EXERCISE-I

Plane Mirror

1. When a plane mirror is placed horizontally on a level ground at a distance of 60m from the foot of a tower, the top of the tower and its image in the mirror subtend an angle of 90° at the eye. The height of the tower will be

(A) 30m (B) 60m
(C) 90m (D) 120m

2. A ray of light incidents on a plane mirror at an angle of 30°. The deviation produced in the ray is

(A) 30° (B) 60°
(C) 90° (D) 120°

3. A ray of light is incidenting normally on a plane mirror. The angle of reflection will be

(A) 0°
(B) 90°
(C) Will not be reflected
(D) None of the above

4. When light wave suffers reflection at the interface from air to glass, the change in phase of the reflected wave is equal to

(A) 0 (B) $\frac{\pi}{2}$
(C) π (D) 2π

5. A ray is reflected in turn by three plain mirrors mutually at right angles to each other. The angle between the incident and the reflected rays is

(A) 90° (B) 60°
(C) 180° (D) None of these

6. Two plane mirrors are at right angles to each other. A man stands between them and combs his hair with his right hand. In how many of the images will he be seen using his right hand

(A) None (B) 1
(C) 2 (D) 3

7. When a plane mirror is rotated through an angle θ then the reflected ray turns through the angle 2θ then the size of the image

(A) Is doubled (B) Is halved
(C) Remains the same (D) Becomes infinite

8. A plane mirror produces a magnification of

(A) −1
(B) +1
(C) Zero
(D) Between 0 and $+\infty$

9. A plane mirror makes an angle of 30° with horizontal. If a vertical ray strikes the mirror, find the angle between mirror and reflected ray

(A) 30° (B) 45°
(C) 60° (D) 90°

10. A watch shows time as 3:25 when seen through a mirror, time appeared will be

(A) 8:35 (B) 9:35
(C) 7:35 (D) 8:25

Spherical Mirror

11. Which one of the following statements is true

(A) An object situated at the principle focus of a concave lens will have its image formed at infinity
(B) Concave mirror can give diminished virtual image
(C) Given a point source of light, a convex mirror can produce a parallel beam of light
(D) The virtual image formed in a plane mirror can be photographed

12. The relation between the linear magnification m, the object distance u and the focal length f is

(A) $m = \frac{f-u}{f}$ (B) $m = \frac{f}{f-u}$
(C) $m = \frac{f+u}{f}$ (D) $m = \frac{f}{f+u}$

13. While using an electric bulb, the reflection for street lighting should be from

(A) Concave mirror (B) Convex mirror
(C) Cylindrical mirror (D) Parabolic mirror

14. A concave mirror is used to focus the image of a flower on a nearby well 120cm from the flower. If a lateral magnification of 16 is desired, the distance of the flower from the mirror should be

(A) 8cm (B) 12cm
(C) 80cm (D) 120cm

15. A virtual image larger than the object can be obtained by

(A) Concave mirror (B) Convex mirror
(C) Plane mirror (D) Concave lens

16. An object is placed 40cm from a concave mirror of focal length 20cm. The image formed is

(A) Real, inverted and same in size
(B) Real, inverted and smaller
(C) Virtual, erect and larger
(D) Virtual, erect and smaller

17. A virtual image three times the size of the object is obtained with a concave mirror of radius of curvature 36cm. The distance of the object from the mirror is

(A) 5cm (B) 12cm
(C) 10cm (D) 20cm

18. Radius of curvature of concave mirror is 40cm and the size of image is twice as that of object, then the object distance is

(A) 60cm (B) 20cm
(C) 40cm (D) 30cm

19. All of the following statements are correct except

(A) The magnification produced by a convex mirror is always less than one
(B) A virtual, erect, same-sized image can be obtained using a plane mirror
(C) A virtual, erect, magnified image can be formed using a concave mirror
(D) A real, inverted, same-sized image can be formed using a convex mirror

20. If an object is placed 10cm in front of a concave mirror of focal length 20cm, the image will be

(A) Diminished, upright, virtual
(B) Enlarged, upright, virtual
(C) Diminished, inverted, real
(D) Enlarged, upright, real

Refraction of Light at Plane Surfaces

21. Immiscible transparent liquids A, B, C, D and E are placed in a rectangular container of glass with the liquids making layers according to their densities. The refractive index of the liquids are shown in the adjoining diagram. The container is illuminated from the side and a small piece of glass having refractive index 1.61 is gently dropped into the liquid layer. The glass piece as it descends downwards will not be visible in

A	1.51
B	1.53
C	1.61
D	1.52
E	1.65

(A) Liquid *A* and *B* only
(B) Liquid *C* only
(C) Liquid *D* and *E* only
(D) Liquid *A*, *B*, *D* and *E*

22. The refractive indices of glass and water w.r.t. air are 3/2 and 4/3 respectively. The refractive index of glass *w.r.t.* water will be

(A) 8/9 (B) 9/8
(C) 7/6 (D) None of these

23. If $_{i}\mu_{j}$ represents refractive index when a light ray goes from medium *i* to medium *j*, then the product $_{2}\mu_{1} \times {}_{3}\mu_{2} \times {}_{4}\mu_{3}$ is equal to

(A) $_{3}\mu_{1}$ (B) $_{3}\mu_{2}$
(C) $\frac{1}{_{1}\mu_{4}}$ (D) $_{4}\mu_{2}$

24. The wavelength of light diminishes μ times ($\mu = 1.33$ for water) in a medium. A diver from inside water looks at an object whose natural colour is green. He sees the object as

(A) Green (B) Blue
(C) Yellow (D) Red

25. Ray optics fails when

(A) The size of the obstacle is 5 *cm*
(B) The size of the obstacle is 3 *cm*
(C) The size of the obstacle is less than the wavelength of light
(D) (A) and (B) both

26. On heating a liquid, the refractive index generally

(A) Decreases
(B) Increases or decreases depending on the rate of heating
(C) Does not change
(D) Increases

27. If $\hat{i}$ denotes a unit vector along incident light ray, $\hat{r}$ a unit vector along refracted ray into a medium of refractive index μ and $\hat{n}$ unit vector normal to boundary of medium directed towards incident medium, then law of refraction is

(A) $\hat{i}.\hat{n} = \mu(\hat{r}.\hat{n})$ (B) $\hat{i} \times \hat{n} = \mu(\hat{n} \times \hat{r})$

(C) $\hat{i} \times \hat{n} = \mu(\hat{r} \times \hat{n})$ (D) $\mu(\hat{i} \times \hat{n}) = \hat{r} \times \hat{n}$

28. The bottom of a container filled with liquid appear slightly raised because of

(A) Refraction (B) Interference

(C) Diffraction (D) Reflection

29. The speed of light in air is 3×10^8 m / s. What will be its speed in diamond whose refractive index is 2.4

(A) 3×10^8 m / s (B) 332 m / s

(C) 1.25×10^8 *m/s* (D) 7.2×10^8 m / s

30. Time taken by the sunlight to pass through a window of thickness 4 mm whose refractive index is 1.5 is

(A) 2×10^{-8} *sec* (B) 2×10^{8} *sec*

(C) 2×10^{-11} *sec* (D) 2×10^{11} *sec*

31. Ray optics is valid, when characteristic dimensions are

(A) Of the same order as the wavelength of light

(B) Much smaller than the wavelength of light

(C) Of the order of one millimetre

(D) Much larger than the wavelength of light

32. The refractive index of water is 1.33. What will be the speed of light in water

(A) 3×10^8 m / s (B) 2.25×10^8 m / s

(C) 4×10^8 m / s (D) 1.33×10^8 *m/s*

33. The time required to pass the light through a glass slab of 2 *mm* thick is ($\mu_{glass} = 1.5$)

(A) 10^{-5} s (B) 10^{-11} s

(C) 10^{-9} *s* (D) 10^{-13} s

34. The refractive index of water with respect to air is 4 / 3 and the refractive index of glass with respect to air is 3/2. The refractive index of water with respect to glass is

(A) $\frac{9}{8}$ (B) $\frac{8}{9}$

(C) $\frac{1}{2}$ (D) 2

35. Electromagnetic radiation of frequency *n*, wavelength λ, travelling with velocity *v* in air, enters a glass slab of refractive index μ. The frequency, wavelength and velocity of light in the glass slab will be respectively

(A) $\frac{n}{\mu}, \frac{\lambda}{\mu}, \frac{v}{\mu}$ (B) $n, \frac{\lambda}{\mu}, \frac{v}{\mu}$

(C) $n, \lambda, \frac{v}{\mu}$ (D) $\frac{n}{\mu}, \frac{\lambda}{\mu}, v$

Total Internal Reflection

36. Total internal reflection of a ray of light is possible when the (i_c = critical angle, i = angle of incidence)

(A) Ray goes from denser medium to rarer medium and $i < i_c$

(B) Ray goes from denser medium to rarer medium and $i > i_c$

(C) Ray goes from rarer medium to denser medium and $i > i_c$

(D) Ray goes from rarer medium to denser medium and $i < i_c$

37. A diver at a depth of 12*m* in water ($\mu = 4/3$) sees the sky in a cone of semi-vertical angle

(A) $\sin^{-1}(4/3)$ (B) $\tan^{-1}(4/3)$

(C) $\sin^{-1}(3/4)$ (D) 90°

38. Critical angle is that angle of incidence in the denser medium for which the angle of refraction in rarer medium is

(A) 0° (B) 57°

(C) 90° (D) 180°

39. The critical angle for diamond (refractive index = 2) is

(A) About 20° (B) 60°

(C) 45° (D) 30°

40. The reason for shining of air bubble in water is

(A) Diffraction of light

(B) Dispersion of light

(C) Scattering of light

(D) Total internal reflection of light

41. With respect to air critical angle in a medium for light of red colour $[\lambda_1]$ is θ. Other facts remaining same, critical angle for light of yellow colour $[\lambda_2]$ will be

(A) θ (B) More than θ

(C) Less than θ (D) $\frac{\theta\lambda_1}{\lambda_2}$

42. 'Mirage' is a phenomenon due to

(A) Reflection of light

(B) Refraction of light

(C) Total internal reflection of light

(D) Diffraction of light

43. When a ray of light emerges from a block of glass, the critical angle is

(A) Equal to the angle of reflection

(B) The angle between the refracted ray and the normal

(C) The angle of incidence for which the refracted ray travels along the glass-air boundary

(D) The angle of incidence

44. The phenomenon utilised in an optical fibre is

(A) Refraction

(B) Interference

(C) Polarization

(D) Total internal reflection

45. The refractive index of water is 4 / 3 and that of glass is 5/3. What will be the critical angle for the ray of light entering water from the glass

(A) $\sin^{-1}\frac{4}{5}$ (B) $\sin^{-1}\frac{5}{4}$

(C) $\sin^{-1}\frac{1}{2}$ (D) $\sin^{-1}\frac{2}{1}$

46. If critical angle for a material to air is 30^o, the refractive index of the material will be

(A) 1.0 (B) 1.5

(C) 2.0 (D) 2.5

47. The refractive index of water is 1.33. The direction in which a man under water should look to see the setting sun is

(A) 49^o to the horizontal

(B) 90^o with the vertical

(C) 49^o to the vertical

(D) Along the horizontal

48. Optical fibres are related with

(A) Communication (B) Light

(C) Computer (D) None of these

49. Brilliance of diamond is due to

(A) Shape

(B) Cutting

(C) Reflection

(D) Total internal reflection

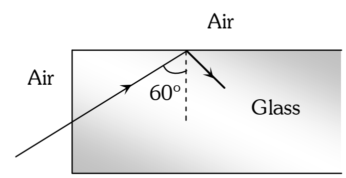
50. A light ray from air is incident (as shown in figure) at one end of a glass fiber (refractive index μ = 1.5) making an incidence angle of 60^o on the lateral surface, so that it undergoes a total internal reflection. How much time would it take to traverse the straight fiber of length 1 *km*

(A) 3.33 μsec

(B) 6.67 μsec

(C) 5.77 μsec

(D) 3.85 μsec



Refraction at Curved Surface

51. A biconvex lens forms a real image of an object placed perpendicular to its principal axis. Suppose the radii of curvature of the lens tend to infinity. Then the image would

(A) Disappear

(B) Remain as real image still

(C) Be virtual and of the same size as the object

(D) Suffer from aberrations

52. The radius of curvature of convex surface of a thin plano-convex lens is 15 *cm* and refractive index of its material is 1.6. The power of the lens will be

(A) $+1D$ (B) $-2D$

(C) $+3D$ (D) $+4D$

53. Focal length of a convex lens will be maximum for
(A) Blue light (B) Yellow light
(C) Green light (D) Red light

54. A lens is 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) $\frac{A_1 + A_2}{2}$ (B) $\left[\frac{1}{A_1} + \frac{1}{A_2}\right]^{-1}$
(C) $\sqrt{A_1 A_2}$ (D) $\left[\frac{\sqrt{A_1} + \sqrt{A_2}}{2}\right]^2$

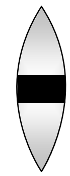
55. Two lenses of power $6D$ and $-2D$ are combined to form a single lens. The focal length of this lens will be
(A) $\frac{3}{2}$ *m* (B) $\frac{1}{4}$ m
(C) 4 *m* (D) $\frac{1}{8}$ m

56. A combination of two thin lenses with focal lengths f_1 and f_2 respectively forms an image of distant object at distance 60 *cm* when lenses are in contact. The position of this image shifts by 30 *cm* towards the combination when two lenses are separated by 10 *cm*. The corresponding values of f_1 and f_2 are
(A) 30 cm, −60 cm (B) 20 cm, −30 cm
(C) 15 cm, −20 cm (D) 12 cm, −15 cm

57. An achromatic combination of lenses is formed by joining
(A) 2 convex lenses
(B) 2 concave lenses
(C) 1 convex lens and 1 concave lens
(D) Convex lens and plane mirror

58. A plano convex lens $(f = 20\text{cm})$ is silvered at plane surface. Now *f* will be
(A) 20 *cm* (B) 40 *cm*
(C) 30 cm (D) 10 *cm*

59. If the central portion of a convex lens is wrapped in black paper as shown in the figure



(A) No image will be formed by the remaining portion of the lens
(B) The full image will be formed but it will be less bright
(C) The central portion of the image will be missing
(D) There will be two images each produced y one of the exposed portions of the lens

60. A diminished image of an object is to be obtained on a screen 1.0 *m* from it. This can be achieved by appropriately placing
(A) A convex mirror of suitable focal length
(B) A concave mirror of suitable focal length
(C) A concave lens of suitable focal length
(D) A convex lens of suitable focal length less than 0.25 *m*

61. If a convex lens of focal length 80 *cm* and a concave lens of focal length 50 *cm* are combined together, what will be their resulting power
(A) + 6.5*D* (B) – 6.5 *D*
(C) + 7.5 *D* (D) – 0.75 *D*

62. f_v and f_r are the focal lengths of a convex lens for violet and red light respectively and F_v and F_r are the focal lengths of a concave lens for violet and red light respectively, then
(A) $f_v < f_r$ and $F_v > F_r$
(B) $f_v < f_R$ and $F_v < F_r$
(C) $f_c > f_r$ and $F_v > F_r$
(D) $f_v > f_r$ and $F_v < F_r$

63. If a lens is cut into two pieces perpendicular to the principal axis and only one part is used, the intensity of the image
(A) Remains same (B) $\frac{1}{2}$ times
(C) 2 times (D) Infinite

64. A convex lens of focal length f produces an image $\frac{1}{n}$ times than that of the size of the object. The distance of the object from the lens is

(A) nf (B) $\frac{f}{n}$

(C) $(n+1)f$ (D) $(n-1)f$

65. Two thin lenses whose powers are +2*D* and – 4*D* respectively combine, then the power of combination is

(A) – 2*D* (B) + 2*D*

(C) – 4*D* (D) + 4*D*

66. A substance is behaving as convex lens in air and concave in water, then its refractive index is

(A) Smaller than air

(B) Greater than both air and water

(C) Greater than air but less than water

(D) Almost equal to water

67. A concave lens of focal length 20 *cm* placed in contact with a plane mirror acts as a

(A) Convex mirror of focal length 10 *cm*

(B) Concave mirror of focal length 40 *cm*

(C) Concave mirror of focal length 60 *cm*

(D) Concave mirror of focal length 10 *cm*

68. A convex lens is used to form real image of an object on a screen. It is observed that even when the positions of the object and that screen are fixed there are two positions of the lens to form real images. If the heights of the images are 4 *cm* and 9 *cm* respectively, the height of the object is

(A) 2.25 *cm* (b) 6.00 *cm*

(C) 6.50 *cm* (D) 36.00 *cm*

69. A convex lens of power + 6*D* is placed in contact with a concave lens of power – 4*D*. What is the nature and focal length of the combination

(A) Concave, 25 *cm* (B) Convex, 50 *cm*

(C) Concave, 20 *cm* (D) Convex, 100 *cm*

70. A double convex lens of glass of $\mu = 1.5$ has radius of curvature of each of its surface is 0.2 *m*. The power of the lens is

(A) + 10 *dioptres* (B) – 10 *dioptres*

(C) – 5 *dioptres* (D) +5 *dioptres*

71. A magnifying glass is to be used at the fixed object distance of 1 *inch*. If it is to produce an erect image magnified 5 *times* its focal length should be

(A) 0.2 *inch* (B) 0.8 *inch*

(C) 1.25 *inch* (D) 5 *inch*

72. A film projector magnifies a 100 cm^2 film strip on a screen. If the linear magnification is 4, the area of magnified film on the screen is

(A) 1600 cm^2 (B) 400 cm^2

(C) 800 cm^2 (D) 200 cm^2

73. An object placed 10 *cm* in front of a lens has an image 20 *cm* behind the lens. What is the power of the lens (in *dioptres*)

(A) 1.5 (B) 3.0

(C) – 15.0 (D) + 15.0

74. A beam of parallel rays is brought to a focus by a plano-convex lens. A thin concave lens of the same focal length is joined to the first lens. The effect of this is

(A) The focal point shifts away from the lens by a small distance

(B) The focus remains undisturbed

(C) The focus shifts to infinity

(D) The focal point shifts towards the lens by a small distance

75. A thin plano-convex lens acts like a concave mirror of focal length 0.2 *m* when silvered from its plane surface. The refractive index of the material of the lens is 1.5. The radius of curvature of the convex surface of the lens will be

(A) 0.4 *m* (b) 0.2 *m*

(C) 0.1 *m* (D) 0.75 *m*

Prism Theory & Dispersion of Light

76. Deviation of 5° is observed from a prism whose angle is small and whose refractive index is 1.5. The angle of prism is

(A) 7.5° (B) 10°

(C) 5° (D) 3.3°

77. The refractive indices of violet and red light are 1.54 and 1.52 respectively. If the angle of prism is 10°, then the angular dispersion is

(A) 0.02 (B) 0.2
(C) 3.06 (D) 30.6

78. The angle of minimum deviation measured with a prism is 30° and the angle of prism is 60°. The refractive index of prism material is

(A) $\sqrt{2}$ (B) 2
(C) 3/2 (D) 4/3

79. If the refractive indices of a prism for red, yellow and violet colours be 1.61, 1.63 and 1.65 respectively, then the dispersive power of the prism will be

(A) $\frac{1.65-1.62}{1.61-1}$ (B) $\frac{1.62-1.61}{1.65-1}$
(C) $\frac{1.65-1.61}{1.63-1}$ (D) $\frac{1.65-1.63}{1.61-1}$

80. The minimum deviation produced by a hollow prism filled with a certain liquid is found to be 30°. The light ray is also found to be refracted at angle of 30°. The refractive index of the liquid is

(A) $\sqrt{2}$ (B) $\sqrt{3}$
(C) $\sqrt{\frac{3}{2}}$ (D) $\frac{3}{2}$

81. Minimum deviation is observed with a prism having angle of prism A, angle of deviation δ, angle of incidence i and angle of emergence e. We then have generally

(A) $i > e$ (B) $i < e$
(C) $i = e$ (D) $i = e = \delta$

82. A thin prism P_1 with angle 4° and made from glass of refractive index 1.54 is combined with another thin prism P_2 made from glass of refractive index 1.72 to produce dispersion without deviation. The angle of prism P_2 is

(A) 2.6° (B) 3°
(C) 4° (D) 5.33°

83. An achromatic prism is made by combining two prisms $P_1(\mu_v = 1.523, \mu_r = 1.515)$ and $P_2(\mu_v = 1.666, \mu_r = 1.650)$; where μ represents the refractive index. If the angle of the prism P_1 is 10°, then the angle of the prism P_2 will be

(A) 5° (B) 7.8°
(C) 10.6° (D) 20°

84. Angle of a prism is 30° and its refractive index is $\sqrt{2}$ and one of the surface is silvered. At what angle of incidence, a ray should be incident on one surface so that after reflection from the silvered surface, it retraces its path

(A) 30° (B) 60°
(C) 45° (D) $\sin^{-1}\sqrt{1.5}$

85. For a material, the refractive indices for red, violet and yellow colour light are respectively 1.52, 1.64 and 1.60. The dispersive power of the material is

(A) 2 (B) 0.45
(C) 0.2 (D) 0.045

86. When seen in green light, the saffron and green portions of our National Flag will appear to be

(A) Black
(B) Black and green respectively
(C) Green
(D) Green and yellow respectively

87. At sun rise or sunset, the sun looks more red than at mid-day because

(A) The sun is hottest at these times
(B) Of the scattering of light
(C) Of the effects of refraction
(D) Of the effects of diffraction

88. Line spectrum contains information about

(A) The atoms of the prism
(B) The atoms of the source
(C) The molecules of the source
(D) The atoms as well as molecules of the source

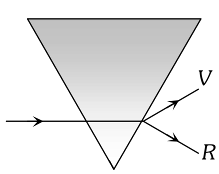
89. Missing lines in a continuous spectrum reveal
(A) Defects of the observing instrument
(B) Absence of some elements in the light source
(C) Presence in the light source of hot vapours of some elements
(D) Presence of cool vapours of some elements around the light source

90. A source emits light of wavelength 4700Å, 5400 Å and 6500 Å. The light passes through red glass before being tested by a spectrometer. Which wavelength is seen in the spectrum
(A) 6500 Å (B) 5400 Å
(C) 4700 Å (D) All the above

91. A ray passes through a prism of angle 60° in minimum deviation position and suffers a deviation of 30°. What is the angle of incidence on the prism
(A) 30° (B) 45°
(C) 60° (D) 90°

92. When light of wavelength λ is incident on an equilateral prism kept in its minimum deviation position, it is found that the angle of deviation equals the angle of the prism itself. The refractive index of the material of the prism for the wavelength λ is, then
(A) $\sqrt{3}$ (B) $\frac{\sqrt{3}}{2}$
(C) 2 (D) $\sqrt{2}$

93. Which of the following diagrams, shows correctly the dispersion of white light by a prism

(A)


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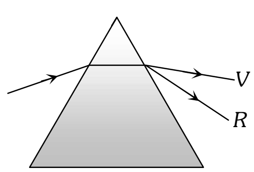
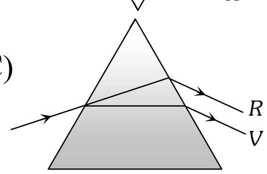
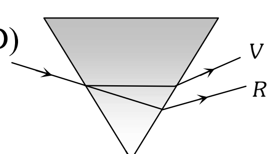


(C)


(D)


94. A neon sign does not produce
(A) Line spectrum
(B) An emission spectrum
(C) An absorption spectrum
(D) Phoons

95. The refractive index of flint glass for blue F line is 1.6333 and red C line is 1.6161. If the refractive index for yellow D line is 1.622, the dispersive power of the glass is
(A) 0.0276 (B) 0.276
(C) 2.76 (D) 0.106

Human Eye and Lens Camera

96. An imaginary line joining the optical centre of the eye lens and the yellow point is called as
(A) Principal axis (B) Vision axis
(C) Neutral axis (D) Optical axis

97. The light when enters the human eye experiences most of the refraction while passing through
(A) Cornea (B) Aqueous humour
(C) Vitrous humour (D) Crystalline lens

98. The impact of an image on the retina remains for
(A) 0.1 *sec* (B) 0.5 *sec*
(C) 10 *sec* (D) 15 *sec*

99. A person is suffering from myopic defect. He is able to see clear objects placed at 15 *cm*. What type and of what focal length of lens he should use to see clearly the object placed 60 *cm* away
(A) Concave lens of 20 *cm* focal length
(B) Convex lens of 20 *cm* focal length
(C) Concave lens of 12 *cm* focal length
(D) Convex lens of 12 *cm* focal length

100. The sensation of vision in the retina is carried to the brain by
(A) Ciliary muscles (B) Blind spot
(C) Cylindrical lens (D) Optic nerve

101. When the power of eye lens increases, the defect of vision is produced. The defect is known as
(A) Shortsightedness (B) Longsightedness
(C) Colourblindness (D) None of the above

102. A man is suffering from colour blindness for green colour. To remove this defect, he should use goggles of
(A) Green colour glasses
(B) Red colour glasses
(C) Smoky colour glasses
(D) None of the above

103. In human eye the focussing is done by
(A) To and fro movement of eye lens
(B) To and fro movement of the retina
(C) Change in the convexity of the lens surface
(D) Change in the refractive index of the eye fluids

104. A short sighted person can see distinctly only those objects which lie between 10 *cm* and 100 *cm* from him. The power of the spectacle lens required to see a distant object is
(A) + 0.5 *D* (B) – 1.0 *D*
(C) – 10 *D* (D) + 4.0 *D*

105. A person can see clearly only upto a distance of 25 *cm*. He wants to read a book placed at a distance of 50 *cm*. What kind of lens does he require for his spectacles and what must be its power
(A) Concave, – 1.0 *D* (B) Convex, + 1.5 *D*
(C) Concave, – 2.0 *D* (D) Convex, + 2.0 *D*

106. The hyper-metropia is a
(A) Short-side defect
(B) Long- side defect
(C) Bad vision due to old age
(D) None of these

107. Amount of light entering into the camera depends upon
(A) Focal length of the objective lens
(B) Product of focal length and diameter of the objective lens
(C) Distance of the object from camera
(D) Aperture setting of the camera

108. A man cannot see clearly the objects beyond a distance of 20 *cm* from his eyes. To see distant objects clearly he must use which kind of lenses and of what focal length
(A) 100 *cm* convex (B) 100 *cm* concave
(C) 20 *cm* convex (D) 20 *cm* concave

109. A person uses spectacles of power +2*D*. He is suffering from
(A) Short sightedness or myopia
(B) Long sightedness or hypermetropia
(C) Presbyopia
(D) Astigmatism

110. To remove myopia (short sightedness) a lens of power 0.66 *D* is required. The distant point of the eye is approximately
(A) 100 *cm* (B) 150 *cm*
(C) 50 *cm* (D) 25 *cm*

Microscope and Telescope

111. In a compound microscope cross-wires are fixed at the point
(A) Where the image is formed by the objective
(B) Where the image is formed by the eye-piece
(C) Where the focal point of the objective lies
(D) Where the focal point of the eye-piece lies

112. In a compound microscope, the focal lengths of two lenses are 1.5 *cm* and 6.25 *cm* an object is placed at 2 *cm* form objective and the final image is formed at 25 *cm* from eye lens. The distance between the two lenses is
(A) 6.00 *cm* (B) 7.75 *cm*
(C) 9.25 *cm* (D) 11.00 *cm*

113. The length of the tube of a microscope is 10 *cm*. The focal lengths of the objective and eye lenses are 0.5 *cm* and 1.0 *cm*. The magnifying power of the microscope is about
(A) 5 (B) 23
(C) 166 (D) 500

114. In a compound microscope, the intermediate image is
(A) Virtual, erect and magnified
(B) Real, erect and magnified
(C) Real, inverted and magnified
(D) Virtual, erect and reduced

115. The magnifying power of a compound microscope increases when
(A) The focal length of objective lens is increased and that of eye lens is decreased
(B) The focal length of eye lens is increased and that of objective lens is decreased
(C) Focal lengths of both objective and eye-piece are increased
(D) Focal lengths of both objective and eye-piece are decreased

116. If the red light is replaced by blue light illuminating the object in a microscope the resolving power of the microscope
(A) Decreases
(B) Increases
(C) Gets halved
(D) Remains unchanged

117. The magnifying power of a simple microscope is 6. The focal length of its lens in *metres* will be, if least distance of distinct vision is 25 cm
(A) 0.05 (B) 0.06
(C) 0.25 (D) 0.12

118. 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 4800Å is used this limit of resolution becomes
(A) 0.08 *mm* (B) 0.10 *mm*
(C) 0.12 *mm* (D) 0.06 *mm*

119. A compound microscope has two lenses. The magnifying power of one is 5 and the combined magnifying power is 100. The magnifying power of the other lens is
(A) 10 (B) 20
(C) 50 (D) 25

120. The angular magnification of a simple microscope can be increased by increasing
(A) Focal length of lens (B) Size of object
(C) Aperture of lens (D) Power of lens

121. A terrestrial telescope is made by introducing an erecting lens of focal length f between the objective and eye piece lenses of an astronomical telescope. This causes the length of the telescope tube to increase by an amount equal to
(A) f (B) $2f$
(C) $3f$ (D) $4f$

122. The length of an astronomical telescope for normal vision (relaxed eye) (f_o = focal length of objective lens and f_e = focal length of eye lens) is
(A) $f_o \times f_e$ (B) $\frac{f_o}{f_e}$
(C) $f_o + f_e$ (D) $f_o - f_e$

123. A Gallilean telescope has objective and eye-piece of focal lengths 200 *cm* and 2 *cm* respectively. The magnifying power of the telescope for normal vision is
(A) 90 (B) 100
(C) 108 (D) 198

124. In an astronomical telescope, the focal length of the objective lens is 100 *cm* and of eye-piece is 2 *cm*. The magnifying power of the telescope for the normal eye is
(A) 50 (B) 10
(C) 100 (D) $\frac{1}{50}$

125. When diameter of the aperture of the objective of an astronomical telescope is increased, its
(A) Magnifying power is increased and resolving power is decreased
(B) Magnifying power and resolving power both are increased
(C) Magnifying power remains the same but resolving power is increased
(D) Magnifying power and resolving power both are decreased

126. A telescope has an objective lens of focal length 200 *cm* and an eye piece with focal length 2 *cm*. If this telescope is used to see a 50 *meter* tall building at a distance of 2 *km*, what is the height of the image of the building formed by the objective lens
(A) 5 *cm* (B) 10 *cm*
(C) 1 *cm* (D) 2 *cm*

127. Magnification of a compound microscope is 30. Focal length of eye-piece is 5 *cm* and the image is formed at a distance of distinct vision of 25 *cm*. The magnification of the objective lens is
(A) 6 (B) 5
(C) 7.5 (D) 10

128. At Kavalur in India, the astronomers using a telescope whose objective had a diameter of one meter started using a telescope of diameter 2.54 *m*. This resulted in
(A) The increase in the resolving power by 2.54 times for the same λ
(B) The increase in the limiting angle by 2.54 times for the same λ
(C) Decrease in resolving power
(D) No effect on the limiting angle

129. A Galileo telescope has an objective of focal length 100 *cm* and magnifying power 50. The distance between the two lenses in normal adjustment will be

(A) 98 *cm* (B) 100 *cm*
(C) 150 *cm* (D) 200 *cm*

130. A compound microscope has an eye piece of focal length 10 *cm* and an objective of focal length 4 *cm*. Calculate the magnification, if an object is kept at a distance of 5 *cm* from the objective so that final image is formed at the least distance vision (20 *cm*)

(A) 12 (B) 11
(C) 10 (D) 13

Photometry

131. The distance between a point source of light and a screen which is 60 *cm* is increased to 180 *cm*. The intensity on the screen as compared with the original intensity will be

(A) (1 / 9) times (B) (1 / 3) times
(C) 3 times (D) 9 times

132. A source of light emits a continuous stream of light energy which falls on a given area. Luminous intensity is defined as

(A) Luminous energy emitted by the source per second
(B) Luminous flux emitted by source per unit solid angle
(C) Luminous flux falling per unit area of a given surface
(D) Luminous flux coming per unit area of an illuminated surface

133. Venus looks brighter than other stars because

(A) It has higher density than other stars
(B) It is closer to the earth than other stars
(C) It has no atmosphere
(D) Atomic fission takes place on its surface

134. To prepare a print the time taken is 5 sec due to lamp of 60 watt at 0.25 *m* distance. If the distance is increased to 40 *cm* then what is the time taken to prepare the similar print

(A) 3.1 *sec* (B) 1 *sec*
(C) 12.8 *sec* (D) 16 *sec*

135. A lamp is hanging 1 *m* above the centre of a circular table of diameter 1*m*. The ratio of illuminaces at the centre and the edge is

(A) $\frac{1}{2}$ (B) $\left(\frac{5}{4}\right)^{\frac{3}{2}}$
(C) $\frac{4}{3}$ (D) $\frac{4}{5}$

136. Two stars situated at distances of 1 and 10 light years respectively from the earth appear to possess the same brightness. The ratio of their real brightness is

(A) 1 : 10 (B) 10 : 1
(C) 1 : 100 (D) 100 : 1

137. The intensity of direct sunlight on a surface normal to the rays is I_0. What is the intensity of direct sunlight on a surface, whose normal makes an angle of 60^o with the rays of the sun

(A) I_0 (B) $I_0\left(\frac{\sqrt{3}}{2}\right)$
(C) $\frac{I_0}{2}$ (D) $2I_0$

138. Inverse square law for illuminance is valid for

(A) Isotropic point source
(B) Cylindrical source
(C) Search light
(D) All types of sources

139. 1% of light of a source with luminous intensity 50 *candela* is incident on a circular surface of radius 10 *cm*. The average illuminance of surface is

(A) 100 *lux* (B) 200 *lux*
(C) 300 *lux* (D) 400 *lux*

140. Two lamps of luminous intensity of 8 *Cd* and 32 *Cd* respectively are lying at a distance of 1.2 *m* from each other. Where should a screen be placed between two lamps such that its two faces are equally illuminated due to two sources

(A) 10 *cm* from 8 *Cd* lamp
(B) 10 *cm* from 32*Cd* lamp
(C) 40 *cm* from 8 *Cd* lamp
(D) 40 *cm* from 32 *Cd* lamp