## EXPERIMENT NUMBER –1.2

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| **Student Name: Ravi Jaiswal** | **UID:21BCS7818** |
| **Branch:CSE** | **Section/Group: 24'B'** |
| **Semester: 1** | **Date of Performance:** |

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

**APPARATUS-**

1. **Power Supply/Operating Voltage**
2. **Laser**
3. **Diffraction Grating**
4. **Screen**

**OBSERVATIONS-**

Wavelength Of The Diode Laser (λ) = 500.5 nm

| S.No. | Order of Diffraction | Position of nth order maxima | | Mean distance of nth order maxima from zeroth order OPn (m) | Distance Between grating and screen (D)m | $\text{Sin}\theta=\frac{OP1}{\sqrt{OP1^2+D^2}}$ | d=nλ/Sinθ (m) |
|---|---|---|---|---|---|---|---|
| | | On left (OPn)m | On right (OPn)cm | | | | |
| 1. | 1 | 2.1 | 2.1 | 2.1 | 10 | 0.2055 | $1.39\times10^{-4}$ |
| 2. | 2 | 4.5 | 4.5 | 4.5 | 10 | 0.4103 | $1.39\times10^{-4}$ |

Type equation here.

**CALCULATIONS-**

**Mean value of grating element , d= nλ/Sinθ (m)**

**If n=1 then d is,**

**d= nλ/Sinθ**

$$= \frac{1\times 500.5\times 10^{-9}}{\sin 0.2055} = 1.39\times 10^{-4}\text{m}$$

**If n=2 then d is,**

**d= nλ/Sinθ**

$$= \frac{2\times 500\times 10^{-9}}{0.4103} = 1.39\times 10^{-4}\text{m}$$

**PERCENTAGE ERROR-**

Grating element d = $1.39 \times 10^{-4}$m
Standard grating element d= 1/N , where N is no of lines per mm

if N= 409mm

d= $10^{-3}/409 = 2.44 \times 10^{-6}$

% age error = $\frac{/std-exp/}{std} \times 100$

$= \frac{/2.44\times 10^{-6}-1.39\times 10^{-4}/}{2.44\times 10^{-6}} \times 100$

=

**GRAPH (ATTACH IF ANY)-**

SOURCES OF ERROR-

1.The main sources of error are the distance between the laser and the wall, and the size of the dots. There is a further enlargement of the dots due to attenuation as it passes through the air. This experiment would have been more accurate if executed in a vacuum

2.The dots on the extreme edges are also larger than they needed to be since the light is spread out and it is hitting the surface (the wall) at an angle.

**RESULTS AND DISCUSSION-**

Grating element d = _____ m
Standard grating element d= 1/N , where N is no of lines per mm

if N= 500

$d = 10^{-3}/500 = 0.002 \times 10^{-3} = 2 \times 10^{-6}$ m

% age error =

$$\frac{|\text{Std value} - \text{exp value}|}{\text{Standard value}} \times 100$$

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 analyze data.
- 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 in physics.
- 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 the experiment.
- Students will develop skills by the practice of setting up and conducting an experiment with due regards to minimizing 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) | | |