OPTICAL INSTRUMENT

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

1. Any transparent medium bounded by one or two spherical surface, is called:

(a) Lens **(b)** Mirror

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

2. The minimum distance from the eye at which an object appears to be distinct is called the least distance of:

(a) Focal length **(b)** Distinct vision

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

3. A lens which is thicker from middle and thinner from edges called:

(a) Convex lens **(b)** Concave lens

(c) Convex mirror **(d)** Concave mirror

4. A lens which is thinner from middle and thicker from edges called:

(a) Convex lens **(b)** Concave mirror

(c) Convex mirror **(d)** Concave lens

5. The ratio of the size of image to the size of object is called:

(a) Magnification **(b)** Angular magnification

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

6. The ratio of the angles subtended by the image as seen through the optical device to that angle subtended by the object at the eye is called:

(a) Linear magnification **(b)** Angular magnification

(c) Tabulation **(d)** Calculation

7. A straight line joining the centers of curvature of two surfaces is called:

(a) Principal axis **(b)** Radius of lens

(c) Diameter of lens **(d)** Principal focus

8. A point where the incident rays of light converge or appears to diverge after passing through the lens is called:

(a) Aperture **(b)** Focus

(c) Optical centre **(d)** Pole of lens

9. When light passes from one medium to another medium, it is bend away from the normal. This phenomenon is called:

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

(c) Dispersion **(d)** Polarization

10. The distance of near point from the eye is about:

(a) 25 cm **(b)** 25 m

(c) 10 cm **(d)** 10 cm

11. A fixed point inside the lens through which a ray of light does not change its path is called:

(a) Pole **(b)** Principal focus

(c) Optical centre **(d)** None of these

12. The distance between the principal focus and the optical centre of the lens is called:

(a) Aperture **(b)** Focal length

(c) Radius of curvature **(d)** None of these

13. When an object is brought from a far point to the focal point of a convex lens, the size of image is:

(a) Unchanged **(b)** Decreasing

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

14. The apparent size of the object depends upon its actual size and angle subtended by it at the:

(a) Eye **(b)** Face

(c) Mouth **(d)** Near point at eye

15. When an object is viewed at a shorter distance, the image on the retina of the eye is:

(a) Greater **(b)** Smaller

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

16. The reciprocal of the focal length of a lens is expressed in metres is called:

(a) Power of lens **(b)** Focus of lens

(c) Aperture of lens **(d)** None of these

17. The unit of power of a lens is:

(a) Newton **(b)** Watt

(c) Dioptre **(d)** None of above

18. The power of a convex lens of focal length 50 cm will be:

(a) 2 dioptre **(b)** 5 dioptre

(c) 1.5 dioptre **(d)** None of these

19. The focal length of concave lens is:

(a) Positive **(b)** Negative

(c) Positive and negative **(d)** None of these

20. The focal length of convex lens is:

(a) Positive **(b)** Negative

(c) Positive and negative **(d)** None of these

21. In case of concave lens, the image of the real object is:

(a) Real, magnified and inverted **(b)** Virtual, diminished and erect

(c) Virtual, magnified and erect **(d)** None of these

22. The resolving power of an instrument can be expressed as:

(a) α_{min} **(b)** α_{max}

(c) α **(d)** None of these

23. Raleigh showed that for a light of wavelength λ through a lens of diameter D, the resolving power is:

(a) $\alpha_{min} = 1.22 \frac{\lambda}{D}$ **(b)** $\alpha_{min} = 1.22 \frac{D}{\lambda}$

(c) $\alpha_{min} = \frac{1.22}{\lambda D}$ **(d)** $\alpha_{min} = 1.22\ \lambda D$

24. In case of grating spectrometer, the resolving power R of the grating is defined as:

(a) $R = \lambda \,.\, \Delta\lambda$ **(b)** $R = \frac{\lambda}{\Delta\lambda}$

(c) $R = \frac{\Delta\lambda}{\lambda}$ **(d)** None of these

25. The resolving power in the mth order grating equals to:

(a) $R = N \times m$ **(b)** $R = \frac{N}{m}$

(c) $R = \frac{m}{N}$ **(d)** $R = \frac{1}{N\text{-}m}$

26. If an object is placed in front of convex lens then the image will be:

(a) Real and erect **(b)** Real and inverted

(c) Virtual and erect **(d)** Virtual

27. If an object is placed in front of concave lens then the image will be:

(a) Virtual and erect **(b)** Real and inverted

(c) Real and erect **(d)** Virtual

28. If an object is placed at 2F from convex lens, the image is located behind the lens:

(a) Between lens and focus **(b)** At 2F

(c) Between F and 2F **(d)** At the focus

29. Convex lens forms:

(a) Real and erect image **(b)** Virtual and inverted image

(c) Real and inverted image **(d)** None of these

30. If an object is placed slightly more than 2F from a converging lens, the image is located behind the lens:

(a) At 2F **(b)** Between F and 2F

(c) At the focus **(d)** None of these

31. Magnification of a lens is positive when the image is:

(a) Real and inverted **(b)** Virtual and inverted

(c) Real and erect **(d)** None of these

32. Magnification of a lens is negative when the image is:

(a) Real and inverted **(b)** Virtual and inverted

(c) Virtual and erect **(d)** None of these

33. Magnifying power of an optical instrument is given by the ratio of:

(a) $\frac{\beta}{\alpha}$ **(b)** $\frac{\alpha}{\beta}$

(c) $\frac{2\beta}{\alpha}$ **(d)** $\frac{2\alpha}{\beta}$

34. The magnification of the simple microscope if α and β are the angles subtended by the object when seen through the lens and when viewed directly is:

(a) $M = \frac{\beta}{\alpha}$ **(b)** $M = \frac{\alpha}{\beta}$

(c) $M = \alpha\beta$ **(d)** $M = \frac{1}{\alpha\beta}$

35. The magnifying power of a simple microscope is:

(a) $M = 1 + \frac{f}{d}$ **(b)** $M = 1 + \frac{d}{f}$

(c) $M = 1 + fd$ **(d)** None of these

36. An optical device used for the large magnification of a very minute object is called:

(a) Simple microscope **(b)** Compound microscope

(c) Convex lens **(d)** Telescope

37. The convex lens used in compound microscope as objective has focal length:

(a) Large **(b)** Short

(c) Same as eye-piece **(d)** None of these

38. If a single convex lens is placed close to the eye then it can be used as:

(a) Simple microscope **(b)** Compound microscope

(c) Spectrometer **(d)** Telescope

39. The final image produced by the eye-piece of compound microscope is:

(a) Real and inverted **(b)** Real and erect

(c) Virtual and inverted **(d)** Virtual and erect

40. The magnifying power of a compound microscope is:

(a) $M = \frac{p}{q}\left(1 + \frac{d}{f_e}\right)$ **(b)** $M = \frac{q}{p}\left(1 + \frac{d}{f_e}\right)$

(c) $M = \frac{q}{p}\left(1 - \frac{d}{f_e}\right)$ **(d)** $M = pq\left(1 + \frac{d}{f_e}\right)$

41. The magnifying power of a compound microscope is:

(a) Magnification of objective ÷ Magnification of eye-piece

(b) Magnification of objective + Magnification of eye-piece

(c) Magnification of objective × Magnification of eye-piece

(d) Magnification of objective – Magnification of eye-piece

42. In compound microscope, the focal length of eye-piece is:

(a) Large **(b)** Small

(c) Same as objective **(d)** None of these

43. The eye-piece of a compound microscope acts as:

(a) Converging mirror **(b)** Converging lens

(c) Diverging mirror **(d)** Diverging lens

44. If focal length of objective is increased:

(a) Magnifying power of compound microscope decreased

(b) Magnifying power of astronomical telescope increases

(c) Length of astronomical telescope increases

(d) All of above

45. The resolving power of a compound microscope depends upon:

(a) The refractive index of the medium in which the object is placed

(b) The angle subtended by the objective lens at the object

(c) The diameter of the objective lens

(d) None of these

46. It is an optical instrument used to very far off objects is called:

(a) Telescope **(b)** Microscope

(c) Convex lens **(d)** Spectrometer

47. A simple astronomical telescope consists of:

(a) Two convex lens **(b)** Two concave lens

(c) One convex and one concave **(d)** None of these

48. The image of a distant object viewed through telescope appears:

(a) Larger **(b)** Brighter

(c) Smaller **(d)** Dull

49. The distance between the objective and eye-piece of a telescope in normal adjustment is:

(a) $f_0 - f_e$ **(b)** $f_0 + f_e$

(c) $f_e - f_0$ **(d)** None of these

50. The magnifying power of astronomical telescope is:

(a) $M = \frac{f_e}{f_0}$ **(b)** $M = f_e f_0$

(c) $M = \frac{1}{f_e f_0}$ **(d)** $M = \frac{f_0}{f_e}$

51. The resolving power of an astronomical telescope depends upon:

(a) The focal length of the objective lens **(b)** The least distance of distinct vision of the observer

(c) The focal length of the eye-piece **(d)** The diameter of the objective lens

52. The magnifying power of an instrument is expressed in:

(a) Radians **(b)** Degrees

(c) No units **(d)** None of these

53. For an astronomical telescope $f_0 + f_e = 105$ cm, $\frac{f_0}{f_e} = 20$ the focal lengths of objective and eye-piece are:

(a) 50 cm, 5 cm **(b)** 210 cm, 25 cm

(c) 100 cm, 5 cm **(d)** None of these

54. The final image obtained by astronomical telescope is:

(a) Erect **(b)** Virtual

(c) Magnified **(d)** All of them

55. Lenses of focal lengths 100 cm and 5 cm are used as objective and eye-piece of an astronomical telescope, its length for normal adjustment is:

(a) 95 cm **(b)** 105 cm

(c) 20 cm **(d)** None of these

56. An optical instrument used to study the properties of light:

(a) Spectrometer **(b)** Simple microscope

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

57. A grating is placed on the turn table which is capable of rotating about a fixed:

(a) Vertical axis **(b)** Horizontal axis

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

58. The component of the spectrometer which consists of a fixed metallic tube with a convex lens at one end and an adjustable slit is called:

(a) Telescope **(b)** Collimator

(c) Turntable **(d)** Grating

59. An instrument which consists of three parts that is collimator, telescope and turn table is called:

(a) Compound microscope **(b)** Spectrometer

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

60. In spectrometer, the function of collimator is to produce:

(a) Parallel beam of light **(b)** Converging beam of light

(c) Diverging beam of light **(d)** None of these

61. The ability of an instrument to reveal the minor details of the object under examination is its:

(a) Magnification **(b)** Resolution

(c) Resolving power **(d)** None of these

62. The formula $\alpha_{min} = 1.22\ \lambda/\Delta\lambda$ for resolving power was given by:

(a) Einstien **(b)** Newton

(c) Michelson **(d)** Raleigh

63. The scientist who correctly measured the speed of light was:

(a) Einstien **(b)** Michelson

(c) Gallileo **(d)** Newton

64. The scientist who made first attempt to measure the speed of light was:

(a) Huygen **(b)** Young

(c) Einstien **(d)** Gallileo

65. Michelson used the equation to find the speed of light is:

(a) $C = \frac{16}{fd}$ **(b)** $C = \frac{16f}{d}$

(c) $C = 16fd$ **(d)** $C = \frac{fd}{16}$

66. The speed of light in vacuum or in air is:

(a) 3×10^{10} m/s **(b)** 3×10^{7} m/s

(c) 3×10^{9} m/s **(d)** 3×10^{8} m/s

67. The speed of light in other materials is always:

(a) Less than C **(b)** Equal to C

(c) Greater than C **(d)** None of these

68. In Michelson experiment, the angle subtended by the side of eight sided mirror at the centre is:

(a) π **(b)** $\frac{\pi}{2}$

(c) $\frac{\pi}{8}$ **(d)** $\frac{\pi}{4}$

69. The speed at which light travels within the material depends upon:

(a) Refractive index **(b)** Frequency

(c) Wavelength **(d)** Velocity

70. Alexander Bell invented advice known as:

(a) Photo phone **(b)** Telescope

(c) Spectrometer **(d)** Microscope

71. Graham Bell was able to transmit a voice message via:

(a) Telescope **(b)** Beam of light

(c) Spectrometer **(d)** Simple microscope

72. The detector in photo-phone is made of:

(a) Selenium **(b)** Cadmium and Germinium

(c) Codmium and Silicon **(d)** None of these

73. For incident angles equal or greater than the critical angle, the glass air boundary will act as a:

(a) Mirror **(b)** Concave mirror

(c) Convex mirror **(d)** None of these

74. For glass air boundary, the value of critical angle is:

(a) 41° **(b)** 41.5°

(c) 41.8° **(d)** 41.2°

75. Optical fibres are of:

(a) One type **(b)** Two types

(c) Three types **(d)** None of these

76. A fibre optical communication system consists of:

(a) Two major components **(b)** Three major components

(c) Five major components **(d)** Four major components

77. An optical fibre with its protective core may be typically:

(a) 7 mm **(b)** 7.62 cm

(c) 6.0 cm **(d)** None of these

78. Types of optical fibres are:

(a) Single mode step index **(b)** Multimode step index

(c) Multimode graded index **(d)** All of these

79. Multimode step index fibre is useful for:

(a) Short distance **(b)** Long distance

(c) Neither long nor short **(d)** None above

80. Multimode graded index fibre core has diameter of:

(a) 50 – 2000 μm **(b)** 50 – 100 μm

(c) 50 – 1500 μm **(d)** 50 – 300 μm

81. How many phone calls can be carried by single mode step index fibre:

(a) 15000 **(b)** 12000

(c) 16000 **(d)** 14000

82. The optical fibre is covered for protection by a:

(a) Plastic jacket **(b)** Copper jacket

(c) Glass jacket **(d)** Rubber jacket

83. A layer of lower refractive index over the central core of high refractive index is called:

(a) Cladding **(b)** Multimode step index fibre

(c) Multimode graded index fibre **(d)** All of the above

84. Single mode step index fibre has a very thin core of about diameter:

(a) 2.5 μm **(b)** 3.5 μm

(c) 5.0 μm **(d)** None of these

85. Multimode step index fibre has a core of relatively larger diameter such as:

(a) 25 μm **(b)** 75 μm

(c) 100 μm **(d)** 50 μm

86. Light entering glass will not suffer change in:

(a) Velocity **(b)** Direction

(c) Frequency **(d)** Wavelength

87. Fibre optics system can be used for:

(a) Image transmitting **(b)** Word processing

(c) Image processing and receiving **(d)** All of above

88. Use of outer layer in optical fibres called cladding is mainly to:

(a) Produce total internal reflection **(b)** Scatter the light

(c) Transmit the light **(d)** None of these

89. Total internal reflection occurs when the angle of incidence is:

(a) Equal to critical angle **(b)** Greater than critical angle

(c) Less than critical angle **(d)** None of these

90. The disadvantages of step index fibre is:

(a) Quality of the fibre **(b)** Size of the cable

(c) Difference in the wavelength of signals **(d)** None of these

91. Loss of power in optical fibre results into:

(a) Accurate information at the receivers **(b)** Poor reception of signals

(c) Delay in time for reception of signals **(d)** All of these

92. In optical fibres, repeaters are usually laid down after every:

(a) 1000 km **(b)** 10,000 km

(c) 50,000 km **(d)** 100 km

93. Television signals are converted into light signals by:

(a) Optical fibre **(b)** Transistor

(c) Decoder **(d)** Photo diode

94. A convex lens acts as diverging lens when the object is placed:

(a) At 2F **(b)** Within focal length

(c) At forces **(d)** Between F and 2F

95. When the object is between F and 2F, the image formed by a convex lens is:

(a) Real **(b)** Virtual

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

96. The ratio of the diameters of two convex lenses is ———— the ratio of their focal lengths:

(a) Less than **(b)** Greater than

(c) Equal to **(d)** None of these

97. Conventionally all the distances p, q, f are measured from ———— of the lens:

(a) Focus **(b)** Optical centre

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

98. A lens of 2 cm focal length is to be used as a magnifying glass. Its magnification is:

(a) 13.5 **(b)** 2.5

(c) 0.5 **(d)** 12.5

99. The working of a compound microscope is based on the principle of:

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

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

100. In the formula, $\alpha_{min} = \frac{1.22\lambda}{D}$, where D denotes:

(a) Diameter of lens **(b)** Power of the lens

(c) Distance between source and the object **(d)** None of the

101. Maximum detail of an object can be seen by microscope when the object is illuminated by light of:

(a) Longer wavelength **(b)** Short wavelength

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

102. The limit to which a microscope can be used to resolve details of an object depends upon:

(a) Narrow objective and light of short wavelength

(b) Narrow objective and light of short wavelength

(c) Narrow objective and light of longer wavelength

(d) None of these

103. Snell's law is described as:

(a) $n_1 \sin\theta_1 = n_2 \sin\theta_2$ **(b)** $n_2 \sin\theta_1 = n_1 \sin\theta_2$

(c) $n_1 \sin\theta_2 = n_2 \sin\theta_1$ **(d)** None of these

104. When $\theta_2 = 90°$ and $\theta = \theta_c$ then Snell's law becomes:

(a) $\sin\theta_c = n_1 n_2$ **(b)** $\sin\theta_c = \frac{n_2}{n_1}$

(c) $\sin\theta_c = \frac{n_1}{n_2}$ **(d)** None of these

105. Power of any lens would be one dipotre when its focal length is:

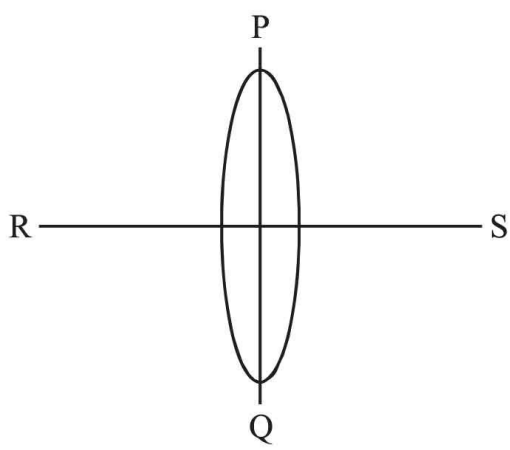
(a) 1.0 m **(b)** 1 cm

(c) 10 cm **(d)** 2 m

106. The figure shows an equi-convex lens of focal length f. If the lens is cut along PQ. The focal length of each help will be:

(a) $\frac{f}{2}$ **(b)** f

(c) 2f **(d)** $\frac{3f}{2}$



107. A spectrometer is used to measure:

(a) Refractive index of material of glass prism

(b) Deviation of light by a glass prism

(c) Wavelength of light

(d) All of the above

108. The unit of power of a lens is:

(a) Metre **(b)** Watt

(c) Newton **(d)** Dioptre

109. The minimum distance between an object and its real image in a convex lens is:

(a) 2f **(b)** 2.5f

(c) 3f **(d)** 4f

110. An object is placed at 18 cm from a converging lens of focal length 6 cm. The image formed is:

(a) Real and inverted **(b)** Real and erect

(c) Virtual and erect **(d)** Virtual and inverted

111. The image formed by a convex lens of focal length 10 cm is twice the size of the object. The position of the object will be:

(a) 20 cm **(b)** 30 cm

(c) 50 cm **(d)** 15 cm

112. In Michelson's experiment, the equation used to find the speed of light is:

(a) $c = 16\ fd$ **(b)** $c = 16\ f/d$

(c) $c = 16d/f$ **(d)** $c = fd/16$

113. The diameter of single mode step fibre core is:

(a) 10 μm **(b)** 30 μm

(c) 5 μm **(d)** 100 μm

114. The focal length 'f' and radius of curvature are related by:

(a) $f = 2R$ **(b)** $R = 2f$

(c) $R = f$ **(d)** None of the above

115. The focal length of objective of telescope is 60 cm. To obtain magnification of 20 focal length of eye piece should be:

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

(c) 3 cm **(d)** 2 cm

116. In compound microscope the magnification of object is M_o and magnification of eyepiece is Me. The magnifying power of compound microscope is:

(a) $M_o + M_e$ **(b)** $M_o \times M_e$

(c) $M_e - M_e$ **(d)** M_o/M_e

117. To increase the resolving power of telescope we should use:

(a) Wider objective **(b)** Wider eyepiece

(c) Shorter objective **(d)** Shorter eyepiece

118. An observer moves towards a stationary plane minor at a peed of 4 ms^{-1}, with what speed will what speed will his image move towards him?

(a) 2 ms^{-1} **(b)** 4 ms^{-1}

(c) 8 ms^{-1} **(d)** Image will stay at rest

119. Which mirror should be used to obtain a parallel beam of light from a small lamp?

(a) Plane mirror **(b)** Convex mirror

(c) Concave mirror **(d)** Any one of the above

120. An object of 2 cm tall is placed 15 cm from concave mirror of focal length 10 cm. How far is the image from the mirror?

(a) 10 cm **(b)** –20 cm

(c) –30 cm **(d)** –40 cm

121. Which one of the following phenomena cannot be explained by the wave theory of light?

(a) Refraction **(b)** Total internal reflection

(c) Diffraction **(d)** Photoelectric effect

122. What will be the colour of the sky as seem from the earth if there were no atmosphere?

(a) Black **(b)** Blue

(c) Orange **(d)** Red

123. In vacuum light travels at a speed of 3×10^8 ms^{-1}, what is the speed of light in glass of refractive index 1.5?

(a) 1.5×10^8 ms^{-1} **(b)** 2×10^8 ms^{-1}

(c) 3×10^8 ms^{-1} **(d)** 4.5×10^8 ms^{-1}

124. An object is placed between two parallel mirrors. The number of image formed is:

(a) 2 **(b)** 4

(c) 8 **(d)** Infinite

ANSWERS

1.	(a)	**2.**	(b)	**3.**	(a)	**4.**	(d)
5.	(a)	**6.**	(b)	**7.**	(a)	**8.**	(b)
9.	(b)	**10.**	(a)	**11.**	(a)	**12.**	(b)
13.	(c)	**14.**	(d)	**15.**	(a)	**16.**	(a)
17.	(c)	**18.**	(a)	**19.**	(b)	**20.**	(a)
21.	(a)	**22.**	(a)	**23.**	(a)	**24.**	(b)
25.	(a)	**26.**	(b)	**27.**	(a)	**28.**	(b)
29.	(c)	**30.**	(b)	**31.**	(a)	**32.**	(c)
33.	(a)	**34.**	(a)	**35.**	(b)	**36.**	(b)
37.	(b)	**38.**	(a)	**39.**	(c)	**40.**	(b)
41.	(c)	**42.**	(a)	**43.**	(b)	**44.**	(d)
45.	(c)	**46.**	(a)	**47.**	(a)	**48.**	(a)
49.	(b)	**50.**	(d)	**51.**	(d)	**52.**	(c)
53.	(c)	**54.**	(d)	**55.**	(b)	**56.**	(a)
57.	(a)	**58.**	(b)	**59.**	(b)	**60.**	(a)
61.	(c)	**62.**	(d)	**63.**	(b)	**64.**	(d)
65.	(c)	**66.**	(d)	**67.**	(a)	**68.**	(b)
69.	(a)	**70.**	(a)	**71.**	(b)	**72.**	(a)
73.	(a)	**74.**	(c)	**75.**	(c)	**76.**	(b)
77.	(a)	**78.**	(d)	**79.**	(a)	**80.**	(b)
81.	(d)	**82.**	(a)	**83.**	(a)	**84.**	(c)
85.	(d)	**86.**	(c)	**87.**	(d)	**88.**	(a)
89.	(b)	**90.**	(c)	**91.**	(d)	**92.**	(d)
93.	(c)	**94.**	(b)	**95.**	(a)	**96.**	(c)
97.	(b)	**98.**	(a)	**99.**	(c)	**100.**	(a)
101.	(b)	**102.**	(a)	**103.**	(a)	**104.**	(c)
105.	(a)	**106.**	(c)	**107.**	(d)	**108.**	(d)
109.	(d)	**110.**	(a)	**111.**	(d)	**112.**	(a)
113.	(c)	**114.**	(b)	**115.**	(c)	**116.**	(b)
117.	(a)	**118.**	(c)	**119.**	(c)	**120.**	(c)
121.	(d)	**122.**	(a)	**123.**	(b)	**124.**	(d)