EXP NUMBER – SIX

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Branch: CSE (B.TECH)	Section/Group-26(B)
Semester: 2ND	Date of Performance:30/03/2021

AIM OF THE EXPERIMENT –

To find the numerical aperture of a given optical fiber and hence to find its acceptance angle

APPARATUS-

S.No.	Equipment	Quantity
1.	Emitter/Laser	1
2.	Fiber Stand	1
3.	Concentrator	1
4.	Optical Fiber	1
5.	Detector	1
6.	Output Unit	1

OBSERVATIONS-

Least count of screw gauge

One pitch scale division (n) = 1mm

Number of divisions on head scale (m) =

100 Least count (L.C) =n/m =0.01mm

Sr no.	Screw gauge readings		Distance in mm	Current (μA)
	psr	hsr		
1	0.5	0	0.5	0
2	1	0.03	1.03	0
3	1.5	0.06	1.56	0
4	2	0.1	2.1	0
5	2.5	0.13	2.63	$4*10^{-9}$
6	3	0.16	3.16	$6.2*10^{-8}$
7	3.5	0.19	3.69	$8.25*10^{-7}$
8	4	0.22	4.22	0.00000857
9	4.5	0.25	4.75	0.000069583
10	5	0.28	5.28	0.0004415
11	5.5	0.31	5.81	0.00219
12	6	0.34	6.34	0.00849
13	6.5	0.37	6.87	0.02573
14	7	0.40	7.40	0.0609572
15	7.5	0.44	7.94	0.112856
16	8	0.47	8.47	0.1633159
17	8.5	0	8.5	0.1847264
18	9	0.03	9.03	0.1633159
19	9.5	0.06	9.56	0.112856
20	10	0.09	10.09	0.0609572
21	10.5	0.13	10.63	0.02573
22	11	0.16	11.16	0.00849
23	11.5	0.19	11.69	0.00219
24	12	0.22	12.22	0.0004415
25	12.5	0.25	12.75	0.00006958
26	13	0.28	13.28	0.00000857
27	13.5	0.31	13.81	$825*10^{-7}$
28	13.5	0.34	13.84	$6.2*10^{-8}$
29	14	0.37	14.37	$4*10^{-9}$
30	14.5	0.40	14.90	0
31	15	0.44	15.44	0
32	15.5	0.47	15.97	0
33	16	0.49	16.49	0

CALCULATIONS-

Distance between fiber and detector =0.004m

r1 = 7.4

r2 = 10.09

r=(r1+r2)/2

$=8.8*10^{-3}$m

Radius of the spot, r = $8.8*10^{-3}$ m

Numerical app of optic fiber –

NA = $r/\sqrt{r^2+d^2}$

$= 0.0088/ ((0.0088)^2 + (0.004)^2)^{1/2}$

= 0.9103 m

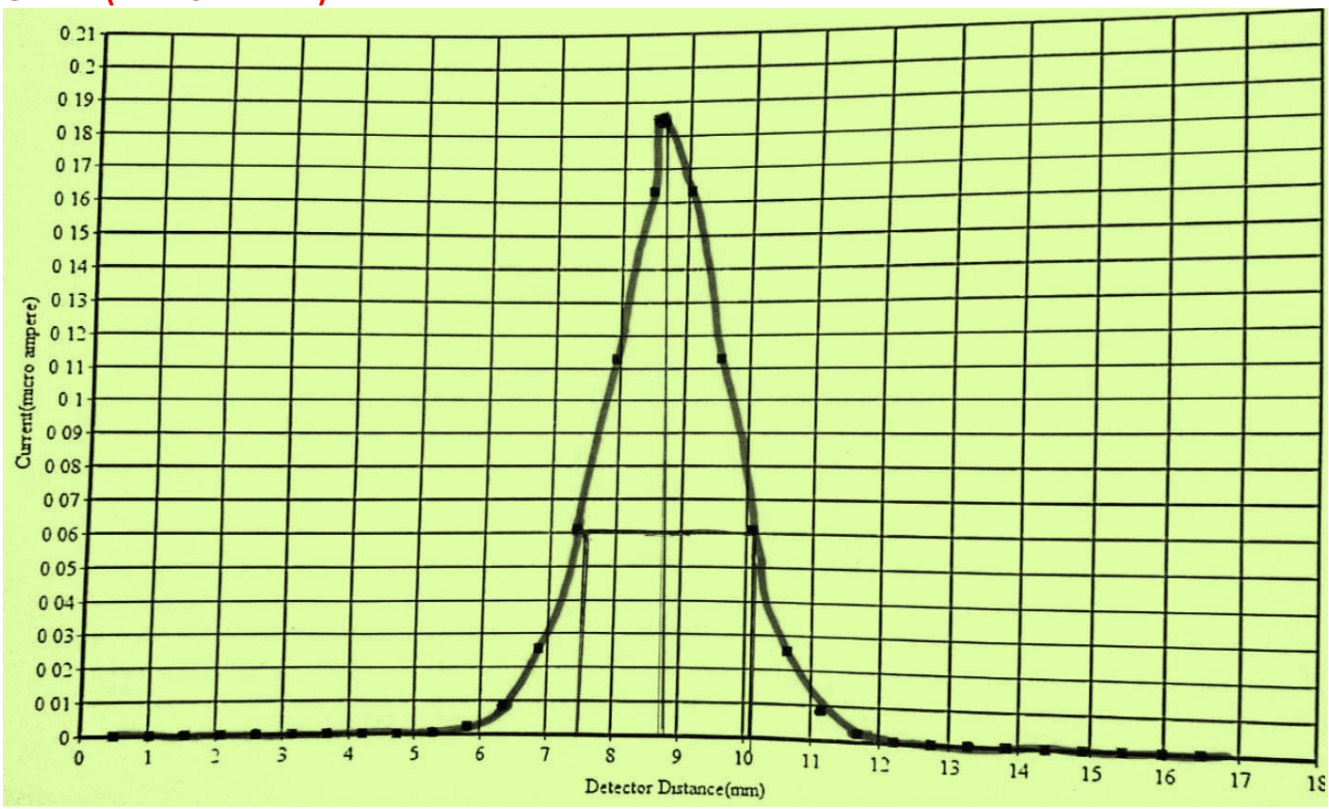
Acceptance Angle= $\sin^{-}(NA)$

$= \sin^{-}(0.9103)$

$= 65.54^{o}$

PERCENTAGE ERROR-

GRAPH (ATTACH IF ANY)-



RESULTS AND DISCUSSION-

The value of numerical app is 0.9103

Acceptance angle = $\sin^{-}(0.9103)$

$=65.54^{o}$

Numerical aperture is a basic descriptive characteristic of a specific fiber. It represents the size or degree of openness of the input acceptance cone.

LEARNING OUTCOMES

- It will provide the modest experience that allows students to develop and improve their experimental skills and develop ability to analyzedata.
- Ability to demonstrate the practical skill on measurements and instrumentation techniques of some Physics experiments. Students will develop the ability to use appropriate physical concepts to obtain quantitative solutions to problems inphysics.
- Students will demonstrate basic experimental skills by setting up laboratory equipment safely and efficiently, plan and carry out experimental procedures, and report verbally and in written language the results of theexperiment.
- Students will develop skills by the practice of setting up and conducting an experimentwithdueregardstominimizing measurement error.

EVALUATION COLUMN (To be filled by concerned faculty only)

Sr. No.	Parameters	Maximum Marks	Marks Obtained
1.	Worksheet completion including writing learning objectives/Outcomes. (To be submitted at the end of the day)	10	
2.	Post Lab Quiz Result.	5	
3.	Student Engagement in Simulation/Demonstration/Performance and Controls/Pre-Lab Questions.	5	
4.	Total Marks	20	
5.	Teacher's Signature (with date)		