

A ray of light passing through a prism having $\mu = \sqrt{2}$ suffer minimum deviation. It is found that angle of incidence is double the angle of refraction within the prism. Find angle of the prism.

Solution

if $\angle i$ = incidence angle

$\angle r$ = refracted angle

$$\angle i = 2 \times \angle r$$

$$\frac{\sin i}{\sin r} = \mu$$

$$\frac{\sin 2r}{\sin r} = \frac{2 \sin r \cos r}{\sin r} = 2 \cos r = \sqrt{2}$$

$$\cos r = \frac{1}{\sqrt{2}}$$

$$r = 45^\circ$$

For minimum deviation, $r_1 = r_2 = r$

$$\therefore a = 2 \times r$$

$$\angle a = 2 \times 45^\circ$$

$$= 90^\circ$$