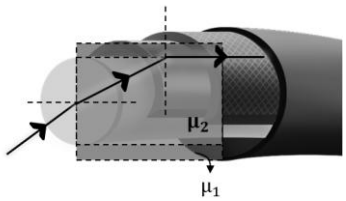
Q.1 The refractive index of the core of an optical fiber is μ_2 and that of the cladding is μ_1. The angle of incidence on the face of the core so that the light ray just grazes at the cladding as shown in the figure is.:



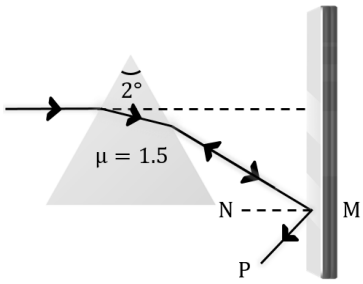
(A) $\sin^{-1}\left(\frac{\mu_1}{\mu_2}\right)$ **(B)** $\sin^{-1}\left(\frac{\mu_2}{\mu_1}\right)$

(C) $\sin^{-1}\sqrt{\mu_2^2-\mu_1^2}$ **(D)** $\sin^{-1}\sqrt{\mu_2^2+\mu_1^2}$

Q.2 In a thin prism of glass (refractive index 1.5), which of the following relations between the angle of minimum deviations (δ_m) and angle of first refraction of light (r) through prism will be correct?

(A) $\delta_m = r$ **(B)** $\delta_m = 1.5r$ **(C)** $\delta_m = 2r$ **(D)** $\delta_m = \frac{r}{2}$

Q.3 In the figure shown, find the angle (θ) by which mirror should be rotated. So that the ray of light retraces its path after reflection from mirror M.



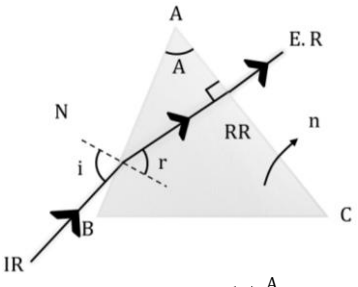
(A) $\theta = 2°$ anticlockwise **(B)** $\theta = 1°$ clockwise

(C) $\theta = 3.5°$ clockwise **(D)** $\theta = 3°$ anticlockwise

Q.4 The refractive indices of flint glass for red and violet light are 1.613 and 1.632 respectively. Find the angular dispersion produced by a thin prism of flint glass having refracting angle of 5°.

(A) 0.081° **(B)** 0.075° **(C)** 0.095° **(D)** 0.06°

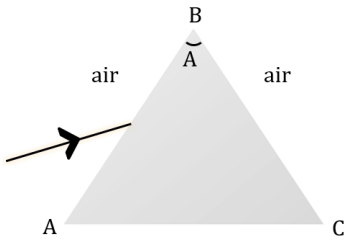
Q.5 A ray of light is incident at an angle of incidence i on one surface of a thin prism (with angle of prism A) and emerges normally from the other face. If the refractive index of the prism is n. then the angle of incidence is nearly equal to :



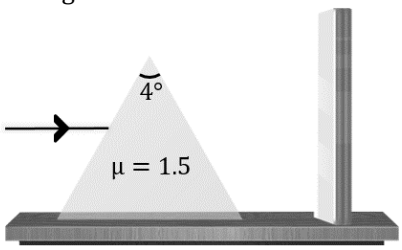
(A) nA **(B)** $\frac{2A}{n}$ **(C)** $\frac{A}{2n}$ **(D)** $\frac{nA}{2}$

Q.6 Which of the following conditions hold true if the ray (shown in figure) always undergo total internal reflection at the surface AC. The critical angle between prism and air is i_c.

(A) $A > i_c$ **(B)** $A < i_c$ **(C)** $A > 2i_c$ **(D)** $A < 2i_c$



Q.7 Find the net angle of deviation produced by the system of a prism and a plane mirror as shown in the figure. The prism being very thin has a refracting angle of 4° and the incident ray is parallel to the base of the prism as shown in the figure below.

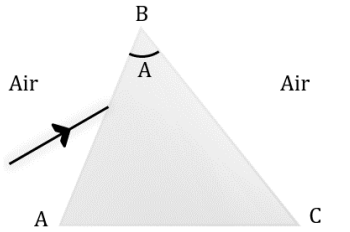


(A) 178° anticlockwise **(B)** 80° clockwise
(C) 178° clockwise **(D)** 180° anticlockwise

Q.8 A thin prism of angle 6° made of glass of refractive index 1.5 is combined with another thin prism made of glass of refractive index 1.75 to produce dispersion without deviation. The angle of the second prism is.
(A) 7° **(B)** 4° **(C)** 9° **(D)** 5°

Q.9 An object is located at a distance of 4 m from a thin prism. The refractive index of the prism is $\mu = 1.3$. When the object is viewed from the opposite side of the thin prism, then the shift produced by the thin prism is recorded as 3 m. Calculate the angle of the thin prism.
(A) 5° **(B)** 8° **(C)** 3.5° **(D)** 2.5°

Q.10 For a Prism of refractive index μ , if $C < A \leq 2C$, where C is critical angle and A is angle of prism. Find the value of angle of incidence, i_0 for which if, $0 \leq i < i_0 \rightarrow$ TIR occurs, ray does not come out of BC. And if $i_0 < i \leq 90° \rightarrow$ Ray emerges from face BC. [Assume, i be the angle of incidence of incident ray as shown in the figure below]



(A) $i_0 = \sin^{-1}[\mu\sin(A - \sin^{-1}\mu)]$ **(B)** $i_0 = \sin^{-1}(\mu\sin A)$
(C) $i_0 = \sin^{-1}[\mu\sin(A - \sin^{-1}\frac{1}{\mu})]$ **(D)** $i_0 = \sin^{-1}[\mu\sin(A + \sin^{-1}\frac{1}{\mu})]$

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(A)	(B)	(C)	(A)	(C)	(C)	(B)	(D)	(C)