

Q1. Calculate the numerical aperture and hence the acceptance angle for an optical fiber. Given that the refractive indices of the core and the cladding are 1.45 and 1.40 respectively.

Given:- $\mu_1 = 1.45$; $\mu_2 = 1.40$

Formula :- $N.A. = \sin \theta_0 = \sqrt{\mu_1^2 - \mu_2^2}$

Solution:- $N.A. = \sqrt{1.45^2 - 1.40^2}$

$$= 0.3775$$

$$\theta_0 = \sin^{-1}(N.A.) = \sin^{-1}(0.3775)$$

$$= 8.192^\circ$$

Ans:- N.A. of fiber is 0.3775 and its acceptance angle is 8.192°