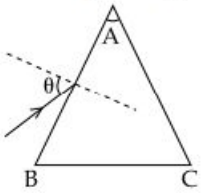
Monochromatic light is incident on a glass prism of angle A. If the refractive index of the material of the prism is μ, a ray, incident at an angle θ, on the face AB would get transmitted through the face AC of the prism provided :



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

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

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

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

For AB, we have
$\sin\theta = \mu \sin r$ .....(*)

For AC, the condition for total internal reflection is $\mu \sin C = 1$

Since, we do not want total internal reflection r' < C

$\therefore \sin r' < \sin C$

$\therefore \mu \sin r' < \mu \sin C$

$\therefore \mu \sin r' < 1$ .....(#)

Now, r + r' = A

$\therefore r' = A - r$

$\therefore \sin r' = \sin(A - r) < \frac{1}{\mu}$ [From (#)]

$\therefore A - r < \sin^{-1}\frac{1}{\mu}$

$\therefore r > A - \sin^{-1}\frac{1}{\mu}$

$\therefore \sin r > \sin\left(A - \sin^{-1}\frac{1}{\mu}\right)$

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

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

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

Hence, option (4).