CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Physics

Chapter Name : *Ray Optics* (Chap : 6)

Total : 11 Marks (expected) [MCQ(2)-1 Mark, Assertion-Reason(1)-1 Mark, SA(1)-3 Marks, LA(1)-5 Marks]

Level - 1

MCQ Type :

1. A convex lens forms a magnified virtual image when

Ⓐ object is placed in between f and $2f$

Ⓑ object is placed in between f and pole

Ⓒ when lens is dipped into a liquid of heigher refractive index

Ⓓ all of the above

[Hints : variation of focal length of a lens due to the variation of refractive index of the surrounding medium is important for 2026]

2. If a red colour object placed in front of a convex lens, a real image of same size is formed. If a blue colour object is placed at the same position in front of the same lens, then the image will be

Ⓐ real and magnified Ⓑ real and same size Ⓒ real and diminished Ⓓ virtual and manified

[Hints : variation of focal length of a lens due to the variation of colour of light]

3. A concave mirror of focal length of produces an image n times the size of the object. If the image is real one, then the distance of the object from the mirror is

Ⓐ $(n^2+1)f$ Ⓑ $\left(\frac{n+1}{n}\right)f$ Ⓒ $\left(\frac{a^2}{n^2+1}\right)\frac{1}{f}$ Ⓓ none of these

[Hints : use mirror formula]

4. The critical angle is maximum when light travels from

Ⓐ water to air Ⓑ glass to air Ⓒ glass to water Ⓓ air to water

[Hints : variation of critical angle due to the variation of relative refractive index]

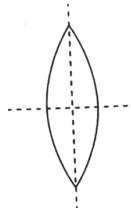
5. Velocity of light in diamond, glass and water decreases in the following order

Ⓐ water > glass > diamond Ⓑ Diamond > glass > water

Ⓒ Diamond > water > glass Ⓓ water > diamond > glass

[Hints : variation of velocity of light with variation of refractive index of medium]

6. An equiconvex lens of focal length 15 cm is cut into two halves as shown in the figure. The focal length of each part is



Ⓐ –30 cm Ⓑ –20 cm

Ⓒ 30 cm Ⓓ –15 cm

7. If m_1 and m_2 be the linear magnification of the object in the conjugate positions of a convex lens and if d be the distance between the conjugate positions, then the focal length of the lens is given by

Ⓐ $f=\frac{d}{m_1-m_2}$ Ⓑ $f=\frac{d}{m_1+m_2}$ Ⓒ $f=\frac{m_1-m_2}{d}$ Ⓓ Ⓐ or Ⓑ

[Hints : formation of real image in two position by convex lens]

8. If the refractive index of a material of equilateral prism is $\sqrt{3}$, then angle of minimum deviation of the prism is

Ⓐ 30° Ⓑ 45° Ⓒ 60° Ⓓ 75°

[Hints : use the formula for a prism $\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\frac{A}{2}}$**]**

Assertion-Reason based questions

a) Both Assertion and Reason are correct and Reason is a correct explanation of Assertion

b) Both Assertion and Reason are correct and Reason is not a correct explanation of Assertion

c) Assertion is correct, Reason is incorrect

d) Assertion is incorrect, Reason is correct

9. Assertion : The edges of the images of white object formed by a concave mirror on the screen appear white.

Reason : Concave mirror has same focal length for all colours of light.

Ⓐ a Ⓑ b Ⓒ c Ⓓ d

10. Assertion : Although the surfaces of a goggle lens are curved, it does not have any power.

Reason : In case of goggles, both the curved surfaces are curved on the same side and have equal radii of curvature.

Ⓐ a Ⓑ b Ⓒ c Ⓓ d

[Hints : use the lens maker's formula]

11. Assertion : The magnifying power of a compound microscope is negative.

Reason : The final image formed is erect with respect to the object.

Ⓐ a Ⓑ b Ⓒ c Ⓓ d

12. Assertion : A convex lens, when immersed in a liquid, disappears.

Reason : The refractive indices of material of the lens and the liquid are equal.

Ⓐ a Ⓑ b Ⓒ c Ⓓ d

[Hints : use the concept of variation of focal length due to the variation of refractive index of the surrounding]

Short answer type questions (SA)

13. a) Draw a labelled ray diagram of compound microscope, when final image forms at the least distance of distinct vision.

b) Why is its objective of short focal length and of short aparture, compared to its eyepiece? Explain.

[Hints : Refer Answer to NCERT page no. 243]

14. Draw a graph to show the variation of the angle of devation 'δ' with that of the angle of incidence *i* for a monochromatic ray of light passing through a glass prism of refracting angle 'A'. Hence deduce the relation $\mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\frac{A}{2}}$

[Hints : Refer Answer to NCERT on page no. 240]

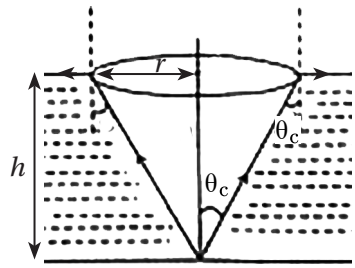
15. At what angle should a ray of light be incident on the face of a prism of refracting angle 60° so that it just suffers total internal reflection at the face? (μ = 1.524)

[Hints : use the formula first $\mu = \frac{1}{\sin\theta_c}$ **and then A = r_1 + r_2]**

16. A lens of refractive index μ becomes a lens of focal length *f* when immersed in a liquid of refractive index μ. If the focal length of the lens in air is *f* prove that $f' = f\frac{\mu'(\mu - 1)}{(\mu - \mu')}$

[Hints : use the lens maker's formula]

17. A small bulb is placed at the bottom of a tank containing water to a depth of 80 cm. What is the area of the surface of water through which light from the bulb can emarge out? Refractive index of water is $\frac{4}{3}$:

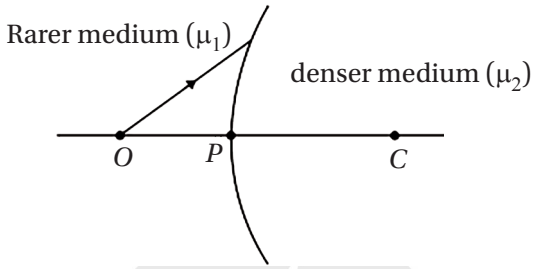


[**Hints : use** $\sin\theta_c = \frac{1}{\mu}$ **and follow the ray diagram]**

Long answer type questions (LA)

18. a) A spherical surface of radius of curvature R, separates a rarer and a denser medium as shown in figure complete the path of refracted ray of light showing the formation of image. Hence derive the formula

$$\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$$



[**Hints : Refer on page no. 233 of NCERT book]**

b) A mark placed on the surface of glass sphere is viewed through glass from a position directly opposite. If the diameter of the sphere is 10 cm and refractive index is 1.5, find the position of the image.

19. a) With the help of a ray diagram, explain the formation of image in an astronomical telescope for a distant object.

b) Define the term magnifying power of a telescope.

c) Derive an expression for its magnifying power when the final image is formed at the least distance of distinct vision.

[**Hints : Refer page no. 245 in NCERT book]**

20. a) Obtain the lens makers formula for a thin lens with proper ray diagram..

b) A equiconvex lens of focal length 20 cm in air, find its focal length in water of refractive index = $\frac{4}{3}$

[**Hints : Refer page no. 233 in NCERT book]**

21. a) Show that the least possible distance between an object and its real image in a convex lens is 4*f*, where *f* is the focal length of the lens.

b) If a convex lens of focal length *f* is placed between an object and a screen, separated by distance d and if m is the magnification of the image, then prove that $f = \frac{md}{(1+m)^2}$

[Hints : The concept of formation of real image form by convex lens]

ANSWER

1. Ⓒ
2. Ⓒ
3. Ⓑ
4. Ⓒ
5. Ⓑ
6. Ⓐ
7. Ⓐ
8. Ⓒ
9. Ⓐ
10. Ⓐ
11. Ⓒ
12. Ⓐ
13.
14.
15. 30°
16.
17. 2.6 m^2
18. b) 20 cm towards mark from the surface opposite to mark
19.
20.
21.