PHYSICAL OPTICS

Each question has four possible answers, encircled the correct answer:

1. The carpuscular nature of light was given by:

(a) Huygen **(b)** Maxwell

(c) Newton **(d)** Thomas young

2. Light is the source to:

(a) Create energy **(b)** Destroy energy

(c) Carry energy **(d)** All of above

3. Wave theory of light was proposed by:

(a) Thomas young **(b)** Huygen

(c) Newton **(d)** Maxwell

4. According to Newton, light travels in the form of:

(a) Photons **(b)** Waves

(c) Carpascular **(d)** Electrons

5. Huygen proposed that light travels in spaced by means of wave motion in:

(a) 1960 **(b)** 1690

(c) 1680 **(d)** 1670

6. Light is the type of:

(a) Momentum **(b)** Velocity

(c) Energy **(d)** Acceleration

7. The light reaches the earth from the sun in plane:

(a) Amplitude **(b)** Frequency

(c) Wavelength **(d)** Wavefronts

8. In interference and diffraction of light, the waves and wavefronts considered as:

(a) Cylindrical **(b)** Conical

(c) Spherical **(d)** Plane

9. Huygen principle is used to explain the:

(a) Dispersion of light **(b)** Reflection of light

(c) Speed of light **(d)** Propagation of light

10. The shape of wavefronts depends upon:

(a) Shape of medium **(b)** Viscosity of medium

(c) Density of medium **(d)** All of above

11. The direction in which light energy is carried called:

(a) Ray **(b)** Wavefront

(c) Locus **(d)** All of above

12. A plane wave is obtained if a point source of light is placed at the focus of a:

(a) Glass **(b)** Plane lens

(c) Mirror **(d)** None of these

13. When the disturbance is propagated out in all directions from a point source, the wavefronts are:

(a) Spherical **(b)** Conical

(c) Plane **(d)** None of these

14. All the points on a primary wavefront can be considered as the source for the production of secondary wavelets is:

(a) Huygen principle **(b)** Hertz principle

(c) Newton's principle **(d)** Maxwell's principle

15. The electromagnetic theory was developed by:

(a) Newton **(b)** Huygen

(c) Maxwell **(d)** Thomas young

16. Direction of propagation of light ray is:

(a) Along the wavefront

(b) Perpendicular to wavefront

(c) At an angle of 45° to the plane of the wavefront

(d) None of these

17. Light waves are:

(a) Complex **(b)** Monochromatic

(c) Mixture of monochromatic and complex **(d)** None of these

18. A medium which separates out a complex waves into component waves is called a:

(a) Polarizing medium **(b)** Refractive medium

(c) Dispersive medium **(d)** None of these

19. When light waves pass through a dispersive medium what happens to them:

(a) No effect at all **(b)** Split into its component waves

(c) Both (a) and (b) **(d)** None of these

20. When waves pass from one medium to another:

(a) Their wavelength changes **(b)** Their speed changes

(c) Frequency remains constant **(d)** All of above

21. Electromagnetic theory of radiation failed to explain:

(a) Compton effect **(b)** Mass-energy relation

(c) Photoelectric effect **(d)** All of them

22. Electromagnetic waves travel in free space with velocity equal to:

(a) 3×10^{10} m/s **(b)** 3×10^{8} m/s

(c) 3×10^{9} m/s **(d)** 6×10^{7} m/s

23. The first explanation of wave nature of light was provided in 1801 by the experiment of:

(a) Maxwell **(b)** Thomas young

(c) Huygen **(d)** Newton

24. Huygen's principle is used to explain:

(a) The speed of light **(b)** The polarisation

(c) Locate the wavefront **(d)** None of these

25. The locus of all points in a medium having the same phase of vibration is called:

(a) Wavefront **(b)** Wavelength

(c) Focal length **(d)** None of these

26. Huygen principle states that:

(a) Light travel in electromagnetic waves

(b) Light has dual nature

(c) Light travel in straight line

(d) All points on primary wavefront are source of secondary wavelets

27. The phenomenon of the resultant wave obtained by overlapping of two or more waves is called:

(a) Reflection **(b)** Refraction

(c) Interference **(d)** Polarisation

28. The monochromatic sources of light emit waves having a constant phase difference are called:

(a) Reliable sources **(b)** Unreliable sources

(c) Primary sources **(d)** Coherent sources

29. Interference effects of light was verified by:

(a) Bragg **(b)** Newton

(c) Thomas young **(d)** None of the above

30. Which one of the following is monochromatic light source:

(a) Light from simple lamp **(b)** Light from sodium lamp

(c) Light from fluouscent **(d)** Light from neon lamp

31. Two sources of light are coherent if they emit rays of:

(a) Same amplitude

(b) Same wavelengths

(c) Same amplitude and wavelength

(d) Same wavelength with constant phase coherence

32. When the crest of one wave falls on the crest of the other waves, this phenomena is known as:

(a) Polarisation **(b)** Dispersion

(c) Constructive interference **(d)** Destructive interference

33. When crest of one wave falls over the trough of other wave, this phenomenon is known as:

(a) Diffraction **(b)** Polarisation

(c) Constructive interference **(d)** Destructive interference

34. Interference produced by reflected light in thin films is constructive when path difference is:

(a) $d \sin \theta = m\lambda$ **(b)** $d \sin \theta = \left(m + \frac{1}{2}\right)\lambda$

(c) $d \sin \theta = \left(m - \frac{1}{2}\right)\lambda$ **(d)** $2d \sin \theta = m\lambda$

35. In order to get interference of light waves:

(a) The sources should be monochromatic

(b) The sources should be phase coherent

(c) The law of super-position should be applicable

(d) All of above

36. The condition for constructive interference of two waves is that the path difference should be:

(a) Integral multiple of λ **(b)** Integral multiple of $\frac{\lambda}{2}$

(c) Even integral multiple of λ **(d)** None of these

37. The condition for destructive interference of two waves is that the path difference should be:

(a) Integral multiple of λ **(b)** Integral multiple of $\frac{\lambda}{2}$

(c) Odd integral multiple of $\frac{\lambda}{2}$ **(d)** None of these

38. In young's double slit experiment, the path difference for bright fringe is:

(a) $d \cos \theta = m\lambda$ **(b)** $d \sin \theta = m\lambda$

(c) $d \sec \theta = m\lambda$ **(d)** $d \tan \theta = m\lambda$

39. In young's double slit experiment, the path difference for dark fringe is:

(a) $d \sin \theta = \left(m - \frac{1}{2}\right)\lambda$ **(b)** $d \sin \theta = m\lambda$

(c) $d \sin \theta = \left(m + \frac{1}{2}\right)\lambda$ **(d)** $d \tan \theta = \left(m + \frac{1}{2}\right)\lambda$

40. The distance between two adjacent bright or dark fringes is:

(a) $\Delta y = \frac{L\lambda}{d}$ **(b)** $\Delta y = \frac{\lambda}{d}$

(c) $\Delta y = \frac{\lambda}{Ld}$ **(d)** $\Delta y = Ld\lambda$

41. In young's double slits experiment, the fringe spacing is:

(a) $\Delta y = \frac{d}{\lambda D}$ **(b)** $\Delta y = \frac{2\lambda d}{D}$

(c) $\Delta y = \frac{\lambda D}{d}$ **(d)** $\Delta y = \frac{\lambda d}{D}$

42. In young's experiment if white light is used:

(a) Dark fringe will be seen

(b) Bright fringe will be seen

(c) Alternate dark and bright fringes will be seen

(d) No fringe will be seen

43. The distance between any two consecutive bright fringes is called:

(a) Wavelet **(b)** Fringe spacing

(c) Amplitude **(d)** Wavelength

44. The interference fringe spacing depends upon:

(a) Separation between the sources **(b)** The wavelength of light used

(c) The distance of screen from the source **(d)** All of above

45. A thin film is transparent medium whose thickness is comparable with wavelength of:

(a) Sound **(b)** Heat

(c) Light **(d)** None of these

46. A thin layer of oil on the surface of water looks coloured due to:

(a) Transmission of light **(b)** Polarization of light

(c) Interference of light **(d)** None of these

47. Soap film in sunlight appears coloured due to:

(a) Diffraction of light **(b)** Scattering of light

(c) Interference of light **(d)** Dispersing of light

48. Brilliant and beautiful colours in soap bubbles on surface of water are due to:

(a) Interference of heat **(b)** Interference of light

(c) Interference of sound **(d)** All of the above

49. A white light passed through a prism is:

(a) Polarized **(b)** Dispersed

(c) Diffracted **(d)** Deviated

50. Newton's rings are formed due to:

(a) Reflection of light **(b)** Polarization of light

(c) Interference of light **(d)** Diffraction of light

51. When Newton's rings interference is seen by mean of reflected light, the central spot is:

(a) Dark **(b)** Bright

(c) Blue **(d)** Red

52. Michelson interferometer can be used to find the:

(a) Wavelength of light **(b)** Wavelength of sound

(c) Velocity of sound **(d)** Velocity of light

53. The Michelson formula for displacement L is:

(a) $L = m\frac{\lambda}{2}$ **(b)** $L = 2m\lambda$

(c) $\lambda L = 2m$ **(d)** $\lambda L = \frac{m}{2}$

54. Michelson interferometer was devised in:

(a) 1987 **(b)** 1881

(c) 1687 **(d)** 1789

55. When one mirror of a Michelson interferometer is move a distance of 0.5 mm, 2000 fringes are observed, the wavelength of light used is:

(a) 2000 A° **(b)** 1000 cm

(c) 5000 A° **(d)** None of these

56. The property of bending light when it passes from one medium to another medium is known as:

(a) Dispersion of light **(b)** Diffraction of light

(c) Reflection of light **(d)** None of these

57. Diffraction effects are:

(a) More for sharp edges **(b)** Less for cylindrical

(c) Less for round edge **(d)** Less for sharp edge

58. We get light inside a room in a day time due to:

(a) Diffraction **(b)** Refraction

(c) Interference **(d)** Polarized

59. Diffraction effects was discovered in 1801 by:

(a) Newton **(b)** Henry

(c) Huygen **(d)** W.L Bragg

60. A glass plate having a large number of close parallel equidistant slits mechanically rules on it is called:

(a) Diffraction **(b)** Diffraction grating

(c) Fring spacing **(d)** All of the above

61. A diffraction grating has 500 lines per mm. Its grating element will be:

(a) 500 mm **(b)** 5×10^{-3} mm

(c) 2×10^{-3} mm **(d)** 5×10^{3} mm

62. The formula for grating element is:

(a) $d \sin \theta = \lambda$ **(b)** $d \sin \theta = m\lambda$

(c) $d \sin \theta = \frac{3}{2}\lambda$ **(d)** $md \sin \theta = \lambda$

63. The condition for constructive interference in case of diffraction grating:

(a) $d \sin \theta = m\lambda$ **(b)** $2d \sin \theta = m\lambda$

(c) $d \sin \theta = \frac{m}{\lambda}$ **(d)** $d \sin \theta = 2m\lambda$

64. Interference effects of light were verified by:

(a) Thomas young **(b)** Newton

(c) Einstien **(d)** W.L. Bragg

65. A fringe is a path of:

(a) Constant phase **(b)** Constant amplitude

(c) Same wavelength **(d)** None of these

66. The main advantage of a grating over young's apparatus is the:

(a) Absence of bright light **(b)** Greater deviation of light

(c) Absence of dark fringes **(d)** Sharpness of bright lines

67. Michelson interferometer is based on the principle of:

(a) Division of wavefronts **(b)** Division of amplitude

(c) Addition of amplitude **(d)** None of these

68. The blue of the sky is due to:

(a) Polarization **(b)** Reflection

(c) Refraction **(d)** Scattering

69. The velocity of light was accurately measured by:

(a) Newton **(b)** Faraday

(c) Michelson **(d)** Young

70. The wavelength of X-rays is:

(a) 1000 A° **(b)** 10 A°

(c) 1 A° **(d)** 100 A°

71. Interference and diffraction of light support the:

(a) Particle nature of light **(b)** Quantum nature of light

(c) Transverse nature of light **(d)** Wave nature of light

72. Polarization of light shows that light is:

(a) Extremely short wavelength **(b)** Transverse waves

(c) Longitudinal waves **(d)** Corpuscular in nature

73. Polarization of light takes place in:

(a) Transverse waves **(b)** Longitudinal waves

(c) Sound waves **(d)** None of these

74. The polarization of an electromagnetic waves is determined by:

(a) Electric field **(b)** Magnetic field

(c) Both electric and magnetic **(d)** The direction of waves

75. A polarized is:

(a) A light filter **(b)** To analysed polarized light

(c) Used in polarimeter **(d)** An adjustable shatter

76. Which one of the following cannot be polarized:

(a) Sound waves **(b)** Radio waves

(c) Ultraviolet rays **(d)** X-rays

77. One angstrom is equal to:

(a) 10^{-6} m **(b)** 10^{-8} nm

(c) 10^{-10} nm **(d)** 10^{-8} cm

78. Diffraction is a special type of:

(a) Interference **(b)** Reflection

(c) Polarization **(d)** None of these

79. Young's double slit experiment proves:

(a) Dual nature of light **(b)** Particle nature of light

(c) Wave nature of light **(d)** None of these

80. Two light waves which are not coherent cannot:

(a) Be interference **(b)** Be diffracted

(c) Be polarized in the same plane **(d)** None of these

81. Light on passing through a Polaroid is:

(a) Unpolarized **(b)** Plane polarized

(c) Elliptically polarized **(d)** Circularly polarized

82. Longitudinal waves do not exhibit:

(a) Diffraction **(b)** Polarization

(c) Reflection **(d)** Refraction

83. Light has:

(a) Particle nature **(b)** Wave nature

(c) Dual nature **(d)** None of these

84. Light waves are:

(a) Longitudinal waves **(b)** Transverse waves

(c) Compressional waves **(d)** None of these

85. Wave length of light on the average is given by:

(a) 10^{-9} **(b)** 10^{-10}

(c) 10^{-4} **(d)** 10^{-6}

86. Light waves are:

(a) Mechanical waves **(b)** Electromagnetic waves

(c) Matter waves **(d)** None of these

87. Monochromatic light means waves of:

(a) Same colour **(b)** Same wavelength

(c) Same frequency **(d)** All of these

88. The path difference 'd' for constructive interference should be:

(a) $d = \lambda/2$ **(b)** $d = 5\lambda/2$

(c) $d = m\lambda$ **(d)** $d = m\lambda \quad m = 0, \pm1, \pm2$

89. The equation $2d \sin\theta = n\lambda$ denotes:

(a) Huygen's principle **(b)** Young's double slit experiment

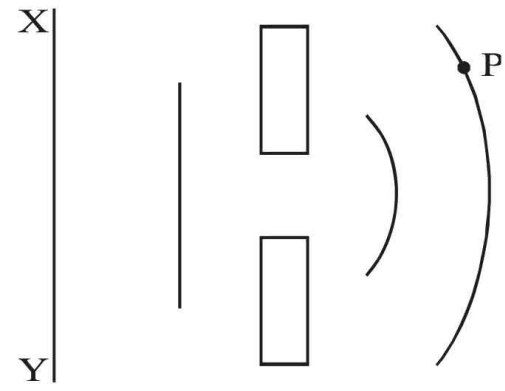
(c) Brogg's equation **(d)** Diffraction grating equation

90. Ultra-violet rays differ from x-rays in that ultra-violet rays:

(a) cannot be diffracted **(b)** cannot be polarized

(c) do not affect a photo-graphic plate **(d)** have a lower frequency

91. A monochromatic plane wave of speed 'c' and wavelength 'λ' is diffracted at a small aperture. The diagram illustrated successive wavefronts. After what time will some portion of the wavefront xy reach P:



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

(c) $\frac{3\lambda}{c}$ **(d)** $\frac{4\lambda}{c}$

92. For which of the following colours will the fringe width be minimum in the double-slit experiment:

(a) Violet **(b)** Red

(c) Green **(d)** Yellow

93. A diver in a lake wants to signal his distress to a person sitting on the edge of the lake flashing his water proof torch. He should direct the beam.

(a) Vertically upwards

(b) Horizontally

(c) At angle to the vertical which is slightly less than the critical angle

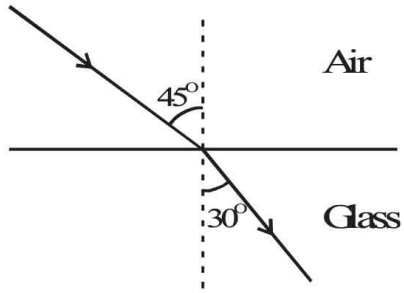
(d) At an angle to the vertical which is slightly more than critical angle

94. The least distance of distinct vision is 25 cm. The focal length of a convex lens is 5 cm. It can act as a simple microscope of magnifying power.

(a) 4 **(b)** 5

(c) 6 **(d)** 3

95. A ray of light travels from air to glass as shown in figure. What is the speed of light in the glass?



(a) $2.0 \times 10^{-6}\ ms^{-1}$

(b) $2.12 \times 10^{-8}\ ms^{-1}$

(c) $2.12 \times 10^{8}\ ms^{-1}$

(d) $3.25 \times 10^{8}\ ms^{-1}$

96. Light reaches the earth from sun in nearly:

(a) 15 minutes **(b)** 10 minutes

(c) 8 minutes **(d)** 8 minutes 20 second

97. Longitudinal waves do not exhibit (show):

(a) Reflection **(b)** Refraction

(c) Diffraction **(d)** Polarisation

98. The danger signals are red while the eye is more sensitive to yellow because:

(a) Scattering in yellow colour is less than that of red

(b) Red light is longer in wavelength than yellow light

(c) Scattering in red is less than in yellow

(d) Red colour has greater frequency than yellow light

99. When crest of one wave falls over the crest of the other waves, this phenomenon is known as:

(a) Destructive interference **(b)** Constructive interference

(c) Dispersion **(d)** Polarisation

100. In Young's double experiment, if white light is used:

(a) Bright fringes will be seen

(b) Dark fringes will be seen

(c) Alternate dark and bright fringes will be seen

(d) No interference fringes will be seen

101. In Young's double slit experiment, if the distance between the slits is doubled and distance between the slits and the screen is halved, the fringe width or spacing is:

(a) Half **(b)** Double

(c) Four times **(d)** One fourth

102. The blue of the sky is due to:

(a) Diffraction **(b)** Reflection

(c) Polarisation **(d)** Scattering

103. When one mirror of a Michelson interferometer is moved a distance of 0.5 mm, 2000 fringes are observed, the wavelength of light used is:

(a) 5000 nm **(b)** 5000 A°

(c) 500 cm **(d)** 2000 A°

104. The wavelength of X-rays is of the order of:

(a) 10 A° **(b)** 1000 A°

(c) 1 A° **(d)** 100 A°

105. Wavelength of X-rays falling at glancing angle of 30° on a crystal with atomic spacing 2×10^{-10} m for the first order diffraction is:

(a) 4×10^{-10} m **(b)** 2×10^{-10} m

(c) 0.2×10^{-10} m **(d)** 20×10^{-10} m

106. If 5000 lines per cm are ruled on a diffraction grating, then the slit spacing will be:

(a) 5×10^{-3} A° **(b)** 0.02 m

(c) 2×10^{-4} A° **(d)** 2×10^{4} A°

107. Which one of the following cannot be polarized?

(a) Radio waves **(b)** Ultraviolet rays

(c) X-rays **(d)** Sound waves

108. The ratio of fringe width for bright and dark fringes is:

(a) 1 : 2 **(b)** 2 : 1

(c) 1 : 4 **(d)** 1 : 1

109. Ratio of intensities of two waves are 4 : 1 then ratio of amplitude of two waves is:

(a) 2 : 1 **(b)** 1 : 2

(c) 4 : 1 **(d)** 1 : 4

110. The index of refraction of diamond is 2.0 velocity of light in diamond in m/sec. is:

(a) 6×10^{8} **(b)** 3×10^{8}

(c) 2×10^{8} **(d)** 1.5×10^{8}

ANSWERS

1.	(c)	**2.**	(c)	**3.**	(b)	**4.**	(c)
5.	(b)	**6.**	(c)	**7.**	(d)	**8.**	(c)
9.	(d)	**10.**	(d)	**11.**	(a)	**12.**	(b)
13.	(a)	**14.**	(a)	**15.**	(c)	**16.**	(b)
17.	(a)	**18.**	(c)	**19.**	(b)	**20.**	(d)
21.	(d)	**22.**	(b)	**23.**	(b)	**24.**	(c)
25.	(a)	**26.**	(d)	**27.**	(c)	**28.**	(d)
29.	(c)	**30.**	(b)	**31.**	(d)	**32.**	(c)
33.	(b)	**34.**	(a)	**35.**	(d)	**36.**	(a)
37.	(b)	**38.**	(b)	**39.**	(c)	**40.**	(a)
41.	(c)	**42.**	(d)	**43.**	(b)	**44.**	(d)
45.	(c)	**46.**	(c)	**47.**	(c)	**48.**	(b)
49.	(b)	**50.**	(c)	**51.**	(a)	**52.**	(a)
53.	(a)	**54.**	(b)	**55.**	(c)	**56.**	(b)
57.	(a)	**58.**	(a)	**59.**	(c)	**60.**	(b)
61.	(b)	**62.**	(b)	**63.**	(a)	**64.**	(a)
65.	(a)	**66.**	(d)	**67.**	(b)	**68.**	(d)
69.	(c)	**70.**	(c)	**71.**	(d)	**72.**	(b)
73.	(a)	**74.**	(a)	**75.**	(c)	**76.**	(a)
77.	(d)	**78.**	(a)	**79.**	(c)	**80.**	(a)
81.	(b)	**82.**	(b)	**83.**	(c)	**84.**	(b)
85.	(d)	**86.**	(b)	**87.**	(d)	**88.**	(d)
89.	(c)	**90.**	(d)	**91.**	(c)	**92.**	(a)
93.	(c)	**94.**	(c)	**95.**	(c)	**96.**	(d)
97.	(d)	**98.**	(c)	**99.**	(b)	**100.**	(c)
101.	(d)	**102.**	(d)	**103.**	(b)	**104.**	(c)
105.	(b)	**106.**	(b)	**107.**	(d)	**108.**	(d)
109.	(a)	**110.**	(d)				