PHYSICS

BOOKS - MARVEL PHYSICS (HINGLISH)

INTERFERENCE AND DIFFRACTION

Mcqs

1. The optical path difference between two identical light waves arriving at a point is 31.5

λ, where λ is the wavelength of light. The point is

A. Bright

B. Dark

C. Alternatively bright and dark

D. Neither bright nor dark

Answer: B

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2. The distance of a point on a screen from two coherent light sources differs by 93 wavelengths. If the path difference is 0.0465 mm, then the wavelength of light used is

A. 4000 Å

B. 4500 Å

C. 5000 Å

D. 7500 Å

Answer: C

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3. The displacement of two interfering light waves are given by $y_1 = 3\sin\omega t, y_2 = 4\sin(\omega t + \pi/2)$. The amplitude of the resultant wave is

A. 3

B. 5

C. zero

D. one

Answer: B

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4. The displacement of two coherent light waves are given by $y_1 = a_1 \cos \omega t$ and $y_2 = a_2 \cos(\pi/2 - \omega t)$. The resultant intensity is given by

A. $a_1 - a_2$

B. $a_1 + a_2$

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

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

Answer: C

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5. Two coherent sources of wavelength $4.8 \times 10^{-7} m$ m produce steady interference pattern. The path difference corresponding to 10th order maximum will be

A. $12 \times 10^{-6} m$

B. $4.8 \times 10^{-8} m$

C. $24 \times 10^{-7} m$

D. $4.8 \times 10^{-6} m$

Answer: D

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6. Four independent waves are expressed as

$y_1 = a_1 \sin \omega t.$ $y_2 = a_2 \sin 2\omega t,$

$y_3 = a_3 \cos \omega t,$ $y_4 = a_4 \sin(\omega t + \pi / 3).$

A steady interference patternn cann be otained by using

A. y_1 and y_3

B. y_1 and y_4

C. y_3 and y_4

D. not possible at all

Answer: D

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

A. $3:2$

B. $4:9$

C. $25:1$

D. $5:1$

Answer: C

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8. Two monochromatic sources of light A and B of wavelengths 5500 Å and 4400 Å respectively are used simultanesouly to produce interference bands on a screen. Which orders of the fringes in the two interference patterns will coincide?

A. 5^{th} order of A and 3rd order of B

B. 10th order of A and 8th order of B

C. 8th order of A and 10th order of B

D. 4th order of A and 6th order of B

Answer: C

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9. If the ratio of the amplitudes of two interfering wave is 4:3, then the ratio of the maximumum and minimum intensities in the interference pattern is

A. $9:16$

B. $16:9$

C. $49:1$

D. $1:49$

Answer: C

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10. The amplitude ratio of two superposing waves 3:1. what is the ratio of the maximum and minimum intensities?

A. $1:1$

B. $9:1$

C. $4:1$

D. $3:1$

Answer: C

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11. Two waves gives by $y_1 = 10\sin\omega t$ cm and $y_2 = 10\sin\left(\omega t + \frac{\pi}{3}\right)$ cm are superimposed. What is the amplitude of the resultannt wave?

A. 10 cm

B. $10\sqrt{2}cm$

C. $5\sqrt{3}cm$

D. $10\sqrt{3}cm$

Answer: D

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12. The optical path difference between two waves starting from a monochromatic source of light is $(100.5)\lambda$. If the path difference

between the waves is 60.3 micron, the wavelength of light used is

A. 4000 Å

B. 4500 Å

C. 6000 Å

D. 5550 Å

Answer: C

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13. 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 find out the amplitude of the resulting wave

A. 7

B. 6

C. 5

D. 3.5

Answer: B

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

A. $I_1 + I_2$

B. $I_1^2 + I_2^2$

C. $(I_1 + I_2)^2$

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

Answer: D

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15. An interference pattern has maximum and minimum intensities in the ratio of 36:1, what is the ratio of theire amplitudes?

A. $5:7$

B. $7:4$

C. $4:7$

D. $7:5$

Answer: D

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16. Find the wrong option from the following. Two beams of light will give rise to an interference pattern. If they are

A. coherent

B. having the same wavelength

C. linearly polarised perrpendicular to each other

D. monochromatic

Answer: C

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17. Two light waves of amplitudes A_1 and A_2 superimpose with each other such that $A_1 > A_2$. The difference between maximum and minimum amplitudes is

A. $A_1 - A_2$

B. $2A_2$

C. $2A_1$

D. $A_1 + A_2$

Answer: B

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

A. the samme frequency and having a definite phase relationship

B. different wavelength

C. the samme frequency

D. nearly the same frequency

Answer: A

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19. The disntances of poinnt on the screen from two slits are $1.8 \times 10^{-5} m$ and $1.23 \times 10^{-5} m$. If the wavelength of light used is 6000 Å, then the

number of bright or dark band formed at that point is

A. 10th dark

B. 10th bright

C. 8th dark

D. 9th bright

Answer: A

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

A. $n\pi$

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

C. 0

D. $(n+1)\pi$

Answer: B

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21. In Young's double slit experiment carried out with light of wavelength $\lambda = 5000$ Å, the distance between the slits is 0.2 mm and screen is 2.0 m away from the slits. The central maximum is at n=0. the third maximum will be formed at a distance x (from the central maxima) equal to

A. 0.5 cm

B. 1.67 cm

C. 1.5 cm

D. 5 cm

Answer: C

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22. 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. $4:1$

D. $2:1$

Answer: D

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23. The optical path difference between two identical light waves arriving at a point (P) on the screen is $27 \times 10^{-7} m$. For P to be a dark point, the wavelength of light used should be

A. 3000 Å

B. 4000 Å

C. 5000 Å

D. 6000 Å

Answer: D

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24. Light from two coherent sources of the same amplitude A and wavelength λ illuminates the screen. The intensity of the

central maximum is I_0. If the sources were incoherent, the intensity at the same point will be

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

B. I_0

C. $2I_0$

D. $4I_0$

Answer: A

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25. Two identical light waves, propagating in the same direction, have a phase difference δ. After they superpose, the intensity of the resulting wave will be proportional to

A. $\cos\delta$

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

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

D. $\cos^2\delta$

Answer: C

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26. The waves of wavelength 6000 Å emitted by any atom or molecule must have some finite length whichis known as coherence length. For solution light, the length is 2.4 cm. what is the number of oscillations for this length?

A. 4×10^8

B. 4×10^4

C. 4×10^6

D. 4×10^5

Answer: B

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27. 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. 4I

C. 5I

D. 7I

Answer: B

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28. Two coherent monochromatic light beams of intensities 4/ and 9/ are superimosed the maxmum and minimum possible intenties in the resulting beam are

A. 3I and 2I

B. 9I and 5I

C. 16I and 3I

D. 25I and I

Answer: D

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29. Two coherent sources of intensity ratio α interfere. In interference pattern $\frac{I_{\max} - I_{\min}}{I_{\max} - I_{\min}}$ =

A. $\frac{2\alpha}{1+\alpha}$

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

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

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

Answer: B

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30. In Young's experiment d=1 m, D=1m, X=0.6mm, then wavelength of light used is

A. 4000 A.U.

B. 4800 A.U.

C. 5000 A.U.

D. 6000 A.U.

Answer: D

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31. In Young's double slit experiment the ratio of intensities at the position of maxima and

minima is 9/1. the ratio of amplitudes of light waves is

A. $\frac{2}{1}$

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

C. $\frac{4}{1}$

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

Answer: A

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32. In Young's double slit experiment, the distance between the two slits is 0.1 mm, the distance between the screen and the slit is 100 cm. if the width of the fringe is 5 mm, then the wavelength of monochromatic light used is

A. 4000 Å

B. 6000 Å

C. 5000 Å

D. 5400 Å

Answer: C

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33. The path difference between two interfering light waves meeting at a point on the screen is $\left(\frac{87}{2}\right)\lambda$. The band obtained at that point is

A. 87th bright band

B. 87th dark band

C. 44th dark bannd

D. 44th light band

Answer: C

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34. In a double slit or a biprism experiment, the fringe width for red colour as compared to that for violet colour is approximately

A. four times

B. two times

C. three times

D. five times

Answer: B

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35. In Young's double slit experiment, the fringe width is found to be 0.6 mm. without distrubing anything, the whole arrangment is dipped in water of refractive index $\frac{4}{3}$ the new fringe width will be

A. 0.15 mm

B. 0.3 mm

C. 0.6 mm

D. 0.45 mm

Answer: D

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36. Light of wavelength 5000 Å is incident on a double with and the interference fringes are formed on a screen plated at a distance of 1m from the slits. If the distance between the two

consecutive dark bands is 1 mm, then the distance between the two slits is

A. 0.5 mm

B. 0.05 mm

C. 1 mm

D. 2 mm

Answer: A

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37. Two parallel slits 1 mm apart are illuminated with light of wavelength 5000 Å, from a single slit. Interference pattern is obtained on a screen placed at 1 m from the slits, what is the distance between the first bright bannd and the seventh dark band?

A. 1.5 m

B. 2 mm

C. 2.25 mm

D. 2.75 mm

Answer: D

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38. If the distance between the screen and the sources is decreased by 25%, then the change in fringe width is

A. 25% decrease

B. 25% increase

C. 75% increase

D. 75% decrease

Answer: A

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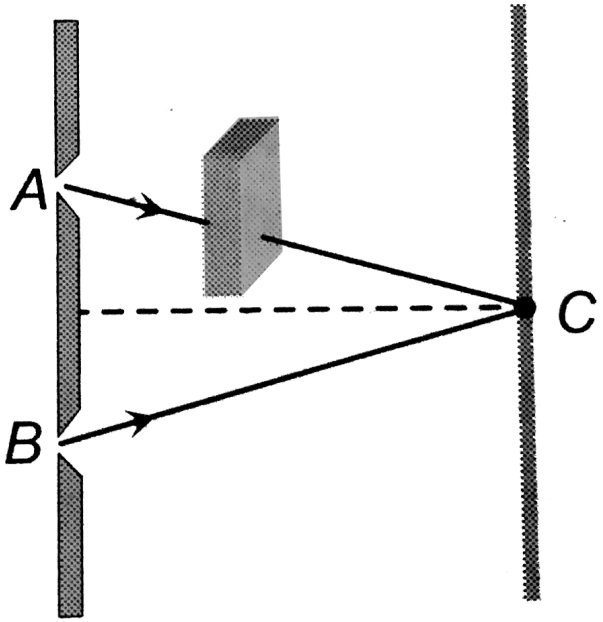
39. In Young's experiment, monochromatic light is used to illuminate the two slits A and B. Interference fringes are observed on a screen placed in front of the slits. Now if a thin glass plate is placed normally in the path of

the beam coming from the slit



A. fringes will disappear

B. fringe width will increase

C. fringe width will decrease

D. fringe width will not change

Answer: D

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40. If white light is used in Young's double slit experiment, then a few coloured fringes can be seen

A. with a central green fringe

B. with a central dark fringe

C. with first order violet fringe being closer to the central white fringe

D. with first order red fringe being coser to the central white fringe

Answer: C

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

A. 2D

B. D

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

D. 3D

Answer: A

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42. In Young's double slit experiment, D=1.5m, d=4.5 $\times 10^{-3} m$ and fringe width X=0.2 mm.

what is the path difference between the interfering beams for two successive maxima

A. $4.5 \times 10^{-7} m$

B. $5.25 \times 10^{-7} m$

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

D. $6.5 \times 10^{-7} m$

Answer: C

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43. If the amplitude of two interfering light waves are not equal, then the intensity in the dark region formed in the interference pattern will be

A. Zero

B. Same

C. Less

D. More

Answer: D

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44. In Young's double slit experiment, we get 15 fringes per cm on the screen, using light of wavelength 5600 Å. For the samme setting, how many fringes per cm will be obtained with light of wavelength 7000 Å?

A. 10

B. 12

C. 15

D. 18

Answer: B

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45. In Young's double slit experiment, interference fringes eachh of width 1 mm are observed with light of wavelength 500 nm. Without distrubing the experimental arrangement, if the source is replaced by one having a wavelength 600 nm, then the fringe width will be

A. 1 mm

B. 1.2 mm

C. 0.8 mm

D. 1.4 mm

Answer: B

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46. 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. $1:4$

B. $1:1$

C. $2:1$

D. $4:1$

Answer: D

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47. Two sources of light of wavelength 4500 Å annd 6000 Å are used simultaneously in Young's double slit experiment. At which order of the two wavelength pattern,s the fringes coincide?

A. 3rd orders of both λ_1 and λ_2

B. 4th orders of both λ_1 and λ_2

C. 4th order of $\lambda_1 = 4500$ Å and 3rd order of $\lambda_2 = 6000$ Å

D. 3rd order of $\lambda_1 = 4500$ Å and 4th order of $\lambda_2 = 6000$ Å

Answer: C

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48. In Young's double-slit experiment the angular width of a fringe formed on a distant screen is 1°. The wavelength of light used is 6000Å. What is the spacing between the slits?

A. 0.02 mm

B. 0.05 mm

C. 0.0344 mm

D. 0.012 mm

Answer: C

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49. In Young's double experiment, slits are kept 0.4 mm apart from each other and the screen is placed at 2 m from the slit. The fringe

width for a given monochromatic source of light is 0.8 mm. if the whole set up is kept in a medium of R.I. 1.6 , the fringe width will be

A. 0.3 mm

B. 0.4 mm

C. 0.2 mm

D. 0.5 mm

Answer: D

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

A. 33

B. 66

C. 99

D. 120

Answer: C

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51. 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 upwards

B. 4 fringes upwards

C. 10 fringes downwards

D. 8 fringes downwards

Answer: A

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52. In a Young's double slit esperiment, the angular width of a fringe formed on a distant screen is 1° . The slit separation is 0.01 mm. The wavelength of the light is

A. 0.174 μm

B. 0.174 Å

C. $0.174 \times 10^{-4} m$

D. 0.174 mm

Answer: A

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53. 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(Blue)=x(Green)

B. x(Blue) $>$ x(Green)

C. x(Blue) $<$ x(Green)

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

Answer: C

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54. 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

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55. In Young's double slit experiment, the phase difference between the light waves

producing the third bright fringe from the central fringe will be ($\lambda = 6000$ Å)

A. Zero

B. 2π

C. 4π

D. 6π

Answer: D

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56. 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

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57. In a Young's experiment, two coherent sources are placed $0.90mm$ 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. $6 \times 10^{-4}cm$

B. $8 \times 10^{-4}cm$

C. $8 \times 10^{-5}cm$

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

Answer: D

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

A. path difference is 9480 Å

B. Phase difference is $\frac{\pi}{2}$ radian

C. path difference is 6320 Å

D. phase difference is π radian

Answer: C

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59. If the width ratio of the two slits in Young's double slit experiment is 4:1, then the ratio of intensity at the maxima and minima in the interferencе patternn will be

A. $1:4$

B. $3:1$

C. $9:1$

D. $16:1$

Answer: C

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60. The path difference at a point on the screen in young's experiment is 5λ. The

distance of that point from the central bright band is 0.5 mm. what is the bandwidth?

A. 2.5 mm

B. 1mm

C. 0.1 mm

D. 10 mm

Answer: C

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61. Two slits separated by a distance of 0.5 mm are illuminated by light of wavelength 5000 Å. The interference fringes are obtained on a screen at a distance of 1.2 m. what is the phase difference between two interfering waves at a point 3 mm from the central bbright fringe?

A. 7π rad

B. 3π rad

C. 5π rad

D. 4π rad

Answer: C

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

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

B. there shall be an interference patterns for red which is different from that of blue

C. there shall be no interference fringes

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

Answer: C

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63. Two slits separated by a distance of 0.5 mm are illuminated by light of wavelength 5000 Å. The interference fringes are obtained on a screen at a distance of 1.2 m. what is the phase difference between two interfering waves at a point 3 mm from the central bright fringe?

A. 7π rad

B. 3π rad

C. 5π rad

D. 4π rad

Answer: C

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64. In a double slit experiment, the distance between the slits is increased 10 times wheares their distance from the screen is halved, then what is the new fringes width if the original fringe width is X?

A. Becomes $\frac{X}{20}$

B. Becomes $\frac{X}{10}$

C. Becomes $\frac{X}{90}$

D. It remains same

Answer: A

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

A. Only bright fringes will appear

B. Fringes will occur as from monochromatic light

C. No fringes will appear

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

Answer: C

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66. The path difference produced by two waves at a point is 3.75 μm and the wavelength is 5000 Å. The point is

A. partially bright

B. dark

C. bright

D. uncertain

Answer: B

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67. In young's experiment, fringes are obtained on a screen placed at a distance of 75 cm from the slits. If the separation of the narrow slits is doubled, the fringe width is decreased.

Through what distance the screen should be moved, in order to restore the spacing of the fringes?

A. Through 150 cm, away from the slits

B. Through 50 cm, towards the slits

C. Through 75 cm, away from the slits

D. Through 25 cm, towards the slits.

Answer: C

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68. On placing a thin film of mica of thickness $12 \times 10^{-5} cm$ in the path of one of the interfering beams in young's double slit experiment using monochromatic light, the fringe pattern shifts through a distance equal to the width of a bright fringe. If

$\lambda = 6 \times 10^{-5} cm$, the refractive index of mica is

A. 1.1

B. 1.3

C. 1.5

D. 1.4

Answer: C

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69. In Young's double slit experiment, the angular width of a fringe formed on a distant screen is 0.1°. What is the spacing between the slits, if the waveelngth of light used is 6000 Å?

A. $3.44 \times 10^{-4} m$

B. $2.44 \times 10^{-4} m$

C. $1.44 \times 10^{-4} m$

D. 5.44×10^{-4}m

Answer: A

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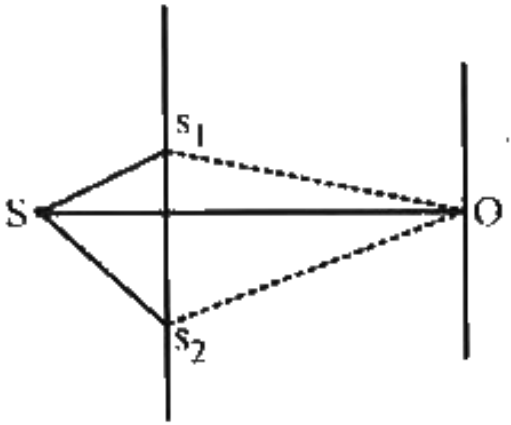
70. In an interference experiment, the two slits S_1 and S_2 are not equidistant from the source S. then the central fringe at 0 will be



A. always dark

B. always bright

C. either bright or dark depending upon the position of S

D. neither dark nor bright

Answer: C

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71. Two coherent sources A and B of wavelenth $6 \times 10^{-5} cm$ produce interference at ann arbitrary observation point P.

what is the path difference BP-AP if the point P is at a dark band between the third and forth order maxima?

A. $2.1 \times 10^{-2} cm$

B. $2.1 \times 10^{-4} cm$

C. $4.2 \times x10^{-4} cm$

D. $4.2 \times 10^{-3} cm$

Answer: B

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72. In a double slit experiment, the distance between the slits is d. The screen is at a distance D from the slits. If a bright fringe is formed opposite to one of the slits, its order is

A. $\frac{d^2}{\lambda D}$

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

C. $\frac{d^2}{4\lambda D}$

D. $\frac{d^2}{3\lambda D}$

Answer: B

73. 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}. If the distance between the slits is 10^{-3}m, calculate the wavelength of the light used.

A. 4000 Å

B. 4500 Å

C. 5000 Å

D. 6000 Å

Answer: D

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74. 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 increase 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

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75. Yong's double-slit experiment is carried out by using green, red and blue light, one color at a time. The fringe widths recorded are β_G, β_R and β_B, respectively. Then

A. $\beta_G > \beta_B > \beta_R$

B. $\beta_B > \beta_G > B_R$

C. $\beta_R > \beta_B > \beta_G$

D. $\beta_R > \beta_G > \beta_B$

Answer: D

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76. 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: C

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77. The disntances of poinnt on the screen from two slits are $1.8 \times 10^{-5} m$ and $1.23 \times 10^{-5} m$. If the wavelength of light used is 6000 Å, then the number of bright or dark band formed at that point is

A. 10th dark

B. 10th bright

C. 8th dark

D. 9th bright

Answer: A

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78. A micture of light, consisting of wavelength 590nm and an unknown wavelength, illuminates Young's double slit and gives rise to two overlapping interference patterns on the scree. The central maximum of both lights coincide. Further, it is obseved that the third

bright fringe of known light coincides with the 4th bright fringe of the unknown light. From this data, the wavelength of the unknown light is:

A. 393.4 nm

B. 885.0 nm

C. 442.5 nm

D. 776.8 nm

Answer: C

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

A. 1.52

B. 1.62

C. 1.82

D. 1.22

Answer: C

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80. Interference fringes were observed in an interference chamber, where air was present.now, the chamber is evacuated and without disturbing the arrangement, intererence pattern is again obserbed. A careful observer will see

A. no interference

B. uniform illumination

C. an interference patternn with a slight increase in the width of the fringes

D. an interference pattern with a slight decrease in the width of the fringes

Answer: C

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81. If the eighth bright band due to light of wavelength λ_1 and coincides with ninth bright band from light of wavelength λ_2 is young's double slit experiment, then the possible wavelength of visible light are

A. 400 nm and 450 nm

B. 425 nm and 400 nm

C. 400 nm and 425 nm

D. 450 nm and 400 nm

Answer: D

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82. 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. $I = I_0$

B. $I = 2I_0$

C. $I = 4I_0$

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

Answer: C

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83. In a Young's double slit experiment (slit distance d) monochromatic light of wavelength λ is used and the figure pattern observed at a distance L from the slits. The angular position of the bright fringes are

A. $0 = \sin^{-1}\left(\frac{N\lambda}{d}\right)$

B. $\theta = \sin^{-1}\left(\frac{\left(HN + \frac{1}{2}\right)\lambda}{d}\right)$

C. $\theta = \sin^{-1}\left(\frac{N\lambda}{L}\right)$

D. $\theta = \sin^{-1}\left(\frac{\left(N + \frac{1}{2}\right)\lambda}{L}\right)$

Answer: A

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84. In Young's double slit experiment, angular width of fringes is 0.20° for sodium light of wavelength 5890 Å. If the complete system is

dipped in water, then the angular width of fringes will become

A. 0.11°

B. 0.15°

C. 0.22°

D. 0.30°

Answer: B

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85. In Young's double slit experiment, one of the slit is wider than other, so that amplitude of the light from one slit is double of that from other slit. If I_m be the maximum intensity, the resultant intensity I when they interfere at phase difference ϕ is given by:

A. $\frac{I_m}{9}(4+5\cos\phi)$

B. $\frac{I_m}{3}\left(1+2\cos^2\frac{\phi}{2}\right)$

C. $\frac{I_m}{5}\left(1+4\cos^2\frac{\phi}{2}\right)$

D. $\frac{I_m}{9}\left(1+8\cos^2\frac{\phi}{2}\right)$

Answer: D

Watch Video Solution

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

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

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

C. $\sin^{-1}\left(\frac{\lambda}{3d}\right)$

D. $\sin^{-1}\left(\frac{\lambda}{4d}\right)$

Answer: C

Watch Video Solution

87. In Young's double slit experiment, the intensity on the screen at a pont where path difference λ is K. what will be the intensity at the point where the path difference is $\frac{\lambda}{4}$?

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

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

C. K

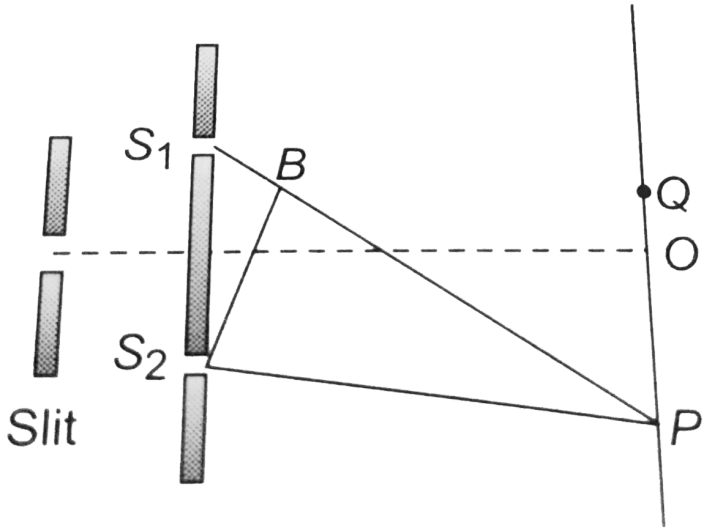
D. Zero

Answer: B

Watch Video Solution

88. 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 $600nm$. 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

89. In Young's double-slit experiment, the two slits act as coherent sources of equal amplitude A and of wavelength λ. In another experiment with the same set-up the two slits are sources of equal amplitude A and wavelength λ, but are incoherent. The ratio of the intensity of light at the midpoint of the

screen in the first case to that in the second case is....

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:1$

Answer: B

Watch Video Solution

90. 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

91. 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

92. In the Young's double slit experiment, the ratio of intensities of bright and dark fringes is 9. this means 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 $\frac{3}{2}$

Answer: B

Watch Video Solution

93. 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

94. In Young's double slit experiment, the intensity at a point where the path difference is $\frac{\lambda}{6}$ (λ is the wavelength of light) is I. if I_0 denotes the maximum intensities, then I / I_0 is equal to

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

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

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

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

Answer: B

Watch Video Solution

95. When a transparent film of refractive index 1.5 is kept over one of the openings of a double slit experiment apparatus, the interference pattern is shifted through six successive maxima, towards the side, where the film was placed. What is the thickness of the film if the wavelength of light used in 6000 Å?

A. 4200 nm

B. 5200 nm

C. 7200 nm

D. 6200 nm

Answer: C

 Watch Video Solution

96. 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. 18

B. 24

C. 8

D. 12

Answer: A

 Watch Video Solution

97. 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 (wave-length λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is

A. $2\lambda/3$

B. λ

C. $\lambda/3$

D. 2λ

Answer: D

Watch Video Solution

98. White light is used to illuminate the two slits in a Young's double slit experiment. The separation between the slits is b and theh screen is at a distance $d(>>b)$ from the slits At a point on the screen directly in front of one of the slits, certain wavelengths are

missing some of these missing wavelengths are

A. $\lambda = \frac{b^2}{2d}$

B. $\lambda = \frac{b^2}{3d}$

C. $\lambda = \frac{b^2}{4d}$

D. $\lambda = \frac{2b^2}{3d}$

Answer: B

Watch Video Solution

99. In Young's double slit experiment, using monochromatic light, the fringe patternn shifts by a certain distance on the screen, when a transparent sheet of thickness 't' and refractive index μ is introduced in the path of one of the interfering waves. the sheet is then removed and the distance between the screen and the slits is doubled. it is found that the distance between the successive maxima (or minima) now is the samme as the observed fringe shift when the sheet was introduced. what is the wavelength of light used?

A. $\lambda = (\mu - 1)t$

B. $\lambda = \frac{(\mu - 1)t}{2}$

C. $\lambda = (\mu + 1)t$

D. $\lambda = \frac{(\mu + 1)t}{2}$

Answer: B

Watch Video Solution

100. A beam of light consisting of two wavelength $6500\text{Å}\&5200\text{Å}$is used to obtain interferance fringes in a young's double slit

experiment .The distance between the slits is $2.0mm$ and the distance between the plane of the slits and thescreen is $120cm$,.what is the least distance from the central maximum where the bright fringes due to both the wave length coincides?

A. 1.56 mm

B. 2.56 mm

C. 3.12 mm

D. 0.86 mm

Answer: A

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101. A double slit apparatus is immersed in a liquid of refractive index 1.33. it has slit separation of 1 mm and distance between the plane of the slits and the screen is 1.33 m. the slits are illuminated by a parallel beam of light whose wavelength in air is 6300 Å. what is the fringe width?

A. $(1.33 \times 0.63)mm$

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

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

D. $0.63 mm$

Answer: D

Watch Video Solution

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

S_3, S_4 and a second screen behind them.

A. there would be no interference pattern on the second screen but it would be lighted

B. the second screen would be totally dark

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

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

Answer: D

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103. In Young's experiment, the ratio of the intensities at the maxima and minima in the interference pattern is 36:16. what is the ratio of the widths of the two beams?

A. 15

B. 20

C. 25

D. 30

Answer: C

Watch Video Solution

104. In young double slit experiment the ratio of intentsities of bright and dark bands is 16 which means

A. the ratio of their amplitudes is 5

B. intensities of individual sources are 25 and 9 units respectively

C. the ratio of their amplitudes is 4

D. intensities of individual sources are 4 and 3 units respectively

Answer: B

 Watch Video Solution

105. In the experiment of interfernece, p is the number of bright bands for a light of wavelength λ_1. If the source of light is replaced by λ_2 then the number of bright bands will be

A. $\frac{p\lambda_2}{\lambda_1}$

B. $\frac{p\lambda_1}{\lambda_2}$

C. $p\lambda_1$

D. $p\lambda_2$

Answer: B

Watch Video Solution

106. In a biprism experiment, the distance (d) between the two sources is doubled and the distance between the slit and the eye piece is also doubled. Then the width of the fringe

A. is doubled

B. is halved

C. remains unchanged

D. is reduced to $\frac{1}{3}$

Answer: C

Watch Video Solution

107. In a biprism experiment, the fringe width is 0.4mm. The distance between the fourthh dark fringe and the sixth bright fringe is

A. 0.5 mm

B. 0.75 mm

C. 1 mm

D. 1.5 mm

Answer: C

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108. In a biprism experiment, if the width of the fourth bright bannd is 1mm, then the width of the 8th bright band will be

A. 0.5 mm

B. 1.5 mm

C. 1 mm

D. 2mm

Answer: C

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109. In Fresnel's biprism experiment, the 5th maximum for wavelength λ_1 is at a distance d_1 from the central bright bannd. If the 5th maximum for wavelength λ_2 is at a distance d_2 from the central bright band, then the ratio $\frac{d_1}{d_2}$ is

A. $\frac{\lambda_1^2}{\lambda_2^2}$

B. $\frac{\lambda_2^2}{\lambda_1^2}$

C. $\frac{\lambda_1}{\lambda_2}$

D. $\frac{\lambda_2}{\lambda_1}$

Answer: C

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110. In fresnel's biprismm experiment, the second dark band is at a distance of 1 mm from the central bright band. If D=1m and d=0.9 mm, then the wavelength of light used is

A. 6000 Å

B. 7000 Å

C. 5000 Å

D. 5500 Å

Answer: A

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111. In a biprism experiment, the distance between the two virtual sources is 0.1 mm and the screen is placed at 100 cm from the slits. If

the wavelength of light used is 5000 Å, then the distance of the 4th bright band from the central bright band will be

A. 2 cm

B. 1.5 cm

C. 1 cm

D. 3 cm

Answer: A

Watch Video Solution

112. In the interference pattern obtained in a biprism experiment, 5th order bright fringe is obtained at a point on the screen, when monochromatic light of wavelength 6000 Å is used. What is the order of the bright fringe produced at the samme point, if the light of wavelength 5000 Å is used?

A. $n = 3$

B. $n = 4$

C. $n = 6$

D. $n = 10$

Answer: C

Watch Video Solution

113. In the biprism experiment, if the images produced by the convex lens in the two positions between the biprism annd the eye piece are 4.5 mm and 2 mm apart, then the distance (d) between the two virtual sources is

A. 2 mm

B. 3 mm

C. 4 mm

D. 5 mm

Answer: B

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114. In a biprism experiment, using monochromatic lightof wavelength 6000 Å, 8th bright band is obtained at a point on the screen. What is the wavelength of the another

source, which produces the 12th bright band at the samme point?

A. 3000 Å

B. 4000 Å

C. 5000 Å

D. 6000 Å

Answer: B

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115. In a biprism experiment, the distance of the 7th dark band from the central bright band is 2.6 mm. the width of the fringe is

A. 0.4 mm

B. 0.03 mm

C. 0.8 mm

D. 0.5 mm

Answer: A

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116. In a biprism experiment, if the 6th bright bannd with a wavelength λ_1 coincides with 7th dark band with a wavelength λ_2, then the ratio of the wavelengths $\left(\frac{\lambda_1}{\lambda_2}\right)$ is

A. $\frac{12}{13}$

B. $\frac{13}{12}$

C. $\frac{6}{7}$

D. $\frac{7}{6}$

Answer: B

Watch Video Solution

117. In a biprism experiment, the slit is illuminated with light of wavelength 5000Å. The number of bright fringes passing on a screen, if the path difference is changed by 0.005cm will be

A. 50

B. 100

C. 150

D. 200

Answer: B

Watch Video Solution

118. The distance of the 10th dark band from the centre of interference pattern is 28.5 mm. the band width is

A. $.15 \times 10^{-3} m$

B. $2.85 \times 10^{-3} m$

C. $3 \times 10^{-3} m$

D. $2.25 \times 10^{-3} m$

Answer: C

Watch Video Solution

119. In a Biprism experiment, the slit separation is 1mm. Using monochromatic light of wavelength 5000 Å, an interference patternn is obtained on a screen. For changing the bond width by 2.5×10^{-5}m.

A. the screen is moved away from the slits by 10 cm

B. the screen is moved towards the slits by 10 cm

C. the screen is moved away or towards the slits by 5 cm

D. the screen is moved away or towards the slits by 10 cm

Answer: C

Watch Video Solution

120. In a biprism experiment, the fifth dark fringe is formed opposite to one of the slits. What is the wavelength of light?

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

B. $\frac{d^2}{9D}$

C. $\frac{d^2}{8D}$

D. $\frac{d^2}{12D}$

Answer: B

Watch Video Solution

121. In a Fresnel's biprism experiment, D=1.3 m and d=0.65 mm. if the eyepiece has to be moved through a distance of 1.6 cm for 16 fringes to crss the firled of view, then the wavelength of light used is

A. 4000 Å

B. 4500 Å

C. 5000 Å

D. 5500 Å

Answer: C

Watch Video Solution

122. In a biprism experiment, using monochromatic light. Fringes are obtained on a screen placed at a distance D from the slits. Separated by 1mm. If the screen is moved through 5 cm towards the slits, the fringe width changes by 0.03 mm. what is the wavelength of light used?

A. 6000 Å

B. 5500 Å

C. 5000 Å

D. 4500 Å

Answer: A

Watch Video Solution

123. The fringe widthh in a biprism experiment is 0.3 mm. what will be the fringe width, if the whole experiment setup is immersed in water of refractive $\frac{4}{3}?a^n w = \frac{4}{3}$

A. 0.4 mm

B. 0.225 mm

C. 0.5 mm

D. 0.15 mm

Answer: B

Watch Video Solution

124. In a biprism experiment, the optical path difference between the two identical waves arriving at a point is 0.05 cm. if the wavelength

of light used of 5000 Å, then the number of dark friges passing through that point will be

A. 100

B. 200

C. 1000

D. 500

Answer: C

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125. Fringes are produced with monochromatic light of wavelength 5500 Å. A thin glass plate of R.I. 1.5 is then placed normally in one of the paths of interfering beams and the central bright fringe is found to be shifted to the position, previously occupied by the third bright band from the centre. the thickness of the glass plate is

A. $33 \times 10^{-4} m$

B. $16.5 \times 10^{-7} m$

C. $33 \times 10^{-7} m$

D. $33 \times 10^{-5} m$

Answer: C

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126. In a biprism experiment d=1mm. Interference fringes of width X=2.25 mm are observed on a screen at a distance of 3 m from the plane of the slit. The wavelength of incident light lies in the ____region.

A. green

B. yellow

C. red

D. violet

Answer: C

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127. In a biprism experiment, if we want to increase the fringe width (X), by keeping the distance between theslit and the screen (D) constant, then we should

A. increase d and decrease λ

B. decrease d and increase λ

C. increase d and increase λ

D. decrease d and decrease λ

Answer: B

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128. The biprism experiment was perfomred by using red light of wavleength 7500 Å and blue light of wavelength 5000Å. The value of n for

which (n+1)th blue bright band coincides with n^{th} red band is

A. 5

B. 4

C. 3

D. 2

Answer: D

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129. The biprism experiment is performed by using first the blue light of wavelength 4800 Å and then with red light. It is found that the fourth bright band of blue light coincides with the third bright band of red light. What is the wavelength of red light?

A. 5200 Å

B. 5600 Å

C. 6000 Å

D. 6400 Å

Answer: D

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130. A ray of light from a monochromatic point source of light is incident at a point on the screen. If a thin mica film of thickness t annd refractive index n is introduced in its path, then the optical path

A. is increased by (n-1)t

B. is decreased by (n-1) t

C. is not affected

D. is increased by (n+1)t

Answer: A

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131. A screen is placed 90 cm away from a luminous object. The image of the object on the screen is formed by a convex lens at two different positions separated by 30 cm. what is the focal length of the lens?

A. 15 cm

B. 20 cm

C. 25 cm

D. 35 cm

Answer: B

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132. Biprism experiment is performed by using light of wavelength of 5000 Å. The distance between the virtual sources is 0.2 mm annd

the micrometer eyepiece is at a distance of 100 cm from the slits. What is the distance between the consecutive bright and dark bands?

A. 1.25 mm

B. 2.5 mm

C. 3.5 mm

D. 0.25 mm

Answer: B

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133. In an interference experiment with a biprism, the distance of the slits from the screenn is increased by 25% annd the separation between the slits is halved. If X represents the original fringe width, the new fringe width will be

A. 2X

B. 1.5X

C. 2.5X

D. 4X

Answer: C

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134. A lens if placed between a source of light and a wall. It forms images of area A_1 and A_2 on the wall for its two different positions. The area of the source or light is

A. $(A_1 + A_2)^{1/2}$

B. $\left[\frac{1}{A_1} + \frac{1}{A_2}\right]^{-1}$

C. $\sqrt{A_1 A_2}$

D. $\left[\sqrt{A_1}+\sqrt{A_2}\right]^2$

Answer: C

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135. In a biprism experiment, if the distance between the slit and the biprism is slightly increased, without disturbing the remaining setting, then the bandwidth will

A. increase

B. decrease

C. not change

D. may incrase or decrease

Answer: B

Watch Video Solution

136. If the refracting angle of a Fresnel Biprism is increased, then

A. the interference ringes will disappear

B. fringes will not be affected

C. the fringe width is increased

D. the fringe width is decreased

Answer: D

 Watch Video Solution

137. If in a biprism experiment, light of wavelength 5000 Å is replaced by 10,000 Å, then the fringes will

A. be of double the original width

B. be of the samme width as original

C. will not be seen

D. will be fo half the original width

Answer: C

Watch Video Solution

138. In an interference pattern produced by using a biprism, the zeroth order maxima is at a distance of 4.7mm from a point P on the

screen. If the fringe width is 0.2 mm, then the distance of the second minima from the point P will be

A. only 4.4 mm

B. only 5 mm

C. either 4.4 mm or 5 mm depending upon the position of P

D. 6 mm

Answer: C

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139. 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

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140. 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. 0.011 cm

C. 2 cm

D. 4 cm

Answer: B

Watch Video Solution

141. A single slit diffraction pattern is obtained by using a beam of red light. What will happen to the diffraction bands if the red light is replaces by green light?

A. No change is the pattern

B. The bands will disappear

C. Bands will become narrower and crowded

D. Bands will become broader annd will move apart

Answer: C

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142. A slit of width a is illuminiated by white light. The first diffraction minimum for light of $\lambda = 6500Å$ is formed at $\theta = 30^\circ$, then the width (a) of the slit is

A. $6.5 \times 10^{-5} m$

B. $13 \times 10^{-6} m$

C. $1.3 \mu m$

D. $2.6 \times 10^{-5} m$

Answer: C

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143. Which one of the following undergo maximum diffraction?

A. Visible light

B. X rays

C. Radiowaves

D. α waves

Answer: C

Watch Video Solution

144. Light of wavelength 5500 Å falls normally on a slit of width $11 \times 10^{-7} m$ and the franhofer diffraction patternn is received on a screen. What is the angular position of the first minimum?

A. 60°

B. 30°

C. 45°

D. 20°

Answer: B

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145. In the experiment of diffraction at a single slit, if the slit width is decreased, the wdith of the central maximum

A. becomes zero

B. does not change

C. is increased

D. is decreased

Answer: C

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146. A laser beam having $\lambda = 7000$ Å and aperture $d = 10^{-2}m$ is sent to the moon. What is the angular spread of the beam?

A. 7×10^{-4} radian

B. $\left(7 \times 10^{-4} \times 10\frac{\pi}{180}\right)^{0}$

C. 7×10^{-5} radian

D. $\frac{7}{2} \times 10^{-5}$ radian

Answer: C

Watch Video Solution

147. Plane microwaves are incident on a long slit of width 6 cm. if the first diffraction minimum is formed at 30° then the wavelength of microwaves is

A. 6 cm

B. 4 mm

C. 6 mm

D. 3 cm

Answer: D

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148. The first diffraction minima in a single slit diffraction pattern is at $\theta = 30^\circ$, for light of wavelength=5000 Å. The width of the slit is

A. $2.5 \times 10^{-4} mm$

B. $5 \times 10^{-4} mm$

C. $7.5 \times 10^{-4} mm$

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

Answer: D

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149. What will be the angle of diffraction for the first secondary maximum due to diffraction at a single slit of width 0.5 mm and using light off 5000 Å?

A. 1.5×10^{-4} radian

B. 1.5×10^{-3} radian

C. 0.75×10^{-3} radian

D. 0.001 radian

Answer: B

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150. The direction of the first secondary maximum in the fraunhoffer 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

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151. Light of wavelength 5500 Å is incident on a slit of width 'a'. For what vlaue of 'a' the first minimum in the diffraction pattern falls at 30° ?

A. $5.5 \times 10^{-6} m$

B. $7.5 \times 10^{-6} m$

C. $1.1 \times 10^{-6} m$

D. 1.3×10^{-6}

Answer: C

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152. A parallel beam of monochromatic light off wavelength $\lambda = 5 \times 10^{-7} m$ is incident normally on a single narrow slit of width 10^{-3} mm. what is angle of diffraction, the first minimum if formed?

A. 30°

B. 45°

C. 60°

D. 75°

Answer: A

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153. For a parallel beam of monochromatic. Light of wavelength $'\lambda'$ diffraction is produced by a single slit whose width 'a' is of the order of the wavelength of the lightl. If 'D' is the distance of the screen from the slit, the width of the central maxima will be

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

B. $\frac{Da}{\lambda}$

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

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

Answer: D

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154. In a single slit diffraction pattern intensity and width of fringes are

A. have equal intensity

B. have equal width

C. have unequal intensity ad unequal width

D. have unequal intensity and equal width

Answer: C

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155. The frequency of the emm. Wave, which is best suitable to observe a particle of the size of $3 \times 10^{-6} m$ is of the order of

A. $10^{14} Hz$

B. $10^{15} Hz$

C. $2 \times 10^{13} Hz$

D. $3 \times 10^{15} Hz$

Answer: A

Watch Video Solution

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

B. I_0

C. $4I_0$

D. $2I_0$

Answer: B

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

A. more number of fringes

B. less number of fringes

C. no diffraction pattern

D. a very narrow central maxima

Answer: C

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158. 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 patternn vanishes and the width is zero

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

C. $3y$

D. None of these

Answer: C

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159. In a single slit diffraction pattern, the first minima for a wavelength $\lambda_1 = 6000$ Å coincides with the first maxima for a wavelength λ_2. Then the value of λ_2 is

A. 8000 Å

B. 4000 Å

C. 5500 Å

D. 3500 Å

Answer: B

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160. A parallel beam of fast moving electrons is incident normally on 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?

A. Diffraction patternn is not observed on the screen in the case of electrons

B. The angular width of the central maxima of the diffraction pattern will increase

C. The angular width of the central maxima will decrease

D. The angularr width of the central maxima will remain the same

Answer: C

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161. A single slit Fraunhoffer diffraction patternn 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 patternn of red light of wavelength 6300 Å?

A. 4400 Å

B. 4800 Å

C. 4500 Å

D. 5500 Å

Answer: C

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162. 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. π

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

C. 2π

D. zero

Answer: C

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163. In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic lightg of wavelength 500 nm is used, what will be the width of each slit for obtaining ten maxima of double slit

within the central maxima of single slit pattern ?

A. 0.1 mm

B. 0.5 mm

C. 0.02 mm

D. 0.2 mm

Answer: D

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164. The aperrture of the largest telescope in the world is about 5 m. if the separation between the moon and the earth is $4 \times 10^5 km$ and the wavelength of visible light is 5000 Å, then the minimum separation between the objects on the surface of the moon which can be just resolved is approximately equal to

A. 200 m

B. 100 m

C. 50 m

D. 25 m

Answer: C

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165. If the blue light is replaced by red light illuminating the object in a microscope, the resolving power of the microscope

A. is increased

B. is decreased

C. gets halved

D. remains constant

Answer: B

Watch Video Solution

166. Which colour will give maximum resolving power for a telescope?

A. Red

B. Gblue

C. Green

D. Violet

Answer: D

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167. A telescope is used to resolve two stars having an angular separation of 3.66×10^{-6} radian. What is the diameter of the objective of the telescope if monochromatic light of wavelength 6000 Å is used?

A. 10 cm

B. 20 cm

C. 25 cm

D. 30 cm

Answer: B

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168. Two points separated by a distance of 0.1 mm can just be resolved in a microscope when a light of wavelength 6000 Å is used. If the

light of wavelength 4800 Å is used this limit of resolution becomes :-

A. 0.05 mm

B. 0.06 mm

C. 0.07 mm

D. 0.08 mm

Answer: D

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169. The resolving power of a telescope whose lens has a diameter of 1.22 m for a wavelength of 5000Å is

A. 1.50×10^6

B. 1.75×10^6

C. 2.25×10^6

D. 2.0×10^6

Answer: D

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170. Wavelength of light used in an optical instrument are $\lambda_1 = 4500$ Å and $\lambda_2 = 6000$ Å. What is the ratio of the resolving powers corresponding to λ_1 and λ_2?

A. $\frac{3}{4}$

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

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

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

Answer: B

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171. The angular separation of a 100 cm telescope for $\lambda = 5500$ Å is approximately equal to

A. 0.14°

B. 1°

C. 1°

D. 0.3°

Answer: A

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172. The objective of a microscope is first illuminated with blue light. Then it is illuminated by yellow light, without changing the experimental set up. In the second case its resolving power.

A. will increase

B. will decrease

C. will not change

D. will be doubled

Answer: B

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173. A man wants to distinguish between two pillars located at a distance of $11km$. What should be the minimum distance between the pillars ?

A. 1.6 m

B. 3.2 m

C. 0.8 mm

D. 5 m

Answer: B

Watch Video Solution

174. If the aperature of a telescope is decreased resolving power will

A. increases

B. does not change

C. becomes infinity

D. decreases

Answer: D

Watch Video Solution

175. Resolving power of a telescope can be increased by

A. increasing the diameter of the objectie of the telescope

B. decreasing the diameter of the objective of the telescope

C. increasing the wavelength of light

D. none of these

Answer: A

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176. Aperture of the human eye is 2 mm. Assuming the mean wavelength of light to be

5000 Å, the angular resolution limit of the eye is nearly

A. 1°

B. 20°

C. 1.5×10^{-3} radian

D. 1°

Answer: A

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177. The diameter of human eye lens is $2mm$. What should be the minimum separation between two points situated at $50m$ from eye, to resolve tham. Take wavelength of light $= 5000\text{Å}$.

A. 1.25 cm

B. 2.35 cm

C. 3.5 cm

D. 4.8 cm

Answer: A

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178. The headlights of a truck are 1.22 m apart and light of wavelength 5000 Å is used for the headlights. The pupil of the eye of the obeserver has a diameter of 1 mm. what should be the maximum distance of the truck from observer, so that the headlights are just separated for him?

A. 2 km

B. 1.5 km

C. 3 km

D. 3.5 km

Answer: A

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

that one doesnot see the indivdual dots is _____ .

A. 17 cm

B. 12.5 cm

C. 14.5 cm

D. 16.3 cm

Answer: C

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180. If numerical aperture of a microscope is increased, then its

A. resolving power decreases

B. limit of resoltuion decreases

C. resolving power remains constant

D. limit off resolution increases

Answer: B

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

A. $0.25 \times 10^{-7} m$

B. $2.5 \times 10^{-7} m$

C. $25 \times 10^{-7} m$

D. 250×10^{-7} m

Answer: C

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182. The frings produces in a diffraction patternn are of

A. equal width with the same intensity

B. unequal width with varying intensity

C. equal width with varying intensity

D. equal widt with varying intensity

Answer: B

Watch Video Solution

183. What is the resolving power of a telescope of aperture 100 cm, for light of wavelength $5.5 \times 10^{-7} m$?

A. 0.149×10^{7}

B. 1.49×10^{7}

C. 14.9×10^{7}

D. 149×10^{7}

Answer: A

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184. In the diffraction pattern due to a single slit of width 'd' with incident light of wavelength $'\lambda'$, at an angle of diffraction $'\theta'$, the condition for first minimum is

A. $\lambda \sin\theta = d$

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

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

D. $\lambda\cos\theta = d$

Answer: C

Watch Video Solution

185. The resolving power of a telescope depends on

A. length of the telescope

B. focal length of the objective

C. diameter of the objective

D. focal length of eyepiece

Answer: C

 Watch Video Solution

186. Interference fringes are produced on a screen by using two light sources of intensities / and 9/. The phase difference between the beams $\frac{\pi}{2}$ is at point P and πat point Q on the screen. The difference between the resultant intensities at point P and Q is

A. 2I

B. 4I

C. 6I

D. 8I

Answer: C

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187. Two coherent sources P and Q produce interference at point A on the screen where there is a dark band which is formed between 4th bright band and 5th bright band. Wavelength of light used is 6000 Å. The path difference between PA and QA is

A. $1.4 \times 10^{-4} m$

B. $2.7 \times 10^{-4} m$

C. $4.5 \times 10^{-4} cm$

D. $6.2 \times 10^{-4} cm$

Answer: B

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188. Resolving power of telescope increases when

A. wavelength of light decreases

B. wavelength of light increases

C. focal length of eye-piece increases

D. focal length of eye-piece decreases

Answer: A

Watch Video Solution

189. In Fraunhofer diffraction pattern, slit width is $0.2mm$ and screen is at 2 m away from the lens. If wavelength of light used is 5000Å, then the distance between the first

minimum on either side of the central maximum is (θ is small and measured in radian)

A. $10^{-1}m$

B. $10^{-2}m$

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

D. $2 \times 10^{-1}m$

Answer: B

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190. Two identical light waves having phase difference $'\phi'$ propagate in same direction. When they superpose, the intensity of resultant wave is proportional to

A. $\cos^2\phi$

B. $\cos^2\frac{\phi}{2}$

C. $\cos^2\frac{\phi}{3}$

D. $\cos^2\frac{\phi}{4}$

Answer: B

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191. In Young's double experiment , in air interference pattern second minimum is observed exactly in front of one slit. The distance beween the two coherent source is 'd' and the distance between source and screen 'D'. The wavelength of light source used is

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

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

C. $\frac{d^2}{3D}$

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

Answer: C

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Test Your Grasp

1. Two waves having the intensities in the ratio of $9:1$ produce interference. The ratio of maximum to minimum intensity is equal to

A. $10:8$

B. $2:1$

C. $9:1$

D. $4:1$

Answer: D

Watch Video Solution

2. A point P is situated at 40.1 cm and 40.2 cm away from two coherent sources. If the wavelength of light used is 5000 Å, then the point P

A. is dark

B. is bright

C. neigher bright nor dark

D. may be bright or dark

Answer: B

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3. 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 3I

B. 9I and I

C. 9I and 3I

D. 5I and I

Answer: B

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4. In Young's double slit experiment carried out with wavelength $\lambda = 5000Å$, the distance between the slits is 0.2 mm and the screen is 2 m away from the slits. The central maxima is at n=0. the third maxima will be at a distance x (from central maxima) is equal to

A. 0.5 cm

B. 1.5 cm

C. 5 cm

D. 1.67 cm

Answer: B

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5. In Young's experiment, interference fringes are obtained on a screen placed at some distance from the slits. When the screen is moved towards the slits by $5 \times 10^{-2} m$, the fringe width is changed by $3.5 \times 10^{-5} m$. If the separation between the slits is 1 mm, then th wavelength of light used is

A. 4000 Å

B. 5000 Å

C. 6000 Å

D. 7000 Å

Answer: D

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6. In a young's double slit experiment, one of the slits is covered by a glass sheet of thickness 2.5×10^{-5}m. Due to this, the

position of the central bright fringe is shifted to position originally occupied by the 30th bright fringe. If $\lambda = 5000$ Å, then the refractive index of glass is

A. 1.45

B. 1.5

C. 1.6

D. 1.65

Answer: C

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7. In Young's double slit experiment, the two slits are at a distance 'd' apart. Interference pattern is observed on a screen at a distance D front the slit, if at a point on the screen, directly opposite to the slits, the first dark fringe is observed, then wave length of the wave will be

A. $\lambda = \frac{d^2}{2D}$

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

C. $\lambda = \frac{2d^2}{D}$

D. $\lambda = \frac{D}{d^2}$

Answer: B

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8. In Youngs 's double slit experiment, the fringe width obtained by using monochromatic light of wavelength 6000 Å is 2 mm. if the whole apparatus is immersed in water of R.I. 1.33, then the change in fringe width will be

A. 1 mm

B. 1.2 mm

C. 1.5 mm

D. 0.5 mm

Answer: D

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9. In Young's double slit experiment, the maximum intensity is I_0. What is the intensity at a point on the screen where the path

difference between the interfering waves is $\frac{\lambda}{4}$

?

A. I_0

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

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

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

Answer: D

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10. In a biprism experiment the band width is 0.4 mm when the eye piece is at a distance of 1m from the slit. If the eye piece is moved through a distanc eof 25 cm towards the biprism, without changing any other arrangement, then the change in fringe width is

A. 0.1 mm

B. 0.01 mm

C. 0.001 mm

D. 0.0001 mm

Answer: A

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11. In a biprism experiment, the distance between the consecutive bright bands is 0.32 mm, when red light of wavelength 6400 Å is used. By how much would the band width change, if blue light of wavelenth 4800 Å is used, with the same setting?

A. 0.02 mm

B. 0.04 mm

C. 0.06 mm

D. 0.08 mm

Answer: D

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12. Microwave ocillators S_1 and S_2 are used to show interference of electromagnetic waves on a screen which in parallel to S_1S_2 and 2 m

away from S_1S_2 . If $S_1S_2 = 20$ cm and $\lambda = 4cm$, then the distance between the successive maxima and minima will be

A. 20 cm

B. 30 cm

C. 40 cm

D. 50 cm

Answer: C

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13. Two sources of light P and Q have wavelengths 6000 Å and 5500 Å respectively. In a biprism experiment, first the source P is used, and then it is replaced by the source Q. it is found that the position of the n^{th} bright band corresponding to P is occupied by $(n+1)^{th}$ bright band of Q. what is the value of n?

A. 5

B. 7

C. 9

D. 11

Answer: D

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14. Light of wavelength 5000 Å, illuminates the slit in a biprism experiment. If it is replaced by light of wavelength 6500 Å, then the fringe width will

A. increase by 20%

B. decrease by 20%

C. increase by 30%

D. decrease by 30%

Answer: C

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15. A diffraction patter is obtained by making lbue light incident on a narrow slit. It blue light is replaced by red light then

A. diffraction bands disappear

B. diffraction bands become broader

C. diffraction bands become narrower

D. there is not change in diffraction pattern

Answer: B

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16. Light of wavelength λ is incident on a slit of width d and distance between screen and slit is D. Then width of maxima and width of slit will be equal if D is --

A. $\frac{a^2}{\lambda}$

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

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

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

Answer: C

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17. 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

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18. In a Fraunhoffer diffraction at single slit of width 'a' with incident light of wavlength of 5500 Å, the first minimum is observed, at an angle of 30°. At what angle the first secondary maximum is observed?

A. $\sin^{-1}\frac{1}{\sqrt{2}}$

B. $\sin^{-1}\frac{1}{4}$

C. $\sin^{-1}\frac{3}{4}$

D. $\frac{\sin^{-1}\left(\sqrt{3}\right)}{2}$

Answer: C

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19. By using light of wavelength 5200 Å, two points separated by a distance of 0.12 mm can just be resolved by a microscope. What will be the limit of resolution, if light of wavelength 6500 Å is used?

A. 0.10 mm

B. 0.08 mm

C. 0.15 mm

D. 0.2 mm

Answer: C

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20. What is the resolving power of a telescope whose objective lens has a diameter 1.22 m from a wavelength 4000 Å?

A. 2×10^6

B. 2.5×10^6

C. 2×10^5

D. 2.5×10^4

Answer: B

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