

Optical fiber characterization

Apparatus - Diode laser, Optical laser, Laser-fibre coupler, optical rail, pinhole photo detector, Power supply for laser and detector output measurement unit.

SLO: To determine numerical aperture of a given multimode optical fiber.

Theory: A multimode optical fiber will only propagate light that enters the fiber within a certain cone, known as the acceptance cone of the fiber. The half angle of this cone is called the acceptance angle, θ_a .

$$\text{Acceptance Angle } \theta_a = \tan^{-1}(R/z)$$

where, D is the diameter of far field intensity at 5% intensity level of the maximum attainable intensity and z is the distance b/w the detector and the fiber output end.

Result: Numerical aperture (NA) of the given multimode optical fiber is: 0.5958

$$\text{Calculation} = 5\% I = 5/100 \times 36.2 = 6.88$$

$$D = 472.5 = 1.5 \text{ mm}$$

$$R = D/2 = 0.75 \text{ mm}$$

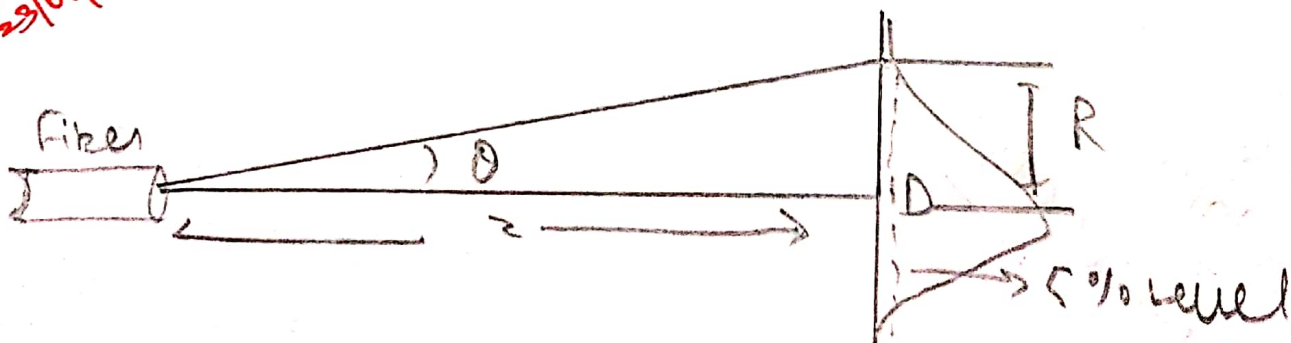
$$\theta_a = \tan^{-1}(R/z) = \tan^{-1}(0.75/1) = 36.87$$

$$NA = \sin \theta_a = \sin(36.87) = 0.5958$$

Expt. No.....

Z 0mm 1mm	Micrometer	Reading (mm)	(mA)		D _{cal}
			Detector	0/p current	
			176.9		
			112.6		
			0		
			0.1		
			0.3		
			1.7		
			18.4		
			57.5		
			95.5		
			136.3		
			126.3		
			92.9		
			38.4		
			8.5		
			0.9		
			0.2		
			0.1		
			0		

cal
~~23/09/21~~



Circle

Graph of $y = \sin x$

Graph of $y = \cos x$

Graph of $y = \tan x$

