DPP 07

1. A prism (n = 2) of apex angle 90° is placed in air (n = 1). What should be the angle of incidence so that light ray strikes the second surface at an angle of incidence 60º.

2. The cross section of a glass prism has the form of an equilateral triangle. A ray is incident onto one of the faces perpendicular to it. Find the angle θ between the incident ray and the ray that leaves the prism. The refractive index of glass is μ = 1.5.

3. The refractive index of a prism is μ. Find the maximum angle of the prism for which a ray incident on it will be transmitted through other face without total internal reflection.

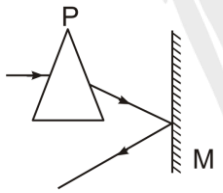
4. A prism having refractive index $\sqrt{2}$ and refracting angle 30º, has one of the refracting surfaces polished. A beam of light incident on the other refracting surface will retrace its path if the angle of incidence is:

(A) 0º (B) 30º (C) 45º (D) 60º

5. A ray of light is incident at angle i on a surface of a prism of small angle A and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, the angle of incidence i is nearly equal to :

(A) A/μ (B) A/(2 μ) (C) μ A (D) μ A/2

6. A prism having an apex angle of 4^0 and refractive index of 1.50 is located in front of a vertical plane mirror as shown in the figure. A horizontal ray of light is incident on the prism. The total angle through which the ray is deviated is:



(A) 4^0 clockwise (B) 178^0 clockwise

(C) 2^0 clockwise (D) 8^0 clockwise

7. The refracting angle of a prism is A and refractive index of the material of the prism is cot (A/2). Then the angle of minimum deviation will be

(A) 180 − 2A (B) 90 − A

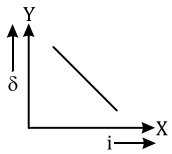
(C) 180 + 2A (D) 180 − 3A

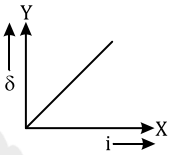
8. A prism of refractive index μ and angle of prism A is placed in the position of minimum angle of deviation. If minimum angle of deviation is also A, then in terms of refractive index, value of A is

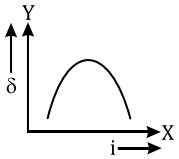
(A) $2\cos^{-1}\left(\frac{\mu}{2}\right)$ (B) $\sin^{-1}\left(\frac{\mu}{2}\right)$

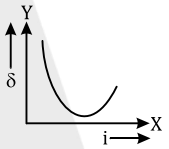
(C) $\cos^{-1}\left(\frac{\mu}{2}\right)$ (D) $\sin^{-1}\left(\sqrt{\frac{\mu-1}{2}}\right)$

9. The expected graphical representation of the variation of angle of deviation δ with angle of incidence i in a prism is

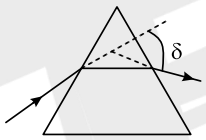
(A) 

(B) 

(C) 

(D) 

10. The angle of deviation through a prism is minimum when



(a) incident ray and emergent ray are symmetric to the prism

(b) the refracted ray inside the prism becomes parallel to its base

(c) angle of incidence is equal to that of the angle of emergence

(d) when angle of emergence is double the angle of incidence.

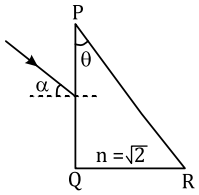
(A) Only statements (a) and (b) are true.

(B) Statements (b) and (c) are true.

(C) Statements (a), (b) and (c) are true.

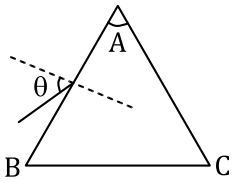
(D) Only statement (d) is true.

11. A parallel beam of light is incident from air at an angle α on the side PQ of a right angled triangular prism of refractive index $n = \sqrt{2}$. Light undergoes total internal reflection in the prism at the face PR when α has a minimum value of 45°. The angle θ of the prism is



(A) 15° (B) 22.5° (C) 30° (D) 45°

12. Monochromatic light is incident on a glass prism of angle A. If the refractive index of the material of the prism is μ, a ray, incident at an angle θ, on the face AB would get transmitted through the face AC of the prism provided



(A) $\theta > \cos^{-1}\left[\mu\sin\left(A + \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

(B) $\theta < \cos^{-1}\left[\mu\sin\left(A + \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

(C) $\theta > \sin^{-1}\left[\mu\sin\left(A - \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

(D) $\theta < \sin^{-1}\left[\mu\sin\left(A - \sin^{-1}\left(\frac{1}{\mu}\right)\right)\right]$

ANSWER KEY

1. $(90°)$

2. $(\theta = 60°)$

3. $\left(2\,sin^{-1}\frac{1}{\mu}\right)$

4. (C)

5. (C)

6. (B)

7. (A)

8. (A)

9. (D)

10. (C)

11. (A)

12. (C)

Home Work

Ex. 1	Q.15,16,17,
Ex. 2	Q.18
Ex.3	Q.17,24,26,
Ex.4	Q. 8,22,23
Ex.5	Q.