PREVIOUS EXAMS QUESTIONS EXERCISE–I

1. 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. **[MP PMT 2000]**

(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

2. A ray of light passes through an equilateral glass prism in such a manner that the angle of incidence is equal to the angle of emergence and each of these angles is equal to 3/4 of the angle of the prism. The angle of deviation is **[MLNR-1988, MP PMT 1999, Roorkee 2000, UPSEAT 2000]**

(1) 45° (2) 39° (3) 20° (4) 30°

3. 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 **[MP PMT 2000]**

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

4. 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° **[MP PMT 2000]**

(3) 25° (4) 10°

5. 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 **[MP PMT 2000]**

(1) 10 cm convex

(2) 100 cm concave

(3) 20 cm convex

(4) 20 cm concave

6. Rainbow is formed due to :- **[AIPMT 2000]**

(1) Scattering & refraction

(2) Total internal reflection & dispersion

(3) Reflection only

(4) Diffraction and dispersion

7. For a plano convex lenx ($\mu = 1.5$) has radius of curvature 10 cm. It is silvered on its plane surface. Find focal length after silvering:- **[AIPMT 2000]**

(1) 10 cm (2) 20 cm

(3) 15 cm (4) 25 cm

8. A tall man of height 6 feet, want to see his full image. Then required minimum length of the mirror will be:- **[AIPMT 2000]**

(1) 12 feet (2) 3 feet

(3) 6 feet (4) Any length

9. A bubble in glass slab ($\mu = 1.5$) when viewed from one side appears at 5 cm and 2cm from other side, then thickness of slab is:- **[AIPMT 2000]**

(1) 3.75 cm (2) 3 cm

(3) 10.5 cm. (4) 2.5 cm

10. A film projector magnifies a film of area 100 square centimeter on screen. If linear magnification is 4 then area of magnified image on screen will be – **[CPMT 2001]**

(1) 1600 sq.cm (2) 800 sq.cm

(3) 400 sq.cm (4) 200 sq.cm

11. 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- **[CPMT 2001]**

(1) $\lambda=\lambda'$ (2) $n=n'$

(3) $v=v'$ (4) $I=I'$

12. Optical fibre are based on – **[CPMT 2001]**

(1) Total internal reflection

(2) Less scattering

(3) Refraction

(4) Less absorption coefficient

13. 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 **[MP PMT 1993, Delhi PMT 2001]**

(1) 180 cm (2) 90 cm

(3) 85 cm (4) 170 cm

14. The focal length of a convex mirror is 20 cm its radius of curvature will be **[MP PMT-2001]**

(1) 10 cm (2) 20 cm

(3) 30 cm (4) 40 cm

15. 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 **[NCERT 1976, MP PET-1994, AIPMT 1996, CET Karnataka 1994, MP PMT 1999, 2001]**

(1) $\frac{t}{nc}$ (2) tnc

(3) $\frac{nt}{c}$ (4) $\frac{tc}{n}$

16. A ray of light propagates from glass (refractive index = 3/2) to water (refractive index = 4/3). The value of the critical angle **[JIPMER 1999, MP PMT 2000,2003 UPSEAT 2001]**

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

(3) $\sin^{-1}(8/9)$ (4) $\sin^{-1}(5/7)$

17. Three prisms 1,2 and 3 have the prism angle A = 60°, but their refractive indices are respectively 1.4, 1.5 and 1.6.If δ_1, δ_2,δ_3, be their respective angles of deviation then **[MP PMT 2001]**

(1) $\delta_3 > \delta_2 > \delta_1$ (2) $\delta_1 > \delta_2 > \delta_3$

(3) $\delta_1 = \delta_2 = \delta_3$ (4) $\delta_2 > \delta_1 > \delta_3$

18. 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 **[MP PMT 2001]**

(1) L_2 , L_3 (2) L_1 , L_4

(3) L_3 ,L_2 (4) L_4 , L_1

19. To remove myopia (short sightedness) a lens of power 0.66D is required. The distant point of the eye is approximately **[MP PMT 2001]**

(1) 100 cm (2) 151.5 cm

(3) 50 cm (4) 25 cm

20. 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 **[MP PMT 2001]**

(3) 0.25 (4) 0.12

21. Relation between critical angles of water and glass is **[AIPMT 2000, CPMT 2001]**

(1) $C_w > C_g$ (2) $C_w < C_g$

(3) $C_w = C_g$ (4) $C_w = C_g = 0$

22. 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 **[AIPMT 1999; Pb.PMT 1999; BHU 2001]**

(1) 50 cm (2) 100 cm

(3) 200 cm (4) 400 cm

23. A disc is placed on a surface of pond which has refractive index $\frac{5}{3}$. A source of light is placed 4 m below the surface of liquid. The minimum radius of disc will be so light is not coming out **[AIPMT 2001]**

(1) ∞ (2) 3m.

(3) 6m. (4) 4m.

24. 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 **[CPMT 1986, MLNR-1988, UPSEAT 2000, MP PMT 2002]**

(1) 1.5 (2) 1.66

(3) 1.33 (4) 3

25. A diminished virtual image can be formed only in

(1) Plane mirror **[MP PMT 2002]**

(2) A concave mirror

(3) A convex mirror

(4) Concave- parabolic mirror

26. Critical angle of light passing from glass to air is minimum for **[NCERT 1975, RPMT-1999, MP PMT 2002]**

(1) Red (2) Green

(3) Yellow (4) Violet

27. Which of the following is used in optical fibres

(1) Total internal reflection **[AIEEE 2002]**

(2) Scattering

(3) Diffraction

(4) Refraction

28. A point source of light is place 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 ($\mu = 5/3$) **[AIPMT 1994; JIPMER 2001,02]**

(1) 2 m (2) 6 m

(3) 4 m (4) 3 m

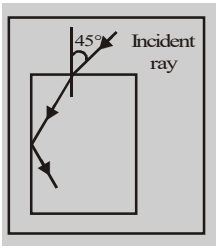
29. If a convex lens of focal length 80 cm and a concave lens of focal length 50 cm are combined together, what will be their resulting power

[AIPMT 1996; AFMC 2002]

(1) + 6.5 D (2) – 6.5 D

(3) + 7.5 D (4) – 0.75 D

30. For the given incident ray as shown in figure, the condition of total internal refraction of this ray the minimum refractive index of prism will be :–



(1) $\frac{\sqrt{3}+1}{2}$ (2) $\frac{\sqrt{2}+1}{2}$ **[AIPMT 2002]**

(3) $\sqrt{\frac{3}{2}}$ (4) $\sqrt{\frac{7}{6}}$

31. A bulb is located on a wall. Its image is to be obtained on a parallel wall with the help of convex lens. If the distance between parallel walls is 'd' then required focal length of lens placed in between the walls is :– **[AIPMT 2002]**

(1) Only $\frac{d}{4}$

(2) Only $\frac{d}{2}$

(3) More than $\frac{d}{4}$ but less than $\frac{d}{2}$

(4) Less than or equal to $\frac{d}{4}$

32. Brilliance of diamond is due to

(1) Shape **[AIIMS 2002, MP PMT 2003]**

(2) Cutting

(3) Reflection

(4) Total internal reflection

33. Two plane mirrors are at 45° to each other. If an object is placed between them then the number of images will be **[MP PMT 2003]**

(1) 5 (2) 9

(3) 7 (4) 8

34. An astronomical telescope has a magnifying power 10. The focal length of eyepiece is 20 cm. The focal length of objective is **[MP PMT 2002,2003]**

(1) 2 cm (2) 200cm

(3) $\frac{1}{2}$ cm (4) $\frac{1}{200}$ cm

35. A person can not see the objects clearly placed at a distance more than 40 cm. He is advised to use a lense of power **[MP PMT 2002,2003]**

(1) – 2.5 D (2) + 2.5 D

(3) – 6.25 D (4) + 1.5 D

36. 'Mirage' is a phenomenon due to **[AIIMS-1998; MP PET 2002; AFMC 2003]**

(1) Relfection of light

(2) Reflraction of light

(3) Total internal reflection of light

(4) Diffraction of light

37. In the formation of a rainbow light from the sun on water droplets undergoes

[AIPMT 2000; Orissa JEE 2002; MP PET 2003]

(1) Dispersion only

(2) Only total internal reflection

(3) Dispersion and total internal reflection

(4) None of these

38. 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 :– **[AIPMT 2003]**

(1) Become zero

(2) Become infinite

(3) Become small, but non-zero

(4) Remain unchanged

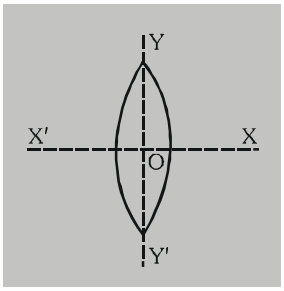
39. An equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as shown in the figure. Let f, f', f" be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively Choose the correct statement from the following :– **[AIPMT 2003]**

(1) f' = f, f" = 2f

(2) f' = 2f, f" = f

(3) f' = f, f" = f

(4) f' = 2f, f" = 2f



40. An object is immersed in a fluid. In order that the object becomes invisible, it should. **[AIIMS 2004]**

(1) Bahave 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

41. A beam of light composed of red and green rays is incident obliquely at a point on the face of a rectangular glass slab. When coming out on the opposite parallel face, the red and green rays emerge from :- **[AIPMT 2004]**

(1) Two points propagating in two different parallel directions

(2) One point propagating in two different directions

(3) One point propagating in the same direction

(4) Two points propagating in two different non parallel directions

42. 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 made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface if its angle of incidence on the prism is :- **[AIPMT 2004]**

(1) 60° (2) 0°

(3) 30° (4) 45°

43. A telescope has an objective lens of 10 cm. diameter and is situated at a distance of one kilometer from two objects. The minimum distance between these two objects, which can be resolved by the telescope, when the mean wavelength of light is 5000 Å, is of the order of :- **[AIPMT 2004]**

(1) 5 m. (2) 5 mm.

(3) 5 cm. (4) 0.5 m.

44. A telescope has an objective lens of focal length 200 cm and an eye piece with focal length 2cm. If this telescope is used to see a 50 meter tall building at a distance of 2km, what is the height of the image of the building formed by the objective lens

(1) 5 cm (2) 10 cm **[AIIMS 2005]**

(3) 1 cm (4) 2 cm

45. What should be the maximum acceptance angle at the air-core interface of an optical fibre if n_1 and n_2 are the refractive indices of the core and the cladding, respectively **[AIIMS 2005]**

(1) $\sin^{-1}(n_2/n_1)$

(2) $\sin^{-1}\sqrt{n_1^2 - n_2^2}$

(3) $\sin^{-1}\left(\frac{n_2}{n_1}\right)$

(4) $\sin^{-1}\left(\frac{n_1}{n_2}\right)$

46. A lens is made of flint glass (refractive index = 1·5). When the lens is immersed in a liquid of refractive index 1·25, the focal length **[AIIMS 2006]**

(1) Increases to a factor of 1·25

(2) Increases to a factor of 2·5

(3) Increases to a factor of 1·2

(4) Decreases to a factor of 1·2

47. A microscope is focussed on a mark on a piece of paper and then a slab of glass of thickness 3 cm and refractive index 1.5 is placed over the mark. How should the microscope be moved to get the mark in focus again :- **[AIPMT 2006]**

(1) 1 cm upward

(2) 4.5 cm downward

(3) 1 cm downward

(4) 2 cm upward

48. A convex lens and a concave lens, each having same focal length of 25 cm, are put in contact to form a combination of lenses. The power in diopters of the combination is :- **[AIPMT 2006]**

(1) 25 (2) 50

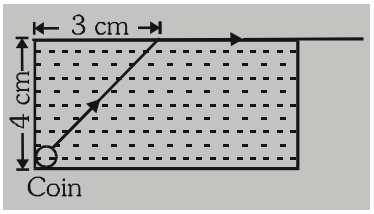
(3) Infinite (4) Zero

49. The frequency of a light wave in a material is 2×10^{14} Hz and wavelength is 5000 Å. The refractive index of material will be : **[AIPMT 2007]**

(1) 1.33 (2) 1.40

(3) 1.50 (4) 3.00

50. A small coin is resting on the bottom of a beaker filled with a liquid. A ray of light from the coin travels upto the surface of the liquid and moves along its surface (see figure). **[AIPMT 2007]**



How fast is the light travelling in the liquid ?

(1) 1.2×10^8 m/s (2) 1.8×10^8 m/s

(3) 2.4×10^8 m/s (4) 3.0×10^8 m/s

51. Two thin lenses of focal lengths f_1 and f_2 are in contact and coaxial. The power of the combination is:- **[AIPMT 2008]**

(1) $\frac{f_1 + f_2}{2}$

(2) $\frac{f_1 + f_2}{f_1 f_2}$

(3) $\sqrt{\frac{f_1}{f_2}}$

(4) $\sqrt{\frac{f_2}{f_1}}$

52. A lens having focal length f and aperture of diameter d forms an image of intensity I. Aperture of diameter $\frac{d}{2}$ in central region of lens is covered by a black paper. Focal length of lens and intensity of image now will be respectively :- **[AIPMT 2010]**

(1) $\frac{f}{2}$ and $\frac{I}{2}$ (2) f and $\frac{I}{4}$

(3) $\frac{3f}{4}$ and $\frac{I}{2}$ (4) f and $\frac{3I}{4}$

53. A ray of light travelling in a transparent medium of refractive index μ, falls on a surface separating the medium from air at an angle of incidence of 45°. For which of the following value of μ the ray can undergo total internal reflection ? **[AIPMT 2010]**

(1) $\mu = 1.25$ (2) $\mu = 1.33$

(3) $\mu = 1.40$ (4) $\mu = 1.50$

54. The speed of light in media M_1 and M_2 is 1.5×10^8 m/s and 2.0×10^8 m/s respectively. A ray of light enters from medium M_1 to M_2 at an incidence angle i. If the ray suffers total internal reflection, the value of i is :- **[AIPMT 2010]**

(1) Equal to or less than $\sin^{-1}\left(\frac{3}{5}\right)$

(2) Equal to or greater than $\sin^{-1}\left(\frac{3}{4}\right)$

(3) Less than $\sin^{-1}\left(\frac{2}{3}\right)$

(4) Equal to $\sin^{-1}\left(\frac{2}{3}\right)$

55. A ray of light is incident on a 60° prism at the minimum deviation position. The angle of refraction at the first face (i.e., incident face) of the prism is:- **[AIPMT 2010]**

(1) 30° (2) 45°

(3) 60° (4) Zero

56. The near point is 100 cm for a man. To see the distant object clearly, what is the power of required lens ? **[AIIMS 2010]**

(1) −1D (2) +1D

(3) −3D (4) +3D

57. Achromatic combination of lenses comprises of the two lenses of same material placed 4cm apart. If focal length of one lens is 5cm, the focal length of other lens is : **[AIIMS 2010]**

(1) 2cm (2) 4cm

(3) 6cm (4) 3cm

58. Which of the following is not due to total internal reflection ? **[AIPMT(Pre) 2011]**

(1) Working of optical fibre

(2) Difference between apparent and real depth of a pond

(3) Mirage on hot summer days

(4) Brilliance of diamond

59. A biconvex lens has a radius of curvature of magnitude 20 cm. Which one of the following options describe best the image formed of an object of height 2 cm placed 30 cm from the lens ? **[AIPMT(Pre) 2011]**

(1) Virtual, upright, height = 1cm

(2) Virtual, upright, height = 0.5cm

(3) Real, inverted, height = 4cm

(4) Real, inverted, height = 1cm

60. A thin prism of angle 15° made of glass of refractive index $\mu_1 = 1.5$ is combined with another prism of glass of refractive index $\mu_2 = 1.75$. The combination of the prisms produces dispersion without deviation. The angle of the second prism should be :- **[AIPMT(Mains) 2011]**

(1) 5° (2) 7°

(3) 10° (4) 12°

61. A converging beam of rays is incident on a diverging lens. Having passed through the lens the rays intersect at a point 15 cm from the lens on the opposite side. If the lens is removed the point where the rays meet will move 5 cm closer to the lens. The focal length of the lens is :- **[AIPMT(Mains) 2011]**

(1) 5 cm

(2) −10 cm

(3) 20 cm

(4) −30 cm

62. Two lens of focal length −20cm and +10cm are put in combination, find the power of the combination: **[AIIMS 2011]**

(1) −1D (2) −2D

(3) +5D (4) +2D

63. A far sighted person has his near point 50cm, find the power of lens he should use to see at 25cm, clearly: **[AIIMS 2011]**

(1) +1 (2) +2

(3) −2 (4) −1D

64. The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is 20 cm. The focal length of lenses are : **[AIPMT(Pre) 2012]**

(1) 18 cm, 2 cm (2) 11 cm, 9 cm

(3) 10 cm, 10 cm (4) 15 cm, 5 cm

65. A ray of light is incident at an angle of incidence, i, on one face of a prism of angle A (assumed to be small) and emerges normally from the opposite face. If the refractive index of the prism is μ, the angle of incidence i, is nearly equal to : **[AIPMT(Pre) 2012]**

(1) A/μ (2) $A/2\mu$

(3) μA (4) $\frac{\mu A}{2}$

66. A concave mirror of focal length 'f_1' is placed at a distance of 'd' from a convex lens of focal length 'f_2'. A beam of light coming from infinity and falling on this convex lens-concave mirror combination returns to infinity. The distance 'd' must equal : **[AIPMT(Pre) 2012]**

(1) $2f_1 + f_2$ (2) $-2f_1 + f_2$

(3) $f_1 + f_2$ (4) $-f_1 + f_2$

67. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index. **[AIPMT(Pre) 2012]**

(1) greater than that of glass

(2) less than that of glass

(3) equal to that of glass

(4) less than one

68. A rod of length 10 cm lies along the principal axis of a concave mirror of focal length 10 cm in such a way that its end closer to the pole is 20 cm away from the mirror. The length of the image is :- **[AIPMT(Mains) 2012]**

(1) 2.5 cm (2) 5 cm

(3) 10 cm (4) 15 cm

69. For the angle of minimum deviation of a prism to be equal to its refracting angle, the prism must be made of a material whose refractive index :- **[AIPMT(Mains) 2012]**

(1) is less than 1

(2) is greater than 2

(3) lies between $\sqrt{2}$ and 1

(4) lies between 2 and $\sqrt{2}$

70. In a convex lens of focal length F, the minimum distance between an object and its real image must be :- **[AIIMS 2012]**

(1) 3F (2) 4F

(3) $\frac{3}{2}F$ (4) 2F

71. A light ray is incident on a glass slab, it is partially reflected and partially transmitted. Then the reflected ray is :- **[AIIMS 2012]**

(1) Completly polarised and highly intense

(2) Partially polarised and poorly intense

(3) Partially polarised and highly intense

(4) Completly polarised and poorly intense

BRAIN TEASERS EXERCISE-II

1. 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

2. 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

3. 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

4. The focal length of a concave mirror is 12 cm. Where should an object of length 4 cm be placed, so that a real image of 1 cm length is formed ?

(1) 48 cm (2) 3 cm

(3) 60 cm (4) 15 cm

5. Minimum and maximum distance should be for clear vision of healthy eye

(1) 100cm & 500 cm (2) Infinite & 25 cm

(3) 25cm & 100 cm (4) 25 cm & infinite

6. The angle of a glass prism is 4.5^0 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°

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

(1) 60° (2) 45°

(3) 30° (4) 15°

8. 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

9. 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 ?

(1) Concave, – 1.0 D (2) Convex, + 1.5 D

(3) Concave, – 2.0 D (4) Convex, + 2.0 D

10. 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

11. A person can not see the objects beyond 50 cm. The power of a lens to correct this vision will be–

(1) +2D (2) –2D (3) +5D (4) 0.5 D

12. 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

13. 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

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 of the smaller the object

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

16. A myopic person can not see objects lying beyond 2 m. The focal length and power of the lens required to remove this defect will be –

(1) 1 m & 0.5 D (2) – 2m & – 0.5 D

(3) 0.5 m & 0.5 D (4) – 0.5 m & 0.5 D

17. 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

18. 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

19. 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°

20. An object is situated at a distance of 15 cm from a convex mirror of focal length 30 cm. The position of the image formed by it will be–
(1) – 5 cm (2) 10 cm (3) – 10 cm (4) + 5 cm

21. Lenses of powers 3D and -5D are combined to from a compound lens. An object is placed at a distance of 50 cm from this lens. Calculate the position of its image.
(1) -10cm (2) +10cm (3) -25cm (4)+ 25cm.

22. An object placed at a distance of a 9cm. from the first principal focus of a convex lens produces a real image at a distance of 25cm. from its second principal focus. then the focal length of the lens is :
(1) 9cm (2) 25cm (3) 15cm (4) 17cm

23. 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 dioptress (2) -6.5 dioptress
(3) +6.5 dioptress (4) +6.67 dioptress

24. 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. Its distance from the lens will be:
(1) 15cm (2) 20cm (3) 25cm (4) 30cm

25. Lenses applied in achromatic combination having dispersive power in ratio of 5:3 if focal length of concave lens is 15cm Then focal length of other lens will be :
(1) -9cm (2) +9cm (3) -12cm (4)+12 cm

26. A telescope consisting of objective of focal length 60cm and a single lens eye piece of focal length 5cm is focussed at a distant object in such a way that parallel rays emerge from the eye piece. If the object subtends an angle of 2° at the objective, then angular width of image will be.
(1) 10° (2) 24°
(3) 50° (4) $1/6^0$

27. Focal length of convex lens is f. If this lens is cut along parallel to its length in two equal parts then focal length of its half part will be:
(1) f/2 (2) f (3) $\frac{3f}{2}$ (4) 2f

28. 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) 20cm (2) 10cm (3) 40cm (4) ∞

29. 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°

30. Two plane mirrors are lying perpendicular to each other, there is lamp in between mirrors. Then No. of images of lamp will be
(1) 3 (2) 4 (3) 5 (4) 6

31. 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) 9cm (2) 25cm (3) 15cm (4) 17cm

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

33. Prism angle of glass prism is 10°. It's refractive index of red and violet colour is 1.51 and 1.52 respectively. Then its dispersive power will be .
(1) 0.015 (2) 0.020
(3) 0.011 (4) 0.019

34. Refractive index of violet, yellow and Red colour of light for a material of lens are 1.66, 1.64 & 1.62 respectively. If mean focal length of lens is 10cm Then chromatic abberation between the colour of violet and red will be
(1) 0.625cm (2) 0.125
(3) .02cm (4) 0cm

35. An astronomical telescope has focal lengths 100 & 10cm 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

36. If the magnitude of dispersive powers of two lenses are 0.024 and 0.036. Then their focal lengths will be for abberation free combination.

(1) 30 cm, –40 cm

(2) 30 cm, –45 cm

(3) 10 cm, 30 cm

(4) 20 cm, –35 cm

37. 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

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

(1) 5 cm (2) 12 cm

(3) 10 cm (4) 20 cm

39. If the refractive indices of crown glass for red, yellow and violet colours are 1.5140, 1.5170 and 1.5318 respectively and for flint glass these are 1.6434, 1.6499 and 1.6852 respectively, then the dispersive powers for crown and flint glass are respectively.

(1) 0.034 and 0.064

(2) 0.064 and 0.034

(3) 1.00 and 0.064

(4) 0.034 and 1.0

40. 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

(1) 5.33° (2) 4°

(3) 3° (4) 2.6°

41. 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) $\frac{4}{3}$

42. A microscope is focussed on a coin lying at the bottom of a beaker. The microscope is now raised up by 1 cm. To what depth should the water be poured into the beaker so that coin is again in the focus (Refractive index of water is 4/3)

(1) 1 cm (2) $\frac{4}{3}$ cm

(3) 3 cm (4) 4 cm

43. A boy stands straight infront of a mirror at a distance of 30 cm away from it. He sees his erect image whose height is 1/5th of his real height. The mirror he is using is –

(1) Plane mirror (2) Convex mirror

(3) Concave mirror (4) Plano-concave mirror

44. 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

45. A point source of light is place 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 ($\mu = 5/3$)

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

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

(1) Diminished, upright, virtual

(2) Enlarged, upright, virtual

(3) Diminished, inverted, real

(4) Enlarged, upright, real

47. 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

48. Angle of prism is A and its one surface is silvered. Light rays falling at an angle of incidence 2A on first surface return back through the same path after suffering reflection at second silvered surface. Refractive index of the material of prism is

(1) 2 sin A (2) 2 cos A

(3) $\frac{1}{2}$ cosA (4) tanA

49. 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

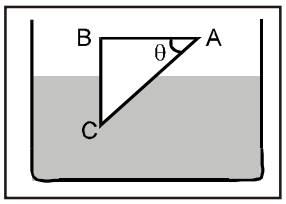
50. A glass prism ($\mu = 1.5$) is dipped in water ($\mu = 4/3$) as shown in figure. A light ray is incident normally on the surface AB. It reaches the surface BC after totally reflected, if

(1) $\sin\theta \geq 8/9$

(2) $2/3 < \sin\theta < 8/9$

(3) $\sin\theta \leq 2/3$

(4) It is not possible



51. 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

52. The minimum distance between the object and its real image for concave mirror is

(1) f (2) $2f$

(3) $4f$ (4) Zero

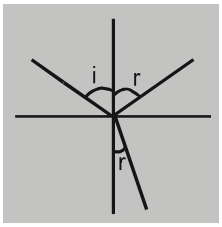
53. A ray of light is incident at an angle i from denser to rare medium. The reflected and the refracted rays are mutually perpendicular. The angle of reflection and the angle of refraction are respectively r and r'. then the critical angle will be

(1) $\sin^{-1}(\sin r)$

(2) $\sin^{-1}(\tan r')$

(3) $\sin^{-1}(\tan i)$

(4) $\tan^{-1}(\sin i)$



Directions for Assertion & Reason questions	
	These questions consist of two statements each, printed as Assertion and Reason. While answering these Questions you are required to choose any one of the following four responses.
A.	If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.
B.	If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
C.	If Assertion is True but the Reason is False.
D.	If both Assertion & Reason are false.

1. ***Assertion*** : A convex mirror is used as a driver's mirror

Reason : Because convex mirror's field of view is large and images formed are virtual, erect and diminished.

(1) A (2) B (3) C (4) D

2. ***Assertion*** : In visible light $\mu_r < \mu_v$

Reason : This follows from cauchy's formula

$$\mu = A + \frac{B}{\lambda^2} + \frac{C}{\lambda^4}$$

(1) A (2) B (3) C (4) D

3. ***Assertion*** : Refractive index of material of a prism depends on angle of prism A and angle of minimum deviation δ_m.

Reason : Because $\mu = \dfrac{\sin\left(\dfrac{A+\delta_m}{2}\right)}{\sin A/4}$

(1) A (2) B (3) C (4) D

4. ***Assertion*** : Two convex lenses joined together produce an achromatic combination

Reason : The condition for achromatism is $\frac{\omega_1}{f_1} + \frac{\omega_2}{f_2} = 0$ where symbols have their usual meaning

(1) A (2) B (3) C (4) D

5. ***Assertion*** : When the object moves with a velcoity $\vec{v}$, its image in the plane mirror moves with a velocity of $-5\vec{v}$. With respect to the object.

Reason : The minimum height of the mirror to be required to see the full image of man of height h is $\frac{h}{5}$

(1) A (2) B (3) C (4) D

6. ***Assertion*** : As the temperature of a medium increases the refractive index decreases

Reason : When a ray travels from vacuum to a medium, then μ is known as absolute refractive index of the medium

(1) A (2) B (3) C (4) D

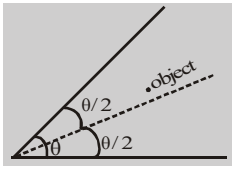
7. ***Assertion*** : Critical angle is minimum for violet colour

Reason : Because critical angle $\theta_c = \sin^{-1}\left(\frac{1}{\mu}\right)$ and $\mu \propto \frac{1}{\lambda}$

(1) A (2) B (3) C (4) D

8. ***Assertion*** : For given system ($\theta = 72°$), number of images formed is 4 when object is placed symmetrically.

Reason : A plane mirror always form a virtual image of a real object



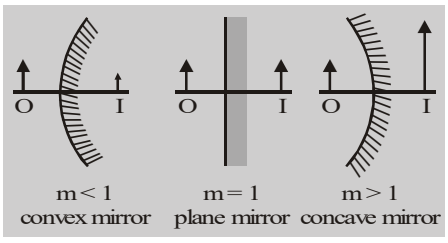
(1) A
(2) B
(3) C
(4) D

9. ***Assertion*** : The power of a converging lens is positive and that of a diverging lens is negative

Reason : Because $P = \frac{1}{f}$

(1) A (2) B (3) C (4) D

10. ***Assertion*** :– We can decide the nature of a mirror by observing the size of erect image in the mirror (see figure)



Reason :– The minimum distance between a real object and its real image in a concave mirror is zero.

(1) A (2) B (3) C (4) D

11. ***Assertion*** **:-** As light travels from one medium to another, the speed of light change.

Reason **:-** Speed is the characteristic of medium so it will change.

(1) A (2) B (3) C (4) D

12. ***Assertion*** **:-** Refractive index $n = \sqrt{\epsilon_r \mu_r}$

Reason **:-** Velocity of light in vacuum $c = \frac{1}{\sqrt{\epsilon_0 \mu_0}}$

and velocity of light in medium $v = \frac{1}{\sqrt{\epsilon \mu}}$

$$\Rightarrow n = \frac{c}{v} = \sqrt{\frac{\epsilon \mu}{\epsilon_0 \mu_0}}\ \sqrt{\epsilon_r \mu_r}\ .$$

(1) A (2) B (3) C (4) D

13. ***Assertion*** **:-** A star will appear to twinkle if seen from free space (say moon).

Reason **:-** An air bubble inside water behave like a convergent lens.

(1) A (2) B (3) C (4) D

14. ***Assertion*** **:-** A beam of white light when passed through a hollow prism, cannot give spectrum.

Reason **:-** Because refractive index of air inside and outside the prism is same, so no refraction and hence no deviation will take place.

(1) A (2) B (3) C (4) D

15. ***Assertion*** **:-** The twinkling of stars is due to the fact that refractive index of the earth's atmosphere fluctuates.

Reason **:-** In cold countries, the phenomenon of looming (i.e ship appears in the sky) takes place, because refractive index of air decreases with height.

(1) A (2) B (3) C (4) D

16. ***Assertion*** **:-** Critical angle is maximum for red colour in water-air system for visible light.

Reason **:-** Because $\sin\theta_C = \frac{1}{\mu}$ and μ_r (refractive index of red colour) is minimum for visible light.

(1) A (2) B (3) C (4) D

17. ***Assertion*** **:-** The minimum distance between a real object and its real image formed by a convex lens is 4f.

Reason **:-** Convex mirror and concave lens form a virtual and erect image for all positions of the real object.

(1) A (2) B (3) C (4) D

18. ***Assertion*** **:-** Chromatic aberration occur in simple lenses but not in mirrors.

Reason **:-** Focal length varies with wavelength in case of lenses and not in mirrors.

(1) A (2) B (3) C (4) D

19. ***Assertion*** **:** In a compound microscope, the intermediate image is real, inverted and magnified.

Reason **:** An eye specialist prescribes spectacles having a combination of convex lens (f = + 40 cm) in contact with a concave lens (f = – 25 cm). The power of this lens combination is – 1.5D

(1) A (2) B (3) C (4) D

20. ***Assertion*** **:-** 11 english alphabets donot show lateral inversion.

Reason **:-** If some portion of a mirror is covered, the intensity of image will increase.

(1) A (2) B (3) C (4) D

21. ***Assertion :-*** Sky appears blue.

Reason :- Sensitivity of eye is higher for yellow colour as compare to violet colour.

(1) A (2) B (3) C (4) D

22. ***Assertion*** **:** The images formed by total internal reflections are much brighter than those formed by mirrors or lenses.

Reason **:** There is no loss of intensity in total internal reflection.

(1) A (2) B (3) C (4) D

23. ***Assertion*** **:** The focal length of lens does not change when red light is replaced by blue light.

Reason **:** The focal length of lens does not depends on colour of light used.

(1) A (2) B (3) C (4) D

24. ***Assertion*** **:** By roughening the surface of a glass sheet its transparency can be reduced.

Reason **:** Glass sheet with rough surface absorbs more light. **[AIIMS 2005]**

(1) A (2) B (3) C (4) D

25. ***Assertion*** **:** Diamond glitters brilliantly. **[AIIMS 2005]**

Reason **:** Diamond does not absorb sunlight.

(1) A (2) B (3) C (4) D

26. ***Assertion*** **:** The resolving power of a telescope is more if the diameter of the objective lens is more. **[AIIMS 2005]**

Reason **:** Objective lens of large diameter collects more light.

(1) A (2) B (3) C (4) D

27. ***Assertion:-*** In optical fibre, the diameter of the core is kept small. **[AIIMS 2006]**

Reason:- This smaller diameter of the core ensures that the fibre should have incident angle more than the critical angle required for total internal reflection.

(1) A (2) B (3) C (4) D

28. **Assertion :-** A thick lens show more chromatic abberration comparision to thin lens. **[AIIMS 2012]**

Reason :- Thick lens behave as many thin lenses.

(1) A (2) B (3) C (4) D

29. **Assertion :-** The focal length of objective lens in telescope is much more than that of eye piece.

Reason :- Telescope has high resolving power due to large focal length. **[AIIMS 2012]**

(1) A (2) B (3) C (4) D

ANSWER KEY EXERCISE - II

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

ANSWER KEY EXERCISE - II

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	2	1	3	4	2	3	2	3	2	2	3	3	4	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	1	2	1	2	3	3	1	4	2	2	4	1	1	1
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	3	2	4	1	3	2	3	2	1	3	1	4	2	1	2
Que.	46	47	48	49	50	51	52	53							
Ans.	2	4	2	3	1	2	4	3							

ANSWER KEY EXERCISE - III

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	1	4	4	4	2	1	2	1	2	1	1	4	1	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
Ans.	1	2	1	2	3	2	1	4	1	2	2	1	1	3	