

## FIBER OPTICS

1. The numerical aperture of an optical fiber is 0.2 when surrounded by air. If the refractive index of the cladding is 1.59, find the acceptance angle of the fiber in water with the index 1.33. [8.65°]
2. A lens of focal length 1 cm is used to launch a light into the silica glass optical fiber having 1.453 refractive index in the cladding. Find the diameter of the lens. [0.25 cm]
3. A step index fiber has a core refractive index of 1.48. If the core diameter and numerical aperture of the fiber are 50  $\mu\text{m}$  and 0.5 respectively, find the maximum number of modes of light of wavelength 1  $\mu\text{m}$  the fiber can carry. [3,081]
4. Consider a ray of light entering 2 m long step index fiber, whose refractive index and diameter of the core are 1.48 and 60  $\mu\text{m}$  respectively. If the incident ray makes an angle of 3.43° with the axis of the fiber, how many reflections will it undergo within the fiber? [1350]
5. A convex lens of focal length 5 cm is used to couple a light into an fiber of refractive index 1.44. If the light undergoes total internal reflection at 65°, find the diameter of the lens. [7.7 cm]

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