PHYSICS

BOOKS - BINA LIBRARY PHYSICS (ASSAMESE ENGLISH)

OPTICS -II

Example

1. Two monochromatic waves propagating in the same direction with amplitudes A and 3A

respectively and differing in phase by $\pi/3$ superpose. Calculate the amplitude of the resultant wave.

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2. Two coherent sources have intensities in the ratio 25 : 16 . Find the ratio of intensities of maxima to minima after interference occurs.

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3. In Young's double slit experiment, the ratio of intensity at the maxima and minima in the interference pattern is 25 : 9 . What is the ratio of the widths of the two slits ?

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4. The two slits in Young's experiment have width in the ratio 9 : 1 . Find the ratio of light intensity at the maxima and minima in the interference pattern.

5. In Young's double slit experiment using light of wavelength 5000Å, the fringe width is 0.6 cm. If the distance between the slit abd screen is reduced to half , calculate the new fringe width.

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6. Yellow light of wavelength 6000Å produces fringes of width 0.8 mm in Young's double slit

experiment. What will be the fringe width of the light source if it is replaced by another monochromic source of wavelength 7500Å and sepearation between the slits is doubled?

7. In a double slit experiment, if the screen is moved by 5 x 10^-2 m towards the slit the change in fringe width is 3 x 10^-5 m. If the distance between the slits is 10^{-3} m, calculate the wavelength of the light used.

8. In a Young's double slit experiment, the slits are 0.03 cm apart and the screen is placed 1.5m away from the plane of the sources. The distance between the central bright fringe and the fourth bright fringe is measured to be 1 cm. Determine the wavelength of the light used.

9. What is Snell's law ?

10. A slit of width 'a' is illuminated by a light of wavelength 6000Å . For what value of 'a' will be first maximum fall at an angle of diffraction of 30° ?

11. A slit of width 'a' is illuminated by a light of wavelength 6000Å . For what value of 'a' will be first maximum fall at an angle of diffraction of 30º ?

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1. Name the scientist who gave the wave theory of light.

2. Who demonstrated the interference of light first?

3. What is a wave?

4. Define torque. State its dimensions

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5. What do you mean by angular momentum?

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6. What are coherent sources?

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7. State one condition for sustained interference pattern.

8. Can non-coherent sources produce interference?

9. Does the law of conservation of energy hold good during interference?

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10. Name the phenomenon that explains the colours of the films.

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11. What is diffraction of light?

12. What is polarisation?

13. Which property of waves proves that light waves are transverse?

14. What is the path difference between two wave for destructive interference?

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15. Two independent sources of light cannot be coherent. Why?

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16. What is the polarising angle of a medium of refractive index $\sqrt{3}$?

17. Name the wave phenomenon which is exhibited by light, but not by sound waves.

18. What is the geometrical shape of a wave front when a plane wave passes through convex lens.

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19. What is the geometrical shape of a wave front when a plane wave passes through concave lens.

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20. What is the geometrical shape of a wave front when a plane wave passes through glass prism.

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21. What is a polaroid?

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22. What are unpolarized and linearly polarized light waves? What is a polaroid?

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23. Explain Huygen's principle of wave optics.

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24. Explain reflection of light on the basis of Huygen's theory.

25. State the factors which determines the width of interference fringes produced on screen.

26. What are coherent source of light? Why no interference pattern is observed when two

coherent source are

too close

27. What is the effect on the interference fringes in Young's double slit experiment when the monochromatic source is replaced by a source of white light?

28. Prove that ratio of the intensities at maxima and minima is

(I_(max))/(I_(min))=((r+1)/(r-1))^2, $Where$

r=a_1/a_2` is the ratio of amplitudes.

29. State two important differences between interference and diffraction.

30. What is resolving power? Give an expression for resolving power of a telescope.

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31. Give an expression for the resolving power of microscope.

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32. What is concave mirror ?

33. What is convex mirror?

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34. Explain the phenomenon of 'redshift' qualitatively.

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35. State and explain Brewster' law.

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36. Explain the phenomenon of double refraction.

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37. Define Reflection of light.

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38. Describe Young's double slit experiment and determine the conditions for obtaining bright and dark fringes.

39. Find the expression of fringe-width $\beta = \dfrac{\lambda D}{d}$ for Young's double slit interference pattern, where d is the separation between the two coherent sources.

40. What are coherent source of light? Why no interference pattern is observed when two coherent source are

too close

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

interference pattern is not detected when two coherent sources are far apart?

42. What is diffraction of light?

43. What is meant by plane polarised light. What type of wave show these property?

44. Describe a method of producing plane polarised light.

45. Define the term 'linearly polarised light' . When does the intensity of transmitted light become maximum when a polaroid sheet is roatated between two crossed polaroids?

46. What is a polaroid?

47. What is the effect on the interference fringes in Young's double slit experiment when the monochromatic source is replaced by a source of white light?

48. Write lens formula

49. We do not see an interference pattern when light from two identical electric bulbs falls on a white wall. Give reasons.

50. Do interference effects occur for sound waves?

51. Is Young's experiment an interference or a diffraction experiment, or both?

52. State Coulombs law of electrostatics. Explain it in vector form ?

53. State two basic properties of electric charge ?

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54. What is light?

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55. What is light?

▶ Watch Video Solution

56. What is a ray of light?

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57. How can the resolving power of a telescope be increased?

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58. Two coherent sources whose intensity ratio is 81 : 1 produce interference fringes. Calculate the ratio of intensity of the maxima and minima in fringe system.

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59. In Young's double slit experiment, the slits are seperated by 0.24 mm. The screen is 1.2m away from the slits. The fringe width is 0.3 cm. Calculate the wavelength of the light used.

60. In Young's experiment, the width of the fringes obtained with light of wavelength 6000Å is 2.0 mm. Calculate the fringe width if the entire apparatus is immersed in a liquid medium of refractive index 1.33 .

61. Light of wavelength 600ηm is incident normally on a slit of width 0.2mm. The angular

width of central maxima in the diffraction pattern is ?

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62. What is the Brewster angle for air to glass transition? (Refractive index of glass is 1.5)

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63. The amplitude ratio of two sources is 5 : 1 . Obtain their intensity ratio of maxima and

minima in their interference pattern.

64. In a Young's double slit experiment distance between the slits is 1 mm. The fringe width is found to be 0.6 mm. When the screen is moved through a distance of 0.25 m away from the plane of the slit, the fringe width becomes 0.75 mm. Find the wavelength of light used.

65. Write two difference between real and

virtual image ?

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66. What is a beam of light?

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67. Two waves of same frequency , but of amplitudes in the ratio $1:3$ are superimposed. The ratio of maximum to minimum intensity is

A. $4:1$

B. $1:4$

C. $3:1$

D. $1:3$

Answer: A

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

A. $4:1$

B. $3:1$

C. $2:1$

D. $1:1$

Answer: B

69. In Young's double slit experiment on interference the ratio of intensities of the bright brand and a dark is 16 : 1. The ratio of amplitudes of waves is

A. 16

B. $\dfrac{5}{3}$

C. 4

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

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

A. 0.12 mm

B. 0.3 mm

C. 3.0 mm

D. 4.0 mm

71. In Young's double slit experiment, intensity on screen at a point where path diffrence is λ is K . What will be the intensity where path difference is $\dfrac{\lambda}{4}$.

A. K/4

B. K/2

C. K

D. zero

Answer: B

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72. In a Young's double slit experiment, using sodium light ($\lambda = 5898\text{Å}$) 92 fringes are seen. If given colour ($\lambda = 5461\text{Å}$) is used, how many fringes will be seen?

A. 62

B. 67

C. 85

D. 99

Answer: D

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73. When light is incident at polarising angle,
which of the following is completely polarised?

A. reflected light

B. refracted light

C. both (a) and (b)

D. neither (a) and (b)

Answer: A

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74. What changes occurs on polarisation of light?

A. frequency

B. wavelength

C. phase

D. intensity

Answer: D

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75. Which of the following undergo maximum diffraction?

A. $alfa$ - ray

B. $gama$ - ray

C. radio waves

D. light waves

Answer: C

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76. Light waves are

A. longitudinal

B. transverse

C. partly longitudinal and partly transverse

D. sometimes   transverse   and   sometimes

longitudinal

Answer: B

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77. Light waves are transverse in nature. This is

indicated by

A. polarisation of light

B. interference of light

C. dispersion of light

D. photoelectric effect

Answer: A

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78. In Young's double slit experiment, the separation between the slits is halved and the

distance between the slits and the screen is doubled. The fringe width is

A. unchanged

B. halved

C. doubled

D. quadrupled

Answer: D

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79. The fringes seen in Young's double slit experiment are an evidance of

A. corpuscular of light

B. wave nature of light

C. dual nature of light

D. refraction of light

Answer: B

80. How is the interference pattern in Young's double slit experiment affected if the sodium (yellow) light is replaced by a red light of same frequency?

A. the fringes will vanish

B. the fringes will become brighter

C. the fringe width will decrease

D. the fringe width will increase

Answer: D

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81. Two light sources are said to be coherent if they emit

    A. waves of same freqency

    B. waves of same velocity

    C. waves of same wavelength and same phase

    D. waves of same wavelength having a constant phase difference

Answer: D

82. Which one of the following phenomena can not be explained by wave theory of light

A. refraction

B. diffraction

C. reflection

D. photoelectric effect

Answer: D

83. Polarisation of light shows that light waves are

A. of tranverse nature

B. of longitudinal nature

C. combination of both transverse and longitudinal nature.

D. None of the above

Answer: A

84. Polarised glass is used in sunglass, because

A. it is cheaper

B. it has good colour

C. it is fashionable

D. it reduces the light intensity to half on

account of polarisation

Answer: D