. In Young's experiment, one slit is covered with a blur filter and the other (slit) with a yellow filter. Then the interference pattern **[MP PET 1997]**

(a) Will be blue (b) Will be yellow (c) Will be green (d) Will not be formed

143. In double slit experiment, the angular width of the fringes is 0.20^0 for the sodium light $(\lambda = 5890\ \overset{0}{A})$. In order to increase the angular width of the fringes by 10%, the necessary change in the wavelength is **[MP PMT 1997]**

(a) Increase of $589\ \overset{0}{A}$ (b) Decrease of $589\ \overset{0}{A}$ (c) Increase of $6479\ \overset{0}{A}$ (d) Zero

144. 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 $5000\ \overset{0}{A}$. The central bright maximum will shift **[CPMT 1999]**

(a) 2 fringes upward (b) 2 fringes downward (b) 10 fringes upward (d) None of these

145. In Young's double slit experiment, angular width of fringes is 0.20^0 for sodium light of wavelength $5890\ \overset{0}{A}$. If complete system is dipped in water, then angular width of fringes becomes **[RPET 1997]**

(a) 0.11^0 (b) 0.15^0 (c) 0.22^0 (d) 0.30^0

146. In Young's double slit experiment, the distance between the slits is 1 mm and that between slit and screen is 1 meter and 10 th fringes is 5 mm away from the central bright fringe, then wavelength of light used will be **[RPMT 1997]**

(a) $5000\ \overset{0}{A}$ (b) $6000\ \overset{0}{A}$ (c) $7000\ \overset{0}{A}$ (d) $8000\ \overset{0}{A}$

147. When a thin metal plate is placed in the path of one of the interfering beams of light **[KCET 1999]**

(a) Fringe width increases (b) Fringes disappear

(c) Fringes become brighter (d) Fringes becomes blurred

148. 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. **[IIT-JEE (Screening) 2000]**

(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

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

(a) $\sin^{-1}(0.33 \times 10^{8})$ (b) $\sin^{-1}(0.33 \times 10^{-6})$ (c) $\sin^{-1}(3 \times 10^{-8})$ (d) $\sin^{-1}(3 \times 10^{-6})$

150. In Young's double slit experiment, the intensity of light coming from the first slit double the intensity from the second slit. The ratio of the maximum intensity to the minimum intensity on the interference fringe pattern observed is **[KCET 2002]**

(a) 34 (b) 40 (c) 25 (d) 38

151. In Young's double-slit experiment, an interference pattern is obtained on a screen by a light of wavelength $6000 \overset{0}{\text{A}}$, coming from the coherent sources S_1 and S_2. At certain point P on the screen third dark fringe is formed. Then the path difference $S_1P - S_2P$ in microns is

[EAMCET 2003]

(a) 0.75 (b) 1.5 (c) 3.0 (d) 4.5

152. A double slit experiment is performed with light of wavelength 500 nm. A thin film of thickness $2 \ \mu\text{m}$ and refractive index 1.5 is introduced in the path of the upper beam. The location of the central maximum will **[AIIMS 2003]**

(a) Remain unshifted (b) Shift downward by nearly two fringes

(c) Shift upward by nearly two fringes (d) Shift downward by 10 fringes

153. In a Young's double-slit experiment the fringe width is 0.2 mm. If the wavelength of light used is increased by 10% and the separation between the slits is also increased by 10%, the fringe width will be **[MP PMT 2004]**

(a) 0.20 mm (b) 0.401 mm (c) 0.242 mm (d) 0.165 mm

154. Two coherent sources of intensity ratio 1 : 4 produce an interference pattern. The fringe visibility will be **[J&K CET 2004]**

(a) 1 (b) 0.8 (c) 0.4 (d) 0.6

155. 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 **[J&K CET2004]**

(a) 3 : 1 (b) 4 : 1 (c) 2 : 1 (d) 9 : 1

156. In Young's double slit experiment, distance between two sources is 0.1 mm. The distance of screen from the sources is 20 cm. Wavelength of light used is $5460\ \overset{0}{A}$. Then angular position of the first dark fringe is **[DEC 2002]**

(a) 0.08^0 (b) 0.16^0 (c) 0.20^0 (d) 0.313^0

157. In Young double slit experiment, when two light waves form third minimum, they have **[RPMT 2003]**

(a) Phase difference of 3π (b) Phase difference of $\frac{5\pi}{2}$

(c) Path difference of 3λ (d) Path difference of $\frac{5\lambda}{2}$

158. The angle of polarisation for any medium is 60^0, what will be critical angle for this **[UPSEAT 1999]**

(a) $\sin^{-1}\sqrt{3}$ (b) $\tan^{-1}\sqrt{3}$ (c) $\cos^{-1}\sqrt{3}$ (d) $\sin^{-1}\frac{1}{\sqrt{3}}$

159. The angle of incidence at which reflected light is totally polarized for reflection from air to glass (refraction index n) is **[AIEEE 2004; UPSEAT 2005]**

(a) $\sin^{-1}(n)$ (b) $\sin^{-1}\left(\frac{1}{n}\right)$ (c) $\tan^{-1}\left(\frac{1}{n}\right)$ (d) $\tan^{-1}(n)$

160. A polaroid is placed at 45^0 to an incoming light of intensity I_0. Now the intensity of light passing through polaroid after polarisation would be **[CPMT 1995]**

(a) I_0 (b) $I_0/2$ (c) $I_0/4$ (d) Zero

161. 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 the light, one of the following is observed **[MNR 1993]**

(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

162. A light has amplitude A and angle between analyser and polariser is 60^0. Light is reflected by analyser has amplitude **[UPSEAT 2001]**

(a) $A\sqrt{2}$ (b) $A/\sqrt{2}$ (c) $\sqrt{3}A/2$ (d) A/2

163. Two Nicols are oriented with their principle planes making an angle of 60^0. The percentage of incident unpolarized light which passes through the system is

(a) 50% (b) 100% (c) 12.5% (d) 37.5%

164. 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 **[AIEEE 2005]**

(a) Zero (b) I_0 (c) $\frac{1}{2} I_0$ (d) $\frac{1}{4} I_0$

165. When unpolarised light beam is incident from air into 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

166. When the angle of incidence on a material is 60^0, the reflected light is completely polarized. The velocity of the refracted ray inside the material is (in ms^{-1}) **[Kerala PMT 2005]**

(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

167. 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

[IIT-JEE (Screening) 2004]

(a) 2λ (b) $\frac{2\lambda}{3}$ (c) $\frac{\lambda}{3}$ (d) λ

168. 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

[MP PET 1998; MP PMT 2003]

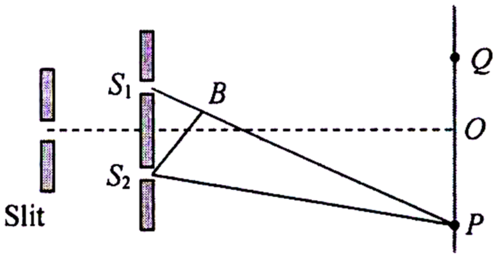
(a) $I = \sqrt{A^2 + B^2 \cos^2 \phi}$ (b) $I = \frac{A}{B} \cos\phi$

(c) $I = A + B \cos\frac{\phi}{2}$ (d) $I = A + B \cos\phi$

169. In a two slit experiment with monochromatic light fringes are obtained on a screen placed at some distance from the slits. If the screen is moved by 5×10^{-2} m towards the slits, the change in fringe width is 3×10^{-5} m. If separation between the slits is 10^{-3} m, the wavelength of light used is **[Roorkee) 1992]**

(a) $6000 \overset{0}{\mathrm{A}}$ (b) $5000 \overset{0}{\mathrm{A}}$ (c) $3000 \overset{0}{\mathrm{A}}$ (d) $4500 \overset{0}{\mathrm{A}}$

170. 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 11th fringe on the other side, as measured from Q. If the wavelength of the light used is 6000×10^{-10} m, then S_1B will be equal to **[CPMT 1986, 92]**



(a) 6×10^{-6} m (b) 6.6×10^{-6} m (c) 3.138×10^{-7} m (d) 3.144×10^{-7} m

171. Four light waves are represented by

(i) $y = a_1 \sin \omega t$ (ii) $y = a_2 \sin(\omega t + \phi)$ (iii) $y = a_1 \sin 2\omega t$ (iv) $y = a_2 \sin 2(\omega t + \phi)$

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)

172. The maximum intensity in Young's double slit experiment is I_0. Distance between the slits 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 = 10 d.

(a) $\frac{I_0}{2}$ (b) $\frac{3}{4} I_0$ (c) I_0 (d) $\frac{I_0}{4}$

173. A beam of electron is used in an YDSE experiment. The slit width is d. When the velocity of electron is increased, then **[IIT-JEE (Screening) 2005]**

(a) No interference is observed (b) Fringe width increases

(c) Fringe width decreases (d) Fringe width remains same

174. A slit of width a is illuminated by white light. For red light $(\lambda = 6500 \overset{0}{A})$, the first minima is obtained at $\theta = 30^0$. Then the value of a will be **[MP PMT 1987; CPMT 2002]**

(a) $3250 \overset{0}{A}$ (b) 6.5×10^{-4} mm (c) $1.24 \, microns$ (d) 2.6×10^{-4} cm

175. The light of wavelength $6328 \overset{0}{A}$ is incident on a slit of width 0.2 mm perpendicularly, the angular width of central maxima will be **[MP PMT 1987; PMT 2002]**

(a) 0.36^0 (b) 0.18^0 (c) 0.72^0 (d) 0.09^0

176. A slit of size 0.15 cm is placed at 2.1 m from a screen. On illuminated it by a light of wavelength 5×10^{-5} cm. The width of central maxima will be **[RPMT 1999]**

(a) 70 mm (b) 0.14 mm (c) 1.4 mm (d) 0.14 cm

177. What will be the angle of diffraction for the first minimum due to Fraunhoffer diffraction with sources of light of wave length 550 nm and slit of width 0.55 mm **[Pb. PMT 2001]**

(a) 0.001 rad (b) 0.01 rad (c) 1 rad (d) 0.1 rad

178. Yellow light is used in single slit diffraction experiment with slit width 0.6 mm. If yellow light is replaced by X-rays then the pattern will reveal

[IIT-JEE (Screening) 1999; MP PMT 200; KCET 2003]

(a) That the central maxima is narrower (b) No diffraction pattern

(c) More number of fringes (d) Less number of fringes

179. Conditions of diffraction is **[RPET 2001]**

(a) $\frac{a}{\lambda}=1$ (b) $\frac{a}{\lambda}>>1$ (c) $\frac{a}{\lambda}<<1$ (d) None of these

180. The diffraction effect can be observed in **[J & K CET 2004]**

(a) Only sound waves (b) Only light waves (c) Only ultrasonic waves (d) Sound as well as light waves

181. Diffraction of the first secondary maximum in the Fraunhofer diffraction pattern at a single slit is given by (a is the width of the slit) **[KCET 1999]**

(a) $a\ \sin\ \theta=\frac{\lambda}{2}$ (b) $a\ \sin\ \theta=\frac{3\lambda}{2}$ (c) $a\ \sin\theta=\lambda$ (d) $a\ \sin\theta=\frac{3\lambda}{2}$

182. A light wave is incident normally over a slit of width $24\times10^{-5}cm$. The angular position of second dark fringe from the central maxima is 30^0. What is the wavelength of light **[RPET 1995]**

(a) $6000\ \overset{0}{A}$ (b) $5000\ \overset{0}{A}$ (c) $3000\ \overset{0}{A}$ (d) $1500\ \overset{0}{A}$

183. The condition for observing Fraunhofer diffraction from a single slit is that the light wavefront incident on the slit should be **[MP PMT 1987]**

(a) Spherical (b) Cylindrical (c) Plane (d) Elliptical

184. Angular width of central maxima in the Fraunhoffer diffraction pattern of a slit is measured. The slit is illuminated by light of wavelength $6000\ \overset{0}{A}$. When the slit is illuminated by light of another wavelength, the angular width decreases by 30%. The wavelength of this light will be

(a) $6000\ \overset{0}{A}$ (b) $4200\ \overset{0}{A}$ (c) $3000\ \overset{0}{A}$ (d) $1800\ \overset{0}{A}$

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

(a) $4400\ \overset{0}{A}$ (b) $6600\ \overset{0}{A}$ (c) $2000\ \overset{0}{A}$ (d) $3500\ \overset{0}{A}$

186. Young's double slit experiment is carried out by using green, red and blue light, one color at a time. The fringe widths records are **(IIT 2012)**

a) $\beta_G > \beta_B > \beta_R$ b) $\beta_B > \beta_G > \beta_R$ c) $\beta_R > \beta_B > \beta_G$ d) $\beta_R > \beta_G > \beta_B$

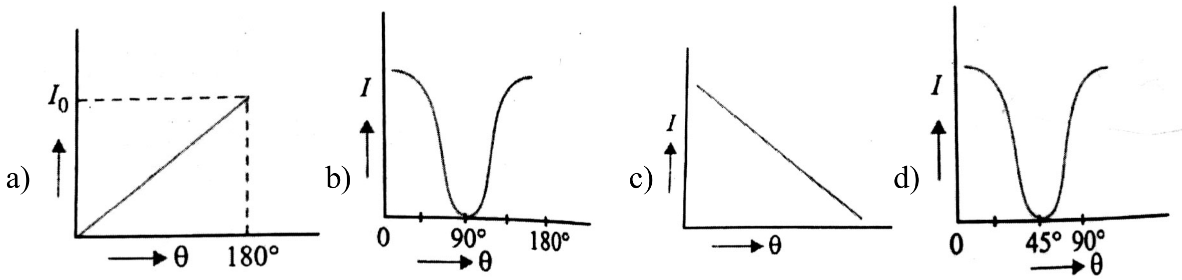
187. In the Young's double slit experiment using a monochromatic light of wavelength λ, the path diffference (in terms of an integer n) corresponding to any point having half the peak intensity is **(JEE advanced 2013)**

a) $(2n+1)\frac{\lambda}{2}$ b) $(2n+1)\frac{\lambda}{4}$ c) $(2n+1)\frac{\lambda}{8}$ d) $(2n+1)\frac{\lambda}{16}$

188. In the experiment of diffraction at a single slit, if the slit width is decreased, the width of the central maximum **(UPSEAT 2004, VITEEE 2008)**

a) increases in both Fresnel and Faunhoffer diffraction
b) decreases both in Fresnel and Fraunhoffer diffraction
c) increases in Fresnel; diffractin but decreases in Faunhoffer diffraction
d) decreases in Fresnel diffraction but increases is Fraunhoffer diffraction

189. Figure shows the dependencce of intensity of transmitted light on the angle between the polariser and analyser. Choose the correct option **(AIIMS 2007)**



190. A beam of unpolarised light of intensity I_0 is passed through a polaroid A and then through another polaroid B which is oriented so that its principal plane makes an angle of 45^0 relative to that of A. The intensity of emergent light is

a) I_0 b) $I_0/2$ c) $I_0/4$ d) $I_0/8$

191. For a parallel beam of monochromatic light of wavelength 'λ' diffraction is produced by a single slit whose width 'a' is of the order of the wavelength of the light. If 'D' is the distance of the screen from the slit, the width of the cenral maxima will be **(CBSE AIPMT 2015)**

a) $\frac{2D\lambda}{a}$ b) $\frac{D\lambda}{a}$ c) $\frac{Da}{\lambda}$ d) $\frac{2Da}{\lambda}$

192. In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic light of wavelength 500 nm is used. What will be the width of each slit for obtaining ten maxima of double slit within the ccentral maxima of single slit patttern ? **(CBSE AIMT 2015)**

a) 0.2 mm b) 0.1 mm c) 0.5 mm d) 0.02mm

193. The ratio of resolving powers of an optical microscope for two wavelengths $\lambda_1 = 4000$ Å and $\lambda_2 = 6000$ Å is **(NEET 2017)**

a) 8 : 27 b) 9 : 4 c) 3 : 2 d) 16 : 81

194. Two polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarised light I_0 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45^0 with that of P_1. The intensity of transmitted light through P_2 is **(NEET 2017)**

a) $\frac{I_0}{2}$ b) $\frac{I_0}{4}$ c) $\frac{I_0}{8}$ d) $\frac{I_0}{16}$

195. The Young's double slit experiment is performed with blue and green light of wavelengths 4360Å and 5460Å respectively. If x is the distance of 4th maxima from the central one, then **(AIIMS 2017)**

a) $x_{blue} = x_{green}$ b) $x_{blue} > x_{green}$ c) $x_{blue} < x_{green}$ d) x_{blue} / x_{green}

196. In the Young's double slit experiment, the intensity of light at a point on the screen where the path difference is λ is K (λ being the wavelength of light used). The intensity at a point where path diff. is λ /4 will be **(AIPMT 2014)**

a) K b) K/4 c) K/2 d) zero

197. A parallel beam of fast moving electrons is incident normally in a narrow slit. A fluorescent screen is placed at a large distance from the slit. If the speed of the electrons is increased, which of the following statements is correct ? **(NEET 2013)**

a) The angular width of central maximum will be unaffected

b) diffraction attern is not observed on the screen in the case of electrons.

c) The angular width of the central maximum of the diffraction pattern will increase

d) The angular width of the central maximum will decrease.

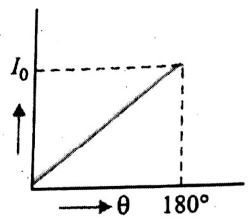
198. A single slit Fraunhoffer diffraction pattern is formed with white light. For what wavelength of light the third secondary maximum in the diffraction pattern coincides with the second secondary maximum in the pattern for red light of wavelength 6500Å?

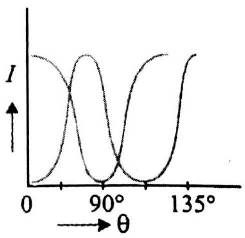
a) 4400Å b) 4100Å c) 4642Å d) 9100Å

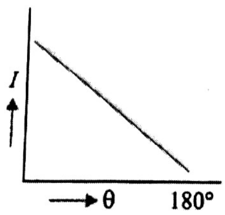
199. The diameter of the objective of a telescope is 0.1m and the wavelength of the light is 6000Å. Its resolving power would be approximately **(AIIMS 2011)**

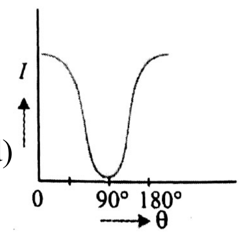
a) 6×10^{-5} rad b) 6×10^{-4} rad c) 6×10^{-3} d) 6×10^{-6} rad

200. The graph showing the dependencce of intensity of transmitted light on the angle between polariser and analyser is **(AIIMS 2007)**

a) 

b) 

c) 

d) 

201. Two polaroids P_1 and P_2 are placced with their axis perpendicular to each other. Unpolarised light I_0 is incicdent on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45^0 with that of P_1. The intensity of transmitted light through P_2 is **(NEET 2017)**

a) $\frac{I_0}{2}$ b) $\frac{I_0}{4}$ c) $\frac{I_0}{8}$ d) $\frac{I_0}{16}$

202. At the first minimum adjacent to the central maximum of a single-slit diffraction pattern, the phase difference between the Huygen's wavelenth from the edge of the slit and the wavelet from the midpoint of the slit is **(NEET 2015)**

a) $\frac{\pi}{3}$ radian b) $\frac{\pi}{4}$ radian c) $\frac{\pi}{2}$ radian d) π radian

203. Two slits in Young's experiment have widths in the ratio 1 : 25. The ratio of intensity at the maxima and minima in the interference pattern $\frac{I_{max}}{I_{min}}$ is **(NEET 2015)**

a) $\frac{4}{9}$ b) $\frac{9}{4}$ c) $\frac{121}{49}$ d) $\frac{49}{121}$

204. In a diffraction pattern due to a single slit of sidth 'a' the first minimum is observed at an angle 30^0 when light of wavelength 5000 Å is incident o n the slit. The first secondary maximum is observed at an angle of **(NEET 2016)**

a) $\sin^{-1}\left(\frac{1}{4}\right)$ b) $\sin^{-1}\left(\frac{2}{3}\right)$ c) $\sin^{-1}\left(\frac{1}{2}\right)$ d) $\sin^{-1}\left(\frac{3}{4}\right)$

205. The intensity at the maximum in a Young's double slit experiment is I_0. Distance between two slits is $d = 5\lambda$, where λ is the wavelength of light used in the experiment. What will be the intensity in front of one of the slits on the screen placed at a distance D = 10 d ? **(NEET 2016)**

a) I_0 b) $\frac{I_0}{4}$ c) $\frac{3}{4}I_0$ d) $\frac{I_0}{2}$

206. The interference pattern is obtained with two coherent light sources of intensity ratio n. In the interference pattern, the ratio $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be **(NEET 2017)**

a) $\frac{\sqrt{n}}{n+1}$ b) $\frac{2\sqrt{n}}{n+1}$ c) $\frac{\sqrt{n}}{(n+1)^2}$ d) $\frac{2\sqrt{n}}{(n+1)^2}$

207. A linear aperture whose width is 0.02 cm is placed immediately in front of a lens of focal length 60 cm, The aperture is illuminated normally by a parallel beam of wavelength $5\times10^{-5}\,cm$. The distance of the first dark band of the diffraction patttern from the centre of the screen is **(NEET 2017)**

a) 0.10 cm b) 0.25 cm c) 0.20 cm d) 0.15 cm

208. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8th bright fringe in the medium lies where 5th dark fringe lies in air. The refractive inde of the medium is nearly **(NEET 2017)**

a) 1.25 b) 1.59 c) 1.69 d) 1.78

209. Unpolarised light is incident from air on a plane surface of a material of refractive index 'μ' At a particular angle of incidence 'i', it is found that the reflected and refracted rays are perpendicular to each other. Which of the following options is correct for this situation ? **(NEET 2018)**

a) $i = \sin^{-1}\left(\frac{1}{\mu}\right)$

b) Reflected light is polarised with its electric vector perpendicular to the plane of incidence

c) Reflected light is polarised with its electric vector parallel to the plane of incidence

d) $i = \tan^{-1}\left(\frac{1}{\mu}\right)$

210. In Young's double slit experiment the separation d between the slits is 2 mm, the wavelength λ of the light used is 5896 Å and distance D between the screen and slits is 100 cm. It is found that the angular width of the fringes is 0.20^0. To increase the fringe angular width to 0.21' (with same λ and D) the separation between the slits needs to be chaned to **(NEET 2018)**

a) 2.1 mm b) 1.9 mm c) 1.8 mm d) 1.7 mm

211. In double slit experiment, when light of wavelength 400 nm was used, the angular width of the first minima formed on a screen placed 1m away, was found to be 0.2^0. What will be the angular width of the first minima, if the entire experimental apparatus is immersed in water $\left(\mu_{water} = 4/3\right)$ **(NEET 2019)**

(a) 0.05^0 (b) 0.1^0 (c) 0.266^0 (d) 0.15^0

212. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is : **(NEET 2020)**

(1) 6.00×10^{-7} rad (2) 3.66×10^{-7} rad
(3) 1.83×10^{-7} rad (4) 7.32×10^{-7} rad

213. The Brewsters angle ib for an interface should be: **(NEET 2020)**

(1) $i_b = 90°$ (2) $0° < i_b < 30°$ (3) $30° < i_b < 45°$ (4) $45° < i_b < 90°$

214. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes : **(NEET 2020)**

(1) one-fourth (2) double (3) half (4) four times

215. Unpolarised light of intensity I passes through an ideal polariser A. Another identical polariser B is placed behind A. The intensity of light beyond B is found to be $\frac{I}{2}$. Now another identical polariser C is placed between A and B. The intensity beyond B is now found to be $\frac{I}{8}$. The angle between polariser A and C is

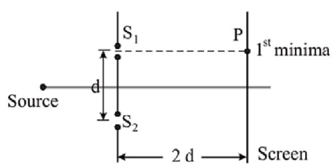
(A) 45^0 (B) 60^0 (C) 0^0 (D) 30^0

216. Unpolarized light of intensity I_0, is made to pass through three polarizers P_1, P_2 and P_3 successively. Thge polarization axis of P_2 makes an angle of θ_1 with that of P_1, while that of P_3 makes an angle θ_2 with that of the P_2. What will be the intensity of light coming out of P_3 ? **(Home Work)**

217. In a young's double slit experiment, slits are separated by 0.5 mm and the screen is placed 150 cm away. A beam of light consisting of two wavelengths, 650 nm and 520 nm, is used to obtain interference fringes on the screen. The least distance from the common central maximum to the point where the bright fringes due to both the wavelengths coincide, is **[JEE - 2017]**

a) 7.8 mm b) 9.75 mm c) 15.6 mm d) 1.56 mm

218. Consider Young's double slit experiment as shown in figure. What whould be the slit separation d in terms of wavelength λ such that the first minima occurs directly in front of t he slit (S_1)



[JEE - 10 Jan 2019 Evening]

(1) $\frac{\lambda}{2(\sqrt{5}-2)}$ (2) $\frac{\lambda}{(\sqrt{5}-2)}$ (3) $\frac{\lambda}{2(5-\sqrt{2})}$ (4) $\frac{\lambda}{(5-\sqrt{2})}$

219. In a Young's double slit experiment, the path difference, at a certain point on the screen, betwen two interfering waves is $\frac{1}{8}th$ of wavelength. The ratio of the intensity at this point to that at the centre of a bright fringe is close to: **[JEE - 11 Jan 2019 Morning]**

(1) 0.74 (2) 0.85 (3) 0.94 (4) 0.80

220. In an interference experiment the ratio of amplitudes of the ratio of amplitudes of coherent waves is $\frac{a_1}{a_2}=\frac{1}{3}$. The ratio of maximum and minimum intensities of fringes will be : **[JEE - 8 April 2019 Mor]**

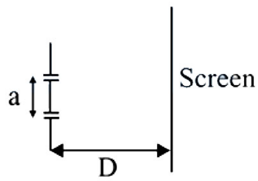
(1) 2 (2) 18 (3) 4 (4) 9

221. Calculate the limit of resolution of a telescope objectiv having a diameter of 200 cm, if it has to detect light of wavelength 500 nm coming from a star. **[JEE - 8 April 2019 Evening]**

(1) 305×10^{-9} radian (2) 610×10^{-9} radian

(3) 152.5×10^{-9} radian (4) 457.5×10^{-9} radian

222. The figure shows a Young's double slit experimental setup. It is observed that when a thin transparent sheet of thickness t and refractive index μ is put in front of one of the slits, the central maximum gets shifted by a distance equal to n fringe widths. If the wavelength of light used is λ, t will be:



[JEE - 9 April 2019 Morning]

(1) $\frac{2n\lambda}{(\mu-1)}$ (2) $\frac{n\lambda}{(\mu-1)}$ (3) $\frac{\lambda}{a(\mu-1)}$ (4) $\frac{2\lambda}{a(\mu-1)}$

223. Diameter of the objective lens of a telescope is 250 cm. For light of wavelength 600 nm. Coming from a distant object, the limit of resolution of the telescope is close to **[JEE - 9 April 2019 Evening]**

(1) 1.5×10^{-7} rad (2) 2.0×10^{-7} (3) 3.0×10^{-7} (4) 4.5×10^{-7}

224. In a Young s double slit experiment, the ratio of the slit s width is 4 : 1. The ratio of the intensity of maxima to minima, close to the central fringe on the screen, will be : **[JEE - 10 April 2019 Evening]**

(1) 25:9 (2) 9 : I (3) 4 : 1 (4) $(\sqrt{3}+1)^4$:16

225. The value of numerical aperature of the objective lens of a microscope is 1.25. If light of wavelength 5000 A is used, the minimum separation between two points, to be seen as distinct, will be :

[JEE - 12 April 2019 Morning]

(1) 0.24 μm (2) 0.38 μm (3) 0.12 μm (4) 0.48 μm

226. In a double slit experiment, when a thin film of thickness t having refractive index μ is introduced in front of one of the slits, the maximum at the centre of the fringe pattern shifts by one fringe width. The value of t is (X is the wavelength of the light used) : **[JEE - 12 April 2019 Morning]**

(1) $\frac{2\lambda}{(\mu-1)}$ (2) $\frac{\lambda}{2(\mu-1)}$ (3) $\frac{\lambda}{(\mu-1)}$ (4) $\frac{\lambda}{(2\mu-1)}$

227. A system of three polarizers P_1 P_2, P_3 is set up such that the pass axis of P_3 is crossed with respect to that of P_1 The pass axis of P_2 is inclined at 60° to the pass axis of P_3 When a beam of unpolarized light of intensity I_o is incident on P_1 the intensity of light transmitted by the three polarizers is I. The ratio (I_0/I) equals (nearly): **[JEE - 12 April 2019 Evening]**

(1) 5.33 (2) 16.00 (3) 10.67 (4) 1.80

228. In a single slit diffraction set up, second minima is observed at an angle of 60^0. The expected position of first minima is **(JEE Mains 2020)**

(1) 25^0 (2) 20^0 (3) 30^0 (4) 45^0

229. If 10% of intensity is passed from analyser, then, the angle by which analyser should be rotated such that transmitted intensity becomes zero. **(JEE Mains 2020)**

(1) 60^0 (2) 18.4^0 (3) 45^0 (4) 71.6^0

230. In YDSE, separation between slits is 0.15 mm, distance between slits and screen is 1.5 m and wavelength of light is 589 nm, then fringe width is **(JEE Mains 2020)**

(1) 5.9 mm (2) 3.9 mm (3) 1.9 mm (4) 2.3 mm

231. In YDSE path difference at a point on screen is $\frac{\lambda}{8}$. Find ratio of intensity at this point with maximum intensity **(JEE Mains 2020)**

(1) 0.853 (2) 0.533 (3) 0.234 (4) 0.123