Q3. An optical fiber has a NA of 0.20 and refractive index of cladding is 1.59. Determine the core refractive index and the acceptance angle for the fiber in water which has a refractive index of 1.33.

Given:- NA=0.20; μ_2=1.59; μ_o=1.33

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

Solution:- N.A.=$\sqrt{{\mu_1}^2 - {\mu_2}^2}$

μ_1=$\sqrt{N.A.^2 + {\mu_2}^2}$ =$\sqrt{0.2^2 + 1.59^2}$ =1.6025

θ_0 = $\sin^{-1}\frac{N.A.}{\mu_o}$ =8.64°

Ans:- The R.I. of core is 1.6025 and acceptance angle 8.64°