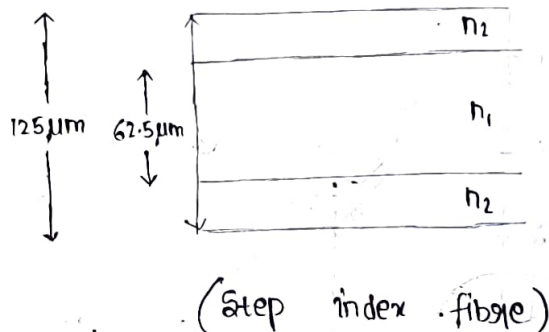
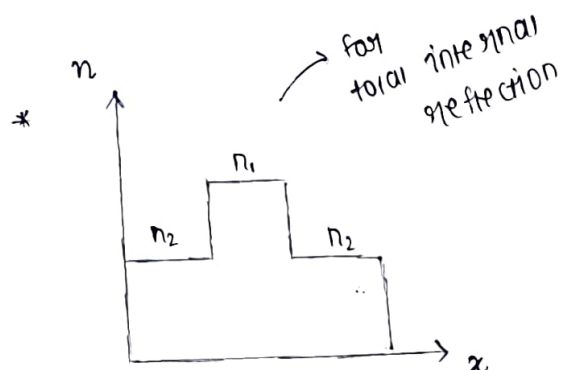
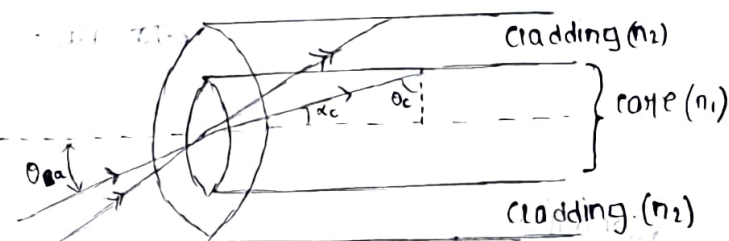


CONDITION FOR LIGHT PROPAGATION IN OPTICAL FIBRE :



* Applying Snell's law in the core-cladding boundary we get :

$$n_1 \sin \theta_c = n_2 \sin 90^\circ$$

$$\Rightarrow \sin \theta_c = \frac{n_2}{n_1}$$

$$\Rightarrow \theta_c = \sin^{-1} \left(\frac{n_2}{n_1} \right)$$

* α_c is the "critical propagation angle"

$$\theta_c = 90^\circ - \alpha_c$$

$$\sin \theta_c = \cos \alpha_c$$

$$\sin \alpha_c = \sqrt{1 - \cos^2 \alpha_c} = \sqrt{1 - \left(\frac{n_2}{n_1} \right)^2} = \sqrt{\frac{n_1^2 - n_2^2}{n_1^2}}$$

* Applying Snell's law at the gap fibre interface

$$n_a \sin \theta_a = n_1 \sin \alpha_c, \quad \theta_a \rightarrow \text{acceptance angle.}$$