EXPERIMENT NUMBER – 1.3

Student Name:	**UID:**
Branch: CSE	**Section/Group:**
Semester: 2	**SUB: PHYSICS**

Experiment-1.3

AIM OF THE EXPERIMENT –

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

APPARATUS –

Sr.No.	Equipment	Quantities in No.
1	Emitter / Laser	1
2	Fiber Stand	1
3	Concentrator	1
4	Optical Fiber	1
5	Detector	1
6	Output Unit	1

OBSERVATIONS –

Sr. No.	Distance X in(mm)	Detector Reading I (μA)
1	4	0.00000021
2	4.5	0.00000285
3	5	0.00002919
4	5.5	0.00022709
5	6	0.00134378
6	6.5	0.00604878
7	7	0.0207118
8	7.5	0.05394846
9	8	0.10689348
10	8.5	0.16111446
11	9	0.1847264
12	9.5	0.16111446
13	10	0.10689384
14	10.5	0.05394846
15	11	0.0207118
16	11.5	0.00604878
17	12	0.00134378
18	12.5	0.00022709
19	13	0.00002919
20	13.5	0.00000285
21	14	0.00000021

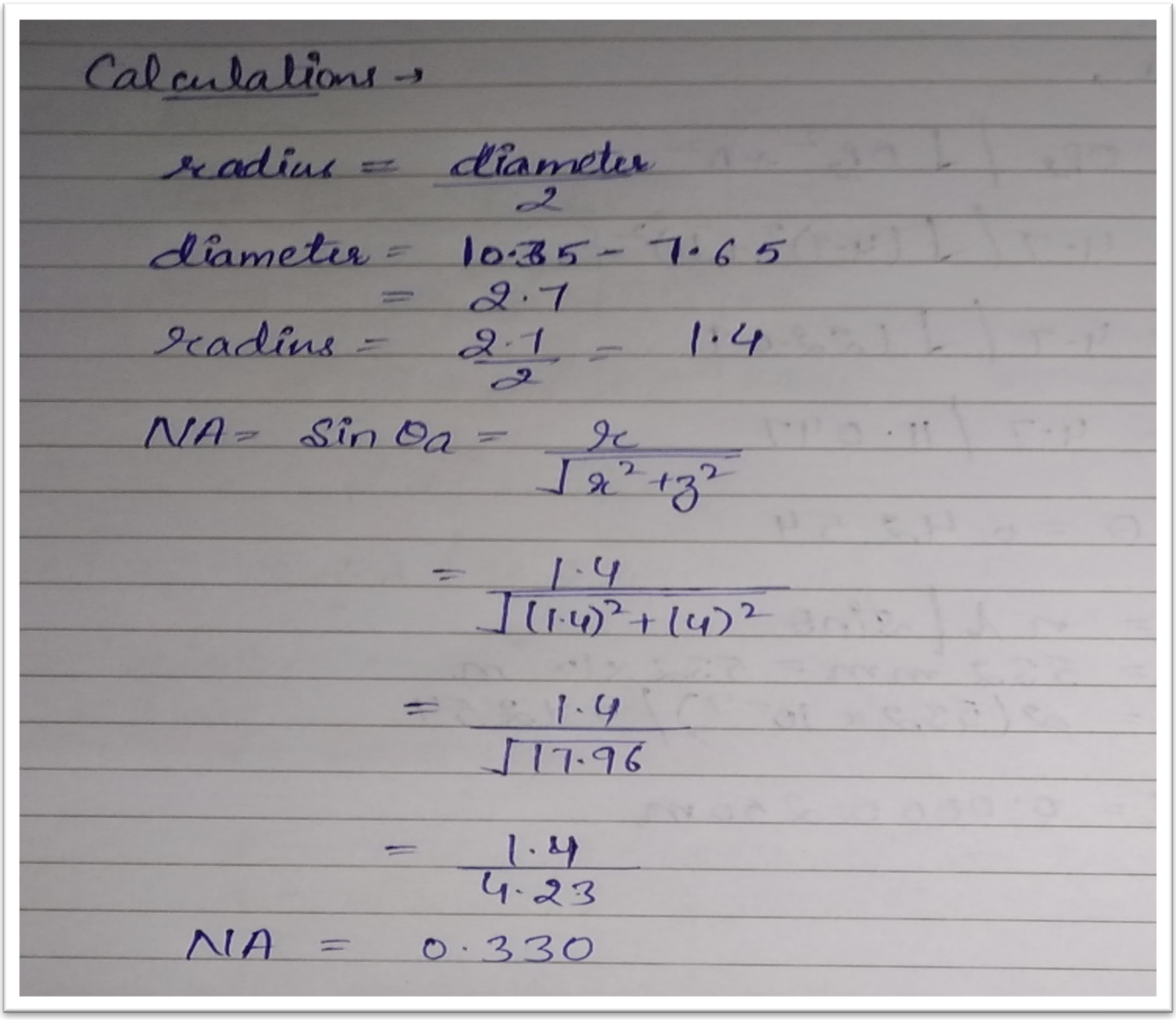
CALCULATIONS –

Distance between the fiber and the detector, z = ……..4…….. mm

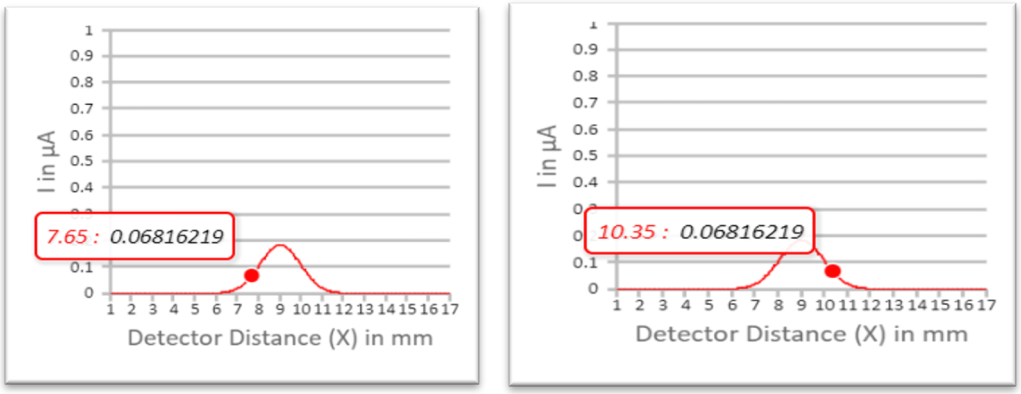
Radius of the spot, r = ……..1.4…….. mm

Numerical Aperture of the optic fiber, = ……..0.330……..

Formula used , NA = SinΘa = r / √r² + z²



GRAPH (ATTACH IF ANY) –



SOURCES OF ERROR –

- **Incorrect measurement of the radius.**
- **Fluctuation in the power supply.**

RESULTS AND DISCUSSION –

Result –

Numerical aperture of the given Optical fiber = 0.330

Conclusion –

A high numerical aperture allows light to propagate down the fiber in rays both close to the axis and at various angles, allowing efficient coupling of light into the fiber. However, a high numerical aperture increases the amount of dispersion as rays at different angles have different path lengths and therefore take different times to traverse the fiber. A low numerical aperture may therefore be desirable.

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 anexperimentwithdueregardstominimizing 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)		