B.Sc Part-I

Q. If a rod travels with a speed $V = 0.8c$ along its length (x axis) calculate percentage of contraction.

$V = 0.8c$

% contraction = ?

Solution →

Given rod with velocity $V = 0.8c$

Let proper length is l_0 & contracted length is l.

So from length contraction formula

$$l = l_0 \sqrt{1 - \frac{v^2}{c^2}}$$

Put value of V

$$l = l_0 \sqrt{1 - \frac{(0.8c)^2}{c^2}}$$

$$l = l_0 \sqrt{1 - 0.64}$$

$$l = l_0 \sqrt{0.36}$$

So contracted length $l = 0.6\, l_0$

Hence % of contraction = $\frac{\text{Proper length} - \text{contracted length}}{\text{Proper length}} \times 100$

$$\Rightarrow \left(\frac{l_0 - 0.6\, l_0}{l_0}\right) \times 100$$

$\Rightarrow (1 - 0.6) \times 100$

$\Rightarrow (0.4) \times 100$

$\Rightarrow 40\%$. Ans