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EXPERIMENT NUMBER – 4

Student Name: RAJDEEP JAISWAL	**UID: 20BCS2761**
Branch: B. TECH (CSE)	**Section/Group: 26 B**
Semester: 2ⁿᵈ	**Date of Performance: 8/03/21**

AIM OF THE EXPERIMENT–To determine the diffraction using laser beam and find the grating element of diffraction grating.

APPARATUS-

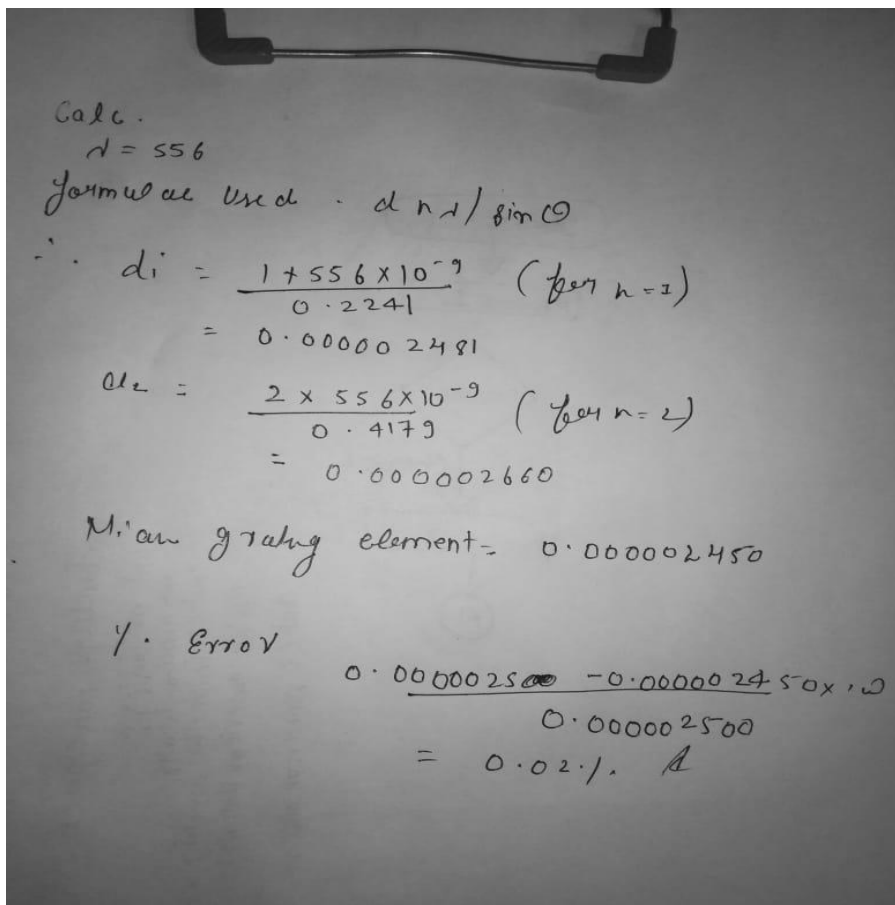| S.No.	Equipment	Range	Quantity
1.	Power supply/Operating voltage	5mV/3-12V	1
2.	Laser	400 – 700nm	1
3.	Grating element	250 - 500 lines per mm.	1
4.	Stand	NA	2

OBSERVATIONS-

i.   Wavelength of Diode laser, λ= 445
ii.   Distance between diffraction grating and screen, D= 10m
iii. Standard Grating Element (d) = 1mm/400 = 0.0000025 m

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S.NO.	Order of Diffraction(n)	Position of nth order maxima(m)	Mean distance of nth order maxima	Distance between Grating and screen(D) (m)	Sin theta	d= in (m)
1.	1	OP_{left} = 2.3 OP_{right} = 2.3	2.3	10	0.2441	0.00000281
2.	2	OP_{left} = 4.6 OP_{right} = 4.6	4.6	10	0.4117	0.000002660

Mean Grating Element = 0.0000002565

OBSERVATIONS:- PERCENTAGE ERROR:-

Calc.

$d = 556$

Formulae Used . $d \, n\lambda / \sin\theta$

$\therefore \quad d_i = \dfrac{1 + 556 \times 10^{-9}}{0.2241}$ (for n=1)

$= 0.00000\,2481$

$d_2 = \dfrac{2 \times 556 \times 10^{-9}}{0.4179}$ (for n=2)

$= 0.000002660$

Mean grating element = 0.000002450

$\%$ Error

$\dfrac{0.0000025000 - 0.00000\,2450 \times 10}{0.000002500}$

$= 0.02\% \, \Lambda$

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RESULT AND DISCUSSION:-

Grating Element, d= 0.000002565

SOURCES OF ERROR:-

1. Laser light should not fall on eyes of observer directly.
2. All lengths should be measured in same unit.
3. Distance between the spots should be measured accurately

CONCLUSIONS:-

We found out a diffraction grating has a very large number of equally spaced slits. When parallel light is incident on a diffraction grating each slit acts as a source of diffracted waves. Those waves therefore interact with one another. Diffracted lights shine on a distant screen which has a central bright spot labelled m=0 and a higher order bright fringes that can also be observed.

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)		

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