IARE

IARE
INSTITUTE OF AERONAUTICAL ENGINEERING
(An Autonomous Institute affiliated to JNTUH, Hyderabad)
Dundigal, Hyderabad - 500 043

LABORATORY WORK SHEET

Name of the Student :.....

Class..... Semester.....

Course Code :.....Course Name :.....

Roll Number										

Name of the Course Faculty.....Faculty ID :.....

Exercise Number :.....Week Number :.....Date :.....

DAY TO DAY EVALUATION:

Marks	Aim / Preparation	Algorithm / Procedure	Source Code	Program Execution	Viva - Voce	Total
		Performance in the Lab	Calculations and Graphs	Results and Error Analysis		
Max. Marks	**4**	**4**	**4**	**4**	**4**	**20**
Obtained						

Signature of Faculty

START WRITING FROM HERE :

Optical Fiber

Objective :

Educational

During our current age, th increasing ability to transmit more information over longer distances more quickly has expanded th boundaries of our technological development in many areas such as data networks, wireless and satellite communications, cable operators and broadcasters. All of this has become possible by th use of fibre optics.

ROLL NUMBER :

Experimental

To determine the numerical aperture of a given optical fibre.

Equipment needed :

1. Step index fibre optic cable 1 or 2m length
2. light source
3. N.A measurement jig.
4. N.A Scale.

Procedure :

1. LED is made to glow by applying 1.5V DC power.
2. Light is allowed to propagate through an optical fibre cable whose N.A is to be determined.
3. The output is screened on a concentric circles of known diameter is placed at a distance of 1, 2, 3, 4 and 5cm and corresponding radius of the concentric circles is noted.
4. The experiment is repeated for different lights.

Applications :

1. Optical fibres may be used for accurate sensing of physical parameters and fields like pressure, temperature and liquid level.
2. For military applications like fiber optic hydrophones for submarine and underwater sea application and gyroscopes for applications in ships, missiles and aircrafts.

ROLL NUMBER :

Observation table :

S.no.	Distance b/w Source & Screen L (mm)	Radius of concentric circle r	$NA = \frac{r}{\sqrt{r^2+L^2}}$	$\theta = \sin^{-1}(NA)$
1.				
2.				
3.				
4.				
5.				

Results :

1. The NA of the optical fibre is _____.

2 The acceptance angle is _____.

Viva voce :

1. Define acceptance angle.

ans The maximum incident angle at which an optical element (lens, fibre) or material will transmit light by total internal reflection.

2 Define numerical aperture.

ans Numerical aperture is defined as being equal to $n\sin\theta$, where n is refractive index of medium between the objective lens and object ($n \cong 1$ for air) and θ is half the angular aperture of objective lens.

ROLL NUMBER :

3. Explain construction of optical fibre.

ans A fibre optic cable consists of a glass (or) silica core. The core of the optical fibre is surrounded by a similar material i.e. glass (or) silica called the cladding, that has a refractive index that is slightly lower than that of the core.

4. Discuss principle of optical fibre.

ans optical fibre works on the principale of total internal reflection. When light rays shine at internal surface of optical fibre called incident angle, is greater than critical angle, then incident light ray reflects in same medium and it repeats.