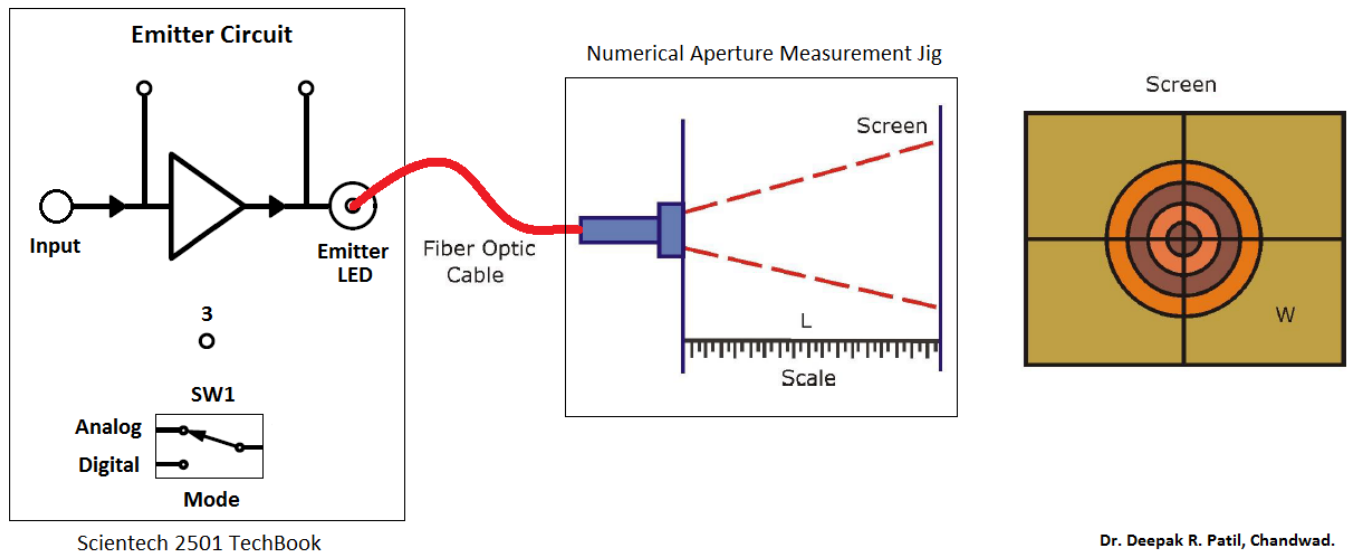


Title: Measurement of Numerical Aperture.

Aim: To measure the numerical aperture of the plastic fiber.

Equipment's and Miscellaneous: Scientech 2501 TechBook with Power Supply cord, Optical Fiber cable (Step Indexed Multimode PMMA plastic cable), Numerical Aperture measurement Jig.

Circuit Diagram:



Procedure:

1. Connect the Power Supply cord to mains supply and to the TechBook Scientech 2501.
2. Connect one end of fiber cable to the output socket of emitter circuit and the other end to the numerical aperture measurement jig. Hold the white screen facing the fiber such that its cut face is perpendicular to the axis of the fiber.
3. Hold the white screen with 4 concentric circles (10, 15, 20 & 25 mm diameter) vertically at a suitable distance to make the red spot from the fiber coincide with 10 mm circle.
4. Record the distances of screen from the fiber end L and note the diameter W of the spot.
5. Compute the numerical aperture from the formula given below.

$$NA = \frac{W}{\sqrt{4L^2 + W^2}}$$

$$= \sin \theta_{max}$$

6. Vary the distance between in screen and fiber optic cable and make it coincide with one of the concentric circles. Note its distance.
7. Tabulate the various distances and diameter of the circles made on the white screen and computer the numerical aperture from the formula given above.

Observation Table:

Sr. No.	Diameter 'W'	Distance 'L'	$NA = \frac{W}{\sqrt{4L^2 + W^2}}$
1.			
2.			
3.			
4.			
5.			

(Leave enough space for observation table in practical book)

Calculations:

Numerical Aperture $NA = \frac{W}{\sqrt{4L^2 + W^2}}$

(Leave enough space for calculations in practical book)

Result:

1. The Numerical Aperture of the Step Indexed Multimode PMMA plastic cable is
2. The numerical aperture as recorded in the manufacturer's data sheet is 0.5 typically. The value measured here is The lower reading recorded is mainly due to the fiber being under filled.

(Do not write on Practical Sheet)

Precautions: 1. It is very important that the optical sources be properly aligned with the cable and the distance from the launched point and the cable be properly selected to ensure that the maximum amount of optical power is transferred to the cable.

2. Carefully handle optical fiber. Do not bent beyond limit.