Q6. A step index fiber has core diameter 29x10⁻⁶m . The refractive indices of the core and the cladding are 1.52 and 1.5189 resp. If the light of wavelength 1.3µm is transmitted through the fiber, determine [a]Normalized frequency of the fiber. [b] The number of modes fiber will support.

Given :- d=29x10⁻⁶m; $\lambda = 1.3 \times 10^{-6}m$; µ₁= 1.52; µ₂=1.5189.

Formula :- $V = \dfrac{2\pi r \sqrt{\mu_1^2 - \mu_2^2}}{\lambda}$; $N_m = \dfrac{V^2}{2}$

Solution:- $V = \dfrac{3.14 \times 29 \times 10^{-6}}{1.3 \times 10^{-6}} \times \sqrt{(1.5)^2 - (1.5189)^2} = 4.049$

$N_m = \dfrac{V^2}{2} = \dfrac{(4.049)^2}{2} = 8.197$

Ans:- Normalized frequency is 4.049 and the number of modes is 8.