

Q5. A glass clad fiber is made with core glass of refractive index 1.5 and the cladding is doped to get a refractive index difference of 0.0005. Find [a] the refractive index of the cladding. [b] the critical internal reflection angle [c] Acceptance angle.

Given :- $\mu_1=1.5$; $\Delta= 0.0005$

Formula:- $\Delta= 1-\frac{\mu_2}{\mu_1}$; $N.A.= \sqrt{\mu_1^2 - \mu_2^2}$

Solution:- $\mu_2= \mu_1(1-\Delta)=1.5(1-0.0005)=1.49925$

$$\varphi_c = \sin^{-1} \frac{\mu_2}{\mu_1} = \sin^{-1} \frac{1.49925}{1.5} = 88.18^\circ$$

$$\theta_0 = \sin^{-1} \sqrt{\mu_1^2 - \mu_2^2}$$

$$= \sin^{-1} \sqrt{1.5^2 - 1.49925^2} = 2.718^\circ$$

Ans:- The R.I of cladding is 1.49925 and the critical angle is 88.18° and the acceptance angle is 2.718°.