

Exercise - I (Conceptual Questions)

Build Up Your Understanding

REFLECTION OF LIGHT AT PLANE SURFACE

1. When a ray of light is incident normally on a plane mirror then the angle of reflection will be
(1) 0° (2) 90° (3) 180° (4) -90°

PRI001

2. A ray is incident at 30° angle on plane mirror. What will be deviation after reflection from mirror.
(1) 120° (2) 60° (3) 30° (4) 45°

PRI002

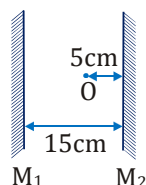
3. Two plane mirrors are lying perpendicular to each other, there is lamp in between mirrors. Then number of images of lamp will be
(1) 3 (2) 4 (3) 5 (4) 6

PRI003

4. A man runs towards stationary plane mirror at a speed of 15 m/s. What is the speed of his image with respect to mirror :-
(1) 7.5 m/s (2) 15 m/s
(3) 30 m/s (4) 45 m/s

PRI004

5. Figure shows two plane mirrors parallel to each other and an object O placed between them. Then the distance of the first three images from the mirror M_2 will be :(in cm)



- (1) 5, 10, 15 (2) 5, 15, 30
(3) 5, 25, 35 (4) 5, 15, 25

PRI005

6. A ray gets successively reflection from two mirrors inclined at an angle of 40° . If the angle of incidence on the first mirror is 30° then the net deviation of this ray after two reflections.
(1) 40° (2) 280° (3) 90° (4) 240°

PRI006

7. A tall man of height 6 feet, want to see his full image. Then required minimum length of the mirror will be :-
(1) 12 feet (2) 3 feet
(3) 6 feet (4) Any length

PRI007

8. A man is 180 cm tall and his eyes are 10 cm below the top of his head. In order to see his entire height right from toe to head, he uses a plane mirror kept at a distance of 1 m from him. The minimum length of the plane mirror required is
(1) 180 cm (2) 90 cm
(3) 85 cm (4) 170 cm

PRI008

9. Two plane mirrors are at 45° to each other. If an object is placed between them then the number of images will be
(1) 5 (2) 9 (3) 7 (4) 8

PRI009

REFLECTION AT SPHERICAL SURFACE

10. The focal length of a concave mirror is 50 cm. where an object be placed so that its image is two times magnified, real and inverted -
(1) 75 cm (2) 72 cm
(3) 63 cm (4) 50 cm

PRI010

11. An object of height 7.5 cm is placed in front of a convex mirror of radius of curvature 25 cm at a distance of 40 cm. The height of the image should be -
(1) 2.3 cm (2) 1.78 cm
(3) 1 cm (4) 0.8 cm

PRI011

12. A square of side 3 cm is placed at a distance of 25 cm from a concave mirror of focal length 10 cm. The centre of the square is at the axis of the mirror and the plane is normal to the axis. The area enclosed by the image of the wire is -
(1) 4 cm^2 (2) 6 cm^2
(3) 16 cm^2 (4) 36 cm^2

PRI012

13. The focal length of a concave mirror is 12 cm. Where should an object of height 4 cm be placed, so that a real image of 1 cm height is formed ?
(1) 48 cm (2) 3 cm
(3) 60 cm (4) 15 cm

PRI013

14. An object is lying at a distance of 90 cm from a concave mirror of focal length 30 cm. The position and nature of image formed by it will be
 (1) 45 cm, of the size of object
 (2) 90 cm, smaller than object
 (3) 30 cm, bigger than object
 (4) – 45 cm smaller than object

PRI014

15. An object of height 1.5 cm is situated at a distance of 15 cm from a concave mirror. The concave mirror forms its real image of height 3.0 cm. The focal length of concave mirror will be
 (1) – 10 cm (2) – 20 cm
 (3) 20 cm (4) 30 cm

PRI015

16. A boy stands straight in front of a mirror at a distance of 30 cm away from it. He sees his erect image whose height is $\frac{1}{5}$ th of his real height. The mirror he is using is -
 (1) Plane mirror (2) Convex mirror
 (3) Concave mirror (4) None

PRI016

17. A point object is moving on the principal axis of a concave mirror of focal length 24 cm towards the mirror. When it is at a distance of 60 cm from the mirror, its velocity is 9 cm/sec. What is the velocity of the image at that instant -
 (1) 5 cm/sec. (2) 12 cm/sec
 (3) 4 cm/sec (4) 9 cm/sec

PRI017

18. A concave mirror gives an image three times as large as the object placed at a distance of 20 cm from it. For the image to be real, the focal length should be -
 (1) –10 cm (2) –15 cm
 (3) –20 cm (4) –30 cm

PRI018

19. The minimum distance between the object and its real image for concave mirror is
 (1) f (2) $2f$ (3) $4f$ (4) Zero

PRI019

20. A convex mirror has a radius of curvature of 22 cm. If an object is placed 14 cm away from the mirror then its image is formed at-
 (1) 6.2 cm on the front side of the mirror
 (2) 6.2 cm on the back side of the mirror.
 (3) 51.3 cm on the front of the mirror.
 (4) 51.3 cm on the back side of the mirror.

PRI020

21. The focal length of a spherical mirror is :-
 (1) Maximum for red light
 (2) Maximum for blue light
 (3) Maximum for white light
 (4) Same for all lights

PRI021

22. A point object is placed at a distance of 10 cm and its real image is formed at a distance of 20 cm from a concave mirror. If the object is moved by 0.1 cm towards the mirror, the image will shift by about.
 (1) 0.4 cm away from the mirror
 (2) 0.4 cm towards the mirror
 (3) 0.8 cm away from the mirror
 (4) 0.8 cm towards the mirror

PRI022

23. The focal length of a convex mirror is 20 cm its radius of curvature will be
 (1) 10 cm (2) 20 cm
 (3) 30 cm (4) 40 cm

PRI023

24. A diminished virtual image can be formed only in
 (1) Plane mirror (2) A concave mirror
 (3) A convex mirror (4) None

PRI024

**REFRACTION AT PLANE SURFACE :
SNELL'S LAWS TIR**

25. The colour are characterised by which of following character of light-
 (1) Frequency (2) Amplitude
 (3) Wavelength (4) Velocity

PRI025

26. The wavelength of light in two liquids 'x' and 'y' is 3500 Å and 7000 Å, then the critical angle will be

(1) 60° (2) 45° (3) 30° (4) 15°

PRI026

Ray Optics and Optical Instruments

27. A microscope is focused on a mark, then a glass slab of refractive index 1.5 and thickness of 6 cm is placed on the mark to get the mark again in focus, the microscope should be moved

(1) 4 cm (2) 2 cm (3) 6 cm (4) 8 cm

PRI027

28. Velocity of light in glass, whose refractive index w.r.t. air is 1.5, is 2×10^8 m/Sec. In a certain liquid the velocity of light is found to be 2.5×10^8 m/Sec. The refractive index of liquid w.r.t. air is

(1) 0.64 (2) 0.80 (3) 1.20 (4) 1.44

PRI028

29. A point source of light is placed 4 m below the surface of water of refractive index $5/3$. The minimum diameter of a disc which should be placed over the source on the surface of water to cut-off all light coming out of water is.

(1) 2 m (2) 6 m (3) 4 m (4) 3 m

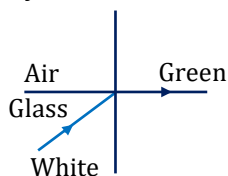
PRI029

30. When a ray of light enters a medium of refractive index μ , it is observed that the angle of refraction is half of the angle of incidence is

(1) $2 \cos^{-1}(\mu/2)$ (2) $\cos^{-1}(\mu/2)$
(3) $2 \cos^{-1}(\mu)$ (4) $2 \sin^{-1}(\mu/2)$

PRI030

31. White light is incident on the interface of glass and air as shown in the figure. If green light is just totally internally reflected then the emerging ray in air contains



- (1) Yellow, orange, red
(2) Violet, indigo, blue
(3) All colours
(4) All colours except green

PRI031

32. A plane glass slab is kept over various coloured letters; the letter which appears least raised is

(1) blue (2) violet (3) green (4) red

PRI032

33. A bubble in glass slab ($\mu = 1.5$) when viewed from one side appears at 5 cm and 2 cm from other side, then thickness of slab is:-

(1) 3.75 cm (2) 3 cm
(3) 10.5 cm. (4) 2.5 cm

PRI033

34. A ray of light travelling in air have wavelength λ , frequency n , velocity V and intensity I . If this ray enters into water than these parameters are λ' , n' , v' and I' respectively. Which relation is correct from following-

(1) $\lambda = \lambda'$ (2) $n = n'$ (3) $v = v'$ (4) $I = I'$

PRI034

35. Light travels through a glass plate of thickness t and having refractive index n . If c is the velocity of light in vacuum. the time taken by the light to travel this thickness of glass is

(1) $\frac{t}{nc}$ (2) tnc (3) $\frac{nt}{c}$ (4) $\frac{tc}{n}$

PRI035

36. A ray of light propagates from glass (refractive index = $3/2$) to water (refractive index = $4/3$). The value of the critical angle

(1) $\sin^{-1}(1/2)$ (2) $\sin^{-1}\left(\frac{\sqrt{8}}{9}\right)$
(3) $\sin^{-1}(8/9)$ (4) $\sin^{-1}(5/7)$

PRI036

37. Relation between critical angles of water and glass is

(1) $C_w > C_g$ (2) $C_w < C_g$
(3) $C_w = C_g$ (4) $C_w = C_g = 0$

PRI037

38. Critical angle of light passing from glass to air is minimum for

(1) Red (2) Green
(3) Yellow (4) Violet

PRI038

39. Which of the following is used in optical fibres
 (1) T.I.R.
 (2) Scattering
 (3) Diffraction
 (4) Refraction

PRI039

40. Brilliance of diamond is due to
 (1) Shape (2) Cutting
 (3) Reflection (4) T.I.R.

PRI040

41. 'Mirage' is a phenomenon due to
 (1) Reflection of light
 (2) Refraction of light
 (3) T.I.R. of light
 (4) Diffraction of light

PRI041

42. An object is immersed in a fluid. In order that the object becomes invisible, it should.
 (1) Behave as a perfect reflector
 (2) Absorb all light falling on it
 (3) Have refractive index one
 (4) Have refractive index exactly matching with that of the surrounding fluid

PRI042

PRISM

43. The angle of a glass prism is 4.5° and its refractive index is 1.52. The angle of minimum deviation will be –
 (1) 1.5° (2) 2.3°
 (3) 4.5° (4) 2°

PRI043

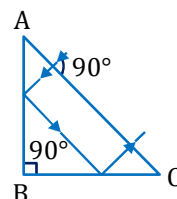
44. A ray of light passes through equilateral Prism ($\mu = 1.5$) such that angle of incidence is equal to angle of emergence and the later is equal to $3/4$ th of Prism angle. The angle of deviation is
 (1) 60° (2) 30°
 (3) 45° (4) 120°

PRI044

45. 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 –
 (1) $\sqrt{2}$ (2) 2
 (3) $\frac{3}{2}$ (4) $\frac{4}{3}$

PRI048

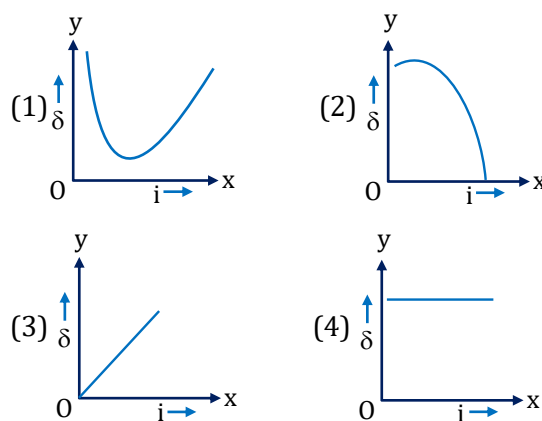
46. A ray falls on a prism ABC ($AB = BC$) and travels as shown in figure. The minimum refractive index of the prism material should be



- (1) $\frac{4}{3}$ (2) $\sqrt{2}$
 (3) 1.5 (4) $\sqrt{3}$

PRI050

47. For a prism, graph between angle of deviation (δ) and angle of incidence will be



PRI051

48. Three prisms 1,2 and 3 have the prism angle $A = 60^\circ$, but their refractive indices are respectively 1.4, 1.5 and 1.6. If $\delta_1, \delta_2, \delta_3$, be their respective angles of deviation then :-
 (1) $\delta_3 > \delta_2 > \delta_1$ (2) $\delta_1 > \delta_2 > \delta_3$
 (3) $\delta_1 = \delta_2 = \delta_3$ (4) $\delta_2 > \delta_1 > \delta_3$

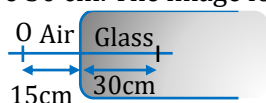
PRI052

49. The refractive index of the material of a prism is $\sqrt{2}$ and its refracting angle is 30° . One of the refracting surfaces of the prism is silvered. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the silvered surface if its angle of incidence on the prism is :-
 (1) 60° (2) 0° (3) 30° (4) 45°

PRI054

REFRACTION AT SPHERICAL SURFACES

50. A point object O is placed in front of a glass rod having spherical end of radius of curvature 30 cm. The image formed would be



- (1) 30 cm left (2) infinity
 (3) 1 cm to the right (4) 18 cm to the left

PRI055

51. A spherical surface of radius of curvature R separates air (refractive index 1.0) from glass (refractive index 1.5). The centre of curvature is in glass. A point object P placed in air is found to have a real image Q in the glass. The line PQ cuts the surface at a point O and $PO = OQ$. The distance PO is equal to

- (1) R (2) 3 R (3) 2 R (4) 5 R

PRI056

LENSES

52. Two convex lens of focal length 20 cm and 25 cm are placed in contact with each other, then power of this combination is -

- (1) + 1 D (2) + 9 D
 (3) - 1 D (4) - 9 D

PRI057

53. Two lenses of power +2.50 D and -3.75 D are combined to form a compound lens. Its focal length in cm will be -

- (1) 40 (2) -40 (3) -80 (4) 160

PRI058

54. Lenses of powers 3D and -5D are combined to form a compound lens. An object is placed at a distance of 50 cm from this lens. Calculate the position of its image.

- (1) -10 cm (2) +10 cm
 (3) -25 cm (4) + 25 cm.

PRI059

55. A convex lens of Focal length of 40cm is in contact with a concave lens of focal length 25cm. The power of the combination is.

- (1) -1.5 D (2) -6.5 D
 (3) +6.5 D (4) +6.67 D

PRI060

56. An object is put at a distance of 5 cm from the first focus of a convex lens of focal length 10cm. If a real image is formed it's distance from the lens will be :-

- (1) 15 cm (2) 20 cm
 (3) 25 cm (4) 30 cm

PRI061

57. An equiconvex lens has a power of 5 dioptre. If it is made of glass of refractive index 1.5. then radius of curvature of its each surface will be ?

- (1) 20 cm (2) 10 cm (3) 40 cm (4) ∞

PRI062

58. An object placed at a distance of 9cm from first principal focus of convex lens, produces a real image at a distance of 25cm from its second principal focus. Then focal length of lens is

- (1) 9 cm (2) 25 cm
 (3) 15 cm (4) 17 cm

PRI063

59. A glass convex lens ($\mu_g = 1.5$) has a focal length of 8 cm when placed in air. What would be the focal length of the lens when it is immersed in water ($\mu_w = 1.33$)

- (1) 2 m (2) 4 cm
 (3) 16 cm (4) 32 cm

PRI064

60. Two thin convex lenses of focal length 10 cm and 15 cm are separated by a distance of 10 cm. The focal length of the combination is :-

- (1) 4.2 cm (2) 6 cm
 (3) 10 cm (4) 15 cm

PRI065

61. A convex lens of power P is immersed in water. how will its power change ?

- (1) Increases
 (2) Decreases
 (3) Remains unchanged
 (4) Increases for red colour and decreases for blue colour

PRI066

62. A convex lens is made up of three different materials as shown in the figure. For a point object placed on its axis, the number of images formed are



- (1) 1 (2) 3 (3) 4 (4) 5

PRI067

63. The focal length of a convex lens is 10 cm and its refractive index is 1.5. If the radius of curvature of one surface is 7.5 cm, the radius of curvature of the second surface will be

- (1) 7.5 cm (2) 15.0 cm
(3) 75 cm (4) 5.0 cm

PRI068

64. A plano convex lens is made of refractive index 1.6. The radius of curvature of the curved surface is 60 cm. The focal length of the lens is

- (1) 50 cm (2) 100 cm
(3) 200 cm (4) 400 cm

PRI070

65. If in a plano-convex lens, the radius of curvature of the convex surface is 10 cm and the focal length of the lens is 30 cm, then the refractive index of the material of lens will be

- (1) 1.5 (2) 1.66 (3) 1.33 (4) 3

PRI071

66. 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

- (1) + 6.5 D (2) - 6.5 D
(3) + 7.5 D (4) -0.75 D

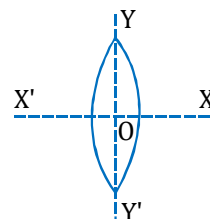
PRI072

67. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will :-

- (1) Become zero
(2) Become infinite
(3) Become small, but non-zero
(4) Remain unchanged

PRI073

68. An equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as shown in the figure. Let f, f', f'' be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively. Choose the correct statement from the following :-



- (1) $f' = f, f'' = 2f$ (2) $f' = 2f, f'' = f$
(3) $f' = f, f'' = f$ (4) $f' = 2f, f'' = 2f$

PRI074

69. An object and its real image are located at distances 25 cm and 40 cm respectively from the two principal foci of a convex lens. The linear magnification of the image is near to

- (1) + 1.3 (2) -1.3
(3) + 1.8 (4) -1.8

PRI075

MICROSCOPES AND TELESCOPES

70. The focal length of convex lens is 2.5 cm. Its magnifying power for minimum distance of distinct vision will be -

- (1) 25 (2) 52 (3) 11 (4) 1.1

PRI082

71. An astronomical telescope of magnifying power 8 is made using two lenses spaced 45 cm apart. The focal length of the lenses used are

- (1) $f = 40$ cm, $f = 5$ cm (2) $f = 8$ cm, $f = 5$ cm
(3) $f = 5$ cm, $f = 47$ cm (4) $f = 20$ cm, $f = 5$ cm

PRI083

72. The magnifying power of the objective of a compound microscope is 7 if the magnifying power of the microscope is 35, then the magnifying power of eyepiece will be -

- (1) 245 (2) 5 (3) 28 (4) 42

PRI084

73. An astronomical telescope has focal length 100 cm and 10 cm of objective and eyepiece lens respectively when final image is formed at least distance of distinct vision, magnification power of telescope will be :

- (1) -10 (2) -11 (3) -14 (4) -15

PRI085

74. If tube length of astronomical telescope is 105 cm and magnifying power is 20 for normal setting. Calculate the focal length of objective.
 (1) 100 cm (2) 10 cm
 (3) 20 cm (4) 25 cm
PRI086
75. Least distance of distinct vision is 25 cm, what will be Magnifying power of simple microscope of focal length 5 cm, if final image is formed at minimum distance of distinct vision –
 (1) $\frac{1}{5}$ (2) 5 (3) $\frac{1}{6}$ (4) 6
PRI087
76. In a compound microscope, the intermediate image, in normal use is
 (1) Virtual, erect and magnified
 (2) Real, erect and magnified
 (3) Real, inverted and magnified
 (4) Virtual, inverted and magnified
PRI088
77. The focal lengths of the objective and eye-piece of a telescope are respectively 100 cm and 2 cm. The moon subtends an angle of 0.5° at the eye. If it is looked through the telescope, the angle subtended by the moon's image will be
 (1) 100° (2) 50° (3) 25° (4) 10°
PRI089
78. In a laboratory four convex lenses L_1, L_2, L_3 and L_4 of focal lengths 2, 4, 6 and 8 cm respectively are available. Two of these lenses form a telescope of length 10 cm and magnifying power 4. The objective and eye lenses are
 (1) L_2, L_3 (2) L_1, L_4
 (3) L_3, L_2 (4) L_4, L_1
PRI090
79. 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
 (1) 0.05 (2) 0.06 (3) 0.25 (4) 0.12
PRI091
80. An astronomical telescope has a magnifying power 10. The focal length of eyepiece is 20 cm. The focal length of objective is
 (1) 2 cm (2) 200 cm
 (3) $\frac{1}{2}$ cm (4) $\frac{1}{200}$ cm
PRI092
81. 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
 (1) 5 cm (2) 10 cm
 (3) 1 cm (4) 2 cm
PRI093

EXERCISE-I (Conceptual Questions)

ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	1	1	1	2	3	2	2	2	3	1	2	1	3	4	1
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	2	3	2	4	2	4	1	4	3	1	3	2	3	2	1
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	1	4	3	2	3	3	1	4	1	4	3	4	2	2	1
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	2	1	1	4	1	4	2	3	3	1	4	1	3	4	3
Question	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Answer	2	2	2	2	3	4	2	1	2	3	1	2	3	1	4
Question	76	77	78	79	80	81									
Answer	3	3	4	1	2	1									

Exercise - II (Previous Year Questions)

AIPMT/NEET

AIPMT 2014

- If the focal length of objective lens is increased then magnifying power of :-
 (1) microscope will increase but that of telescope decrease.
 (2) microscope and telescope both will increase.
 (3) microscope and telescope both will decrease
 (4) microscope will decrease but that of telescope increase.

PRI121

- The angle of a prism is 'A'. One of its refracting surfaces is silvered. Light rays falling at an angle of incidence 2A on the first surface returns back through the same path after suffering reflection at the silvered surface. The refractive index μ , of the prism is :-
 (1) $2\sin A$ (2) $2\cos A$
 (3) $\frac{1}{2} \cos A$ (4) $\tan A$

PRI122

AIPMT 2015

- The refracting angle of a prism is A, and refractive index of the material of the prism is $\cot(A/2)$. The angle of minimum deviation is :-
 (1) $180^\circ - 2A$ (2) $90^\circ - A$
 (3) $180^\circ + 2A$ (4) $180^\circ - 3A$

PRI123

- Two identical thin plano-convex glass lenses (refractive index 1.5) each having radius of curvature of 20 cm are placed with their convex surfaces in contact at the centre. The intervening space is filled with oil of refractive index 1.7. The focal length of the combination is :-
 (1) -25 cm (2) -50 cm
 (3) 50 cm (4) -20 cm

PRI124

NEET-I 2016

- The angle of incidence for a ray of light at a refracting surface of a prism is 45° . The angle of prism is 60° . If the ray suffers minimum deviation through the prism, the angle of

minimum deviation and refractive index of the material of the prism respectively, are :

- (1) $45^\circ, \frac{1}{\sqrt{2}}$ (2) $30^\circ, \sqrt{2}$
 (3) $45^\circ, \sqrt{2}$ (4) $30^\circ, \frac{1}{\sqrt{2}}$

PRI126

- An astronomical telescope has objective and eyepiece of focal lengths 40 cm and 4 cm respectively. To view an object 200 cm away from the objective, the lenses must be separated by a distance :-
 (1) 37.3 cm (2) 46.0 cm
 (3) 50.0 cm (4) 54.0 cm

PRI127

- Match the corresponding entries of **column-1** with **column-2** (Where m is the magnification produced by the mirror) :-

Column-1

Column-2

- | | |
|--|--------------------|
| (A) $m = -2$ | (a) Convex mirror |
| (B) $m = -\frac{1}{2}$ | (b) Concave mirror |
| (C) $m = +2$ | (c) Real image |
| (D) $m = +\frac{1}{2}$ | (d) Virtual image |
| (1) $A \rightarrow b$ and $c, B \rightarrow b$ and $c, C \rightarrow b$ and $d, D \rightarrow a$ and d . | |
| (2) $A \rightarrow a$ and $c, B \rightarrow a$ and $d, C \rightarrow a$ and $b, D \rightarrow c$ and d | |
| (3) $A \rightarrow a$ and $d, B \rightarrow b$ and $c, C \rightarrow b$ and $d, D \rightarrow b$ and c | |
| (4) $A \rightarrow c$ and $d, B \rightarrow b$ and $d, C \rightarrow b$ and $c, D \rightarrow a$ and d | |

PRI128

NEET-II 2016

- Two identical glass ($\mu_g = 3/2$) equiconvex lenses of focal length f each are kept in contact. The space between the two lenses is filled with water ($\mu_w = 4/3$). The focal length of the combination is :-
 (1) $4f/3$ (2) $3f/4$ (3) $f/3$ (4) f

PRI129

Ray Optics and Optical Instruments

9. An air bubble in a glass slab with refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness (in cm) of the slab is :-

(1) 12 (2) 16 (3) 8 (4) 10

PRI130

NEET(UG) 2017

10. A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle θ , the spot of the light is found to move through a distance y on the scale. The angle θ is given by :-

(1) $\frac{y}{x}$ (2) $\frac{x}{2y}$ (3) $\frac{x}{y}$ (4) $\frac{y}{2x}$

PRI132

NEET(UG) 2018

11. The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30° . One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is :-

(1) 60° (2) 45° (3) 30° (4) zero

PRI134

12. An object is placed at a distance of 40 cm from a concave mirror of focal length 15 cm. If the object is displaced through a distance of 20 cm towards the mirror, the displacement of the image will be:-

(1) 30 cm away from the mirror
(2) 36 cm away from the mirror
(3) 30 cm towards the mirror
(4) 36 cm towards the mirror

PRI135

NEET(UG) 2019

13. Which colour of the light has the longest wavelength ?

(1) red (2) blue
(3) green (4) violet

PRI136

14. Two similar thin equiconvex lenses, of focal length f each, are kept coaxially in contact with each other such that the focal length of the combination is F_1 . When the space between the two lenses is filled with glycerine (which has the same refractive index ($\mu = 1.5$) as that of glass) then the equivalent focal length is F_2 . The ratio $F_1 : F_2$ will be :

(1) 2 : 1 (2) 1 : 2 (3) 2 : 3 (4) 3 : 4

PRI138

15. In total internal reflection when the angle of incidence is equal to the critical angle for the pair of media in contact, what will be angle of refraction?

(1) 180°
(2) 0°
(3) equal to angle of incidence
(4) 90°

PRI139

NEET(UG) 2019 (Odisha)

16. An equiconvex lens has power P . It is cut into two symmetrical halves by a plane containing the principal axis. The power of one part will be:

(1) 0 (2) $\frac{P}{2}$ (3) $\frac{P}{4}$ (4) P

PRI140

17. A double convex lens has focal length 25 cm. The radius of curvature of one of the surfaces is double of the other. Find the radii if the refractive index of the material of the lens is 1.5:

(1) 100 cm, 50 cm (2) 25 cm, 50 cm
(3) 18.75 cm, 37.5 cm (4) 50 cm, 100 cm

PRI141

NEET(UG) 2020

18. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ , then the angle of incidence is nearly equal to:

(1) $\frac{\mu A}{2}$ (2) $\frac{A}{2\mu}$ (3) $\frac{2A}{\mu}$ (4) μA

PRI142

NEET(UG) 2020 (COVID-19)

19. A plano-convex lens of unknown material and unknown focal length is given. With the help of a spherometer we can measure the
(1) focal length of the lens
(2) radius of curvature of the curved surface
(3) aperture of the lens
(4) refractive index of the material

PRI143

20. The power of a biconvex lens is 10 dioptre and the radius of curvature of each surface is 10 cm. Then the refractive index of the material of the lens is,

- (1) $\frac{4}{3}$ (2) $\frac{9}{8}$ (3) $\frac{5}{3}$ (4) $\frac{3}{2}$

PRI144

21. An object is placed on the principal axis of a concave mirror at a distance of $1.5f$ (f is the focal length). The image will be at,
(1) $-3f$ (2) $1.5f$ (3) $-1.5f$ (4) $3f$

PRI145

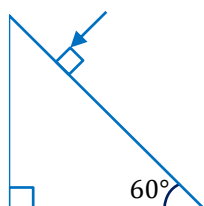
22. If the critical angle for total internal reflection from a medium to vacuum is 45° , then velocity of light in the medium is,

- (1) 1.5×10^8 m/s (2) $\frac{3}{\sqrt{2}} \times 10^8$ m/s
(3) $\sqrt{2} \times 10^8$ m/s (4) 3×10^8 m/s

PRI146

NEET(UG) 2021

23. Find the value of the angle of emergence from the prism. Refractive index of the glass is $\sqrt{3}$.



- (1) 60° (2) 30° (3) 45° (4) 90°

PRI147

24. A convex lens 'A' of focal length 20 cm and a concave lens 'B' of focal length 5 cm are kept along the same axis with a distance 'd' between them. If a parallel beam of light falling on 'A' leaves 'B' as a parallel beam, then the distance 'd' in cm will be :-

- (1) 25 (2) 15 (3) 50 (4) 30

PRI148

NEET(UG) 2022

25. A biconvex lens has radii of curvature, 20 cm each. if the refractive index of the material of the lens is 1.5, the power of the lens is :-

- (1) +20 D (2) +5D
(3) infinity (4) +2D

PRI150

26. Two transparent media A and B are separated by a plane boundary. The speed of light in those media are 1.5×10^8 m/s and 2.0×10^8 m/s, respectively. The critical angle for a ray of light for these two media is:

- (1) $\sin^{-1}(0.750)$ (2) $\tan^{-1}(0.500)$
(3) $\tan^{-1}(0.750)$ (4) $\sin^{-1}(0.500)$

PRI152

RE-NEET(UG) 2022

27. An astronomical refracting telescope is being used by an observer to observe planets in normal adjustment. The focal lengths of the objective and eye piece used in the construction of the telescope are 20 m and 2cm respectively. Consider the following statements about the telescope :

- (a) The distance between the objective and eye piece is 20.02 m
(b) The magnification of the telescope is (-) 1000
(c) The image of the planet is erect and diminished
(d) The aperture of eye piece is smaller than that of objective

The correct statements are :

- (1) (a), (b) and (c) (2) (b), (c) and (d)
(3) (c), (d) and (a) (4) (a), (b) and (d)

PRI154

NEET(UG) 2023

28. Light travels a distance x in time t_1 in air and $10x$ in time t_2 in another denser medium. What is the critical angle for this medium ?

- (1) $\sin^{-1}\left(\frac{10t_2}{t_1}\right)$ (2) $\sin^{-1}\left(\frac{t_1}{10t_2}\right)$
(3) $\sin^{-1}\left(\frac{10t_1}{t_2}\right)$ (4) $\sin^{-1}\left(\frac{t_2}{t_1}\right)$

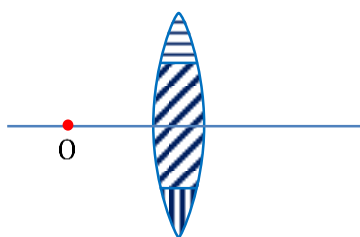
PRI171

29. Two thin lenses are of same focal lengths (f), but one is convex and the other one is concave. When they are placed in contact with each other, the equivalent focal length of the combination will be:
- (1) $f/4$ (2) $f/2$
(3) Infinite (4) Zero

PRI172

RE-NEET(UG) 2023

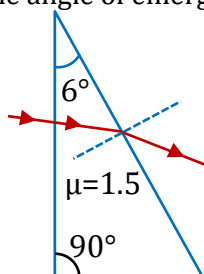
30. A lens is made up of 3 different transparent media as shown in figure. A point object O is placed on its axis beyond $2f$. How many real images will be obtained on the other side?



- (1) 2
(2) 1
(3) No image will be formed
(4) 3

PRI173

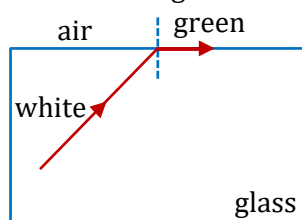
31. A horizontal ray of light is incident on the right angled prism with prism angle 6° . If the refractive index of the material of the prism is 1.5, then the angle of emergence will be:



- (1) 9° (2) 10° (3) 4° (4) 6°

PRI174

32. Which set of colours will come out in air for a situation shown in figure?



- (1) Yellow, Orange and Red
(2) All
(3) Orange, Red and Violet
(4) Blue, Green and Yellow

PRI175

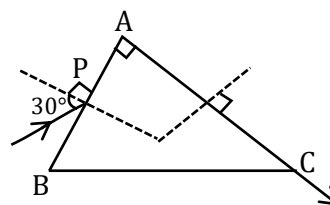
33. An object is mounted on a wall. Its image of equal size is to be obtained on a parallel wall with the help of a convex lens placed between these walls. The lens is kept at distance x in front of the second wall. The required focal length of the lens will be :

- (1) less than $\frac{x}{4}$
(2) more than $\frac{x}{4}$ but less than $\frac{x}{2}$
(3) $\frac{x}{2}$
(4) $\frac{x}{4}$

PRI176

NEET(UG) 2024

34. A light ray enters through a right angled prism at point P with the angle of incidence 30° as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is :



- (1) $\frac{\sqrt{5}}{4}$ (2) $\frac{\sqrt{5}}{2}$
(3) $\frac{\sqrt{3}}{4}$ (4) $\frac{\sqrt{3}}{2}$

PRI177

35. A small telescope has an objective of focal length 140 cm and an eye piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is :

- (1) 34 (2) 28
(3) 17 (4) 32

PRI178

RE-NEET(UG) 2024

36. Given below are two statements:

Statement I : Image formation needs regular reflection and/or refraction.

Statement II : The variety in colour of objects we see around us is due to the constituent colours of the light incident on them.

In the light of the above statements, choose the **most appropriate** answer from the options given below:

- (1) **Statement I** is correct but **Statement II** is incorrect
- (2) **Statement I** is incorrect but **Statement II** is correct.
- (3) Both **Statement I** and **Statement II** are correct
- (4) Both **Statement I** and **Statement II** are incorrect

PRI179

EXERCISE-II (Previous Year Questions)

ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	4	2	1	2	2	4	1	2	1	4	2	2	1	2	4
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	4	3	4	2	4	1	2	1	2	2	1	4	3	3	4
Question	31	32	33	34	35	36									
Answer	1	1	3	2	2	3									

Exercise - III (Analytical Questions)

Master Your Understanding

1. Choose correct answer :

	Column-I		Column-II
(A)	Human Eye	(P)	Enlarged and inverted image
(B)	Simple microscope	(Q)	Enlarged and erect image
(C)	Compound microscope	(R)	Diminished and inverted image
(D)	Astronomical telescope	(S)	Diminished and erect image

Optics

- (1) $A \rightarrow P, B \rightarrow Q, C \rightarrow P, D \rightarrow P$
 (2) $A \rightarrow S, B \rightarrow P, C \rightarrow Q, D \rightarrow R$
 (3) $A \rightarrow R, B \rightarrow P, C \rightarrow R, D \rightarrow Q$
 (4) $A \rightarrow R, B \rightarrow Q, C \rightarrow P, D \rightarrow R$

PRI155

2. Given below are two statements:

Statement-1 : Magnifying power of a simple microscope is positive.**Statement-2** : Magnifying power of a compound microscope is negative.

In light of above statement choose the most appropriate answer from the options given below:

- (1) Both statement I and statement II are correct.
 (2) Statement I is correct and statement II is incorrect.
 (3) Statement I is incorrect and statement II is correct.
 (4) Both statements I and statements II are incorrect.

PRI156

3. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.**Assertion (A)** : Magnifying power of a simple microscope is inversely proportional to focal length of lens in normal adjustment.**Reason (R)** : Magnifying power of simple microscope can be infinite.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
 (2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
 (3) **(A)** is true but **(R)** is false.
 (4) **(A)** is false but **(R)** is true.

PRI157

4. A bird is flying at the height of 12 cm from the surface of a lake and a fish is swimming at a depth of 24 cm from the surface.

(Take $\mu = 4/3$)

	Column-A		Column-B
(A)	Distance of fish from the surface as seen by bird	(P)	16 cm
(B)	Distance of bird from the surface as seen by fish	(Q)	40 cm
(C)	Distance between fish and bird as seen by bird	(R)	18 cm
(D)	Distance between fish and bird as seen by fish	(S)	30 cm

- (1) $A \rightarrow P, B \rightarrow R, C \rightarrow S, D \rightarrow Q$
 (2) $A \rightarrow R, B \rightarrow P, C \rightarrow Q, D \rightarrow S$
 (3) $A \rightarrow R, B \rightarrow P, C \rightarrow S, D \rightarrow Q$
 (4) $A \rightarrow P, B \rightarrow R, C \rightarrow Q, D \rightarrow S$

PRI159

5. (1) When a light ray goes from denser to rarer medium it may suffer TIR
 (2) For TIR to take place angle of incidence should be greater than critical angle.

- (3) Laws of reflection are not valid for TIR
 (4) Intensity gets decreased during TIR

Incorrect statements are -

- (1) 1 and 2
 (2) 3 and 4
 (3) 1, 3 and 4
 (4) 1, 2, 3 and 4

PRI160

6. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Keeping a point object fixed,
if a plane mirror is moved, the image will also move always.

Reason (R) : In case of a plane mirror, distance of object and its image is equal from any point on the mirror.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
- (2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
- (3) **(A)** is true but **(R)** is false.
- (4) **(A)** is false but **(R)** is true.

PRI161

7. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : A thin lens has two principal focal lengths which may be different in magnitude.

Reason (R) : The distance of both principal focus from optical centre of thin lens depend on the two radii of curvature of the lens. Distance of both principal focus from optical centre of a lens are same only if radii of curvature of both sides of lens are same.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
- (2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
- (3) **(A)** is true but **(R)** is false.
- (4) Both **(A)** and **(R)** are false.

PRI162

8. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : When the upper half of a converging lens is missing, a real image formed by the lens for a real object will lack its lower half.

Reason (R) : The real image formed by a thin lens for a real object will be always erected.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
- (2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
- (3) **(A)** is true but **(R)** is false.
- (4) Both **(A)** and **(R)** are false.

PRI163

9. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : A simple microscope may have different magnification for different persons.

Reason (R) : All persons must have the same near point distance of 25 cm.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
- (2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
- (3) **(A)** is true but **(R)** is false.
- (4) **(A)** is false but **(R)** is true.

PRI164

Ray Optics and Optical Instruments

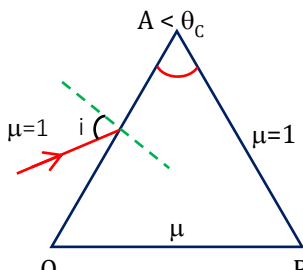
10. Column Matching :-

	Column-I		Column-II
(A)	An object is placed at a distance equal to focal length from pole before convex mirror	(P)	Magnification is ∞
(B)	An object is placed at focus before a concave mirror	(Q)	Magnification is 0.5
(C)	An object is placed at the center of curvature before a concave mirror	(R)	Magnification is $(1/3)$
(F)	As object is placed at a distance equal to radius of curvature before a convex mirror	(S)	Magnification is -1

- (1) $A \rightarrow P, B \rightarrow Q, C \rightarrow R, D \rightarrow S$
 (2) $A \rightarrow Q, B \rightarrow P, C \rightarrow S, D \rightarrow R$
 (3) $A \rightarrow Q, B \rightarrow P, C \rightarrow R, D \rightarrow S$
 (4) $A \rightarrow P, B \rightarrow R, C \rightarrow Q, D \rightarrow S$

PRI165

11. Match the column (θ_c is the critical angle b/w prism medium and surrounding medium)

(A)		(1)	Light ray always crosses the prism for any value of i
(B)	$A > 2\theta_c$	(2)	Light ray never crosses the prism for any value of i

(C)	$\theta_c < A < 2\theta_c$	(3)	Light ray may cross the prism depends on i
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Option :

- (1) $A \rightarrow 1, B \rightarrow 1, C \rightarrow 3$ (2) $A \rightarrow 3, B \rightarrow 2, C \rightarrow 1$
 (3) $A \rightarrow 2, B \rightarrow 1, C \rightarrow 2$ (4) $A \rightarrow 1, B \rightarrow 2, C \rightarrow 3$

PRI166

12. All the following statements are correct except : (For real object)

- (1) The magnification produced by a convex mirror is always less than 1.
 (2) A virtual, erect, same sized image can be obtained by using only a plane mirror.
 (3) A virtual, erect, magnified image can be formed by using concave mirror.
 (4) A real inverted, same sized image can be formed by using a convex mirror.

PRI167

13. Match the following :-

(A)	$\mu = \tan i$	(P)	Snell's law
(B)	$\mu = \frac{1}{\sin \theta_c}$	(Q)	Brewsters angle
(C)	$\mu = \frac{\sin i}{\sin r}$	(R)	Prism
(D)	$\mu = \frac{\sin\left(\frac{\delta_{\min} + A}{2}\right)}{\sin \frac{A}{2}}$	(S)	Total internal reflection

- (1) $A \rightarrow P, B \rightarrow Q, C \rightarrow R, D \rightarrow S$
 (2) $A \rightarrow Q, B \rightarrow P, C \rightarrow S, D \rightarrow R$
 (3) $A \rightarrow Q, B \rightarrow S, C \rightarrow P, D \rightarrow R$
 (4) $A \rightarrow P, B \rightarrow S, C \rightarrow S, D \rightarrow R$

PRI169

14. The angle of a prism is 30° . The rays incident at 60° on one refracting face suffer a deviation of 30° . Then the angle of emergence is $3K^\circ$. Find the value of K.

- (1) 40° (2) 20°
 (3) 10° (4) 0°

PRI170

EXERCISE-III (Analytical Questions)

ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Answer	4	1	3	3	2	4	4	4	3	2	4	4	3	4

Important Notes