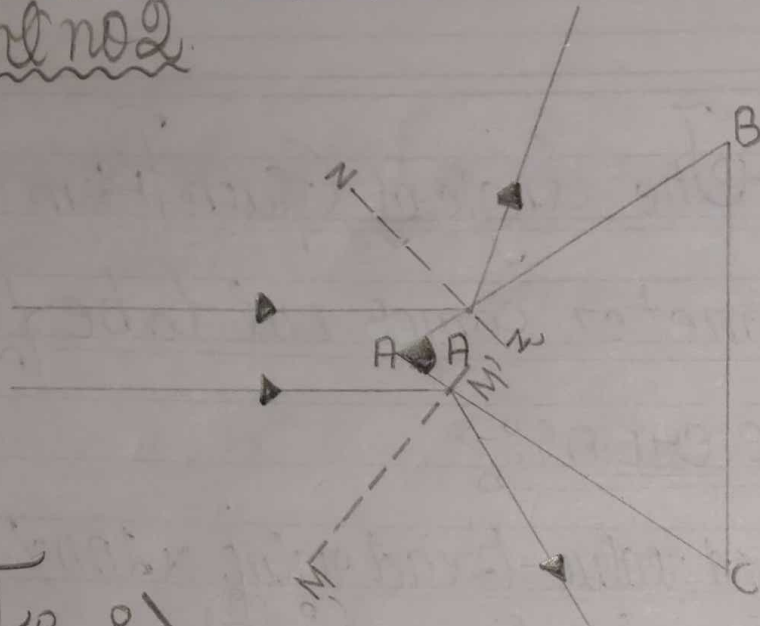
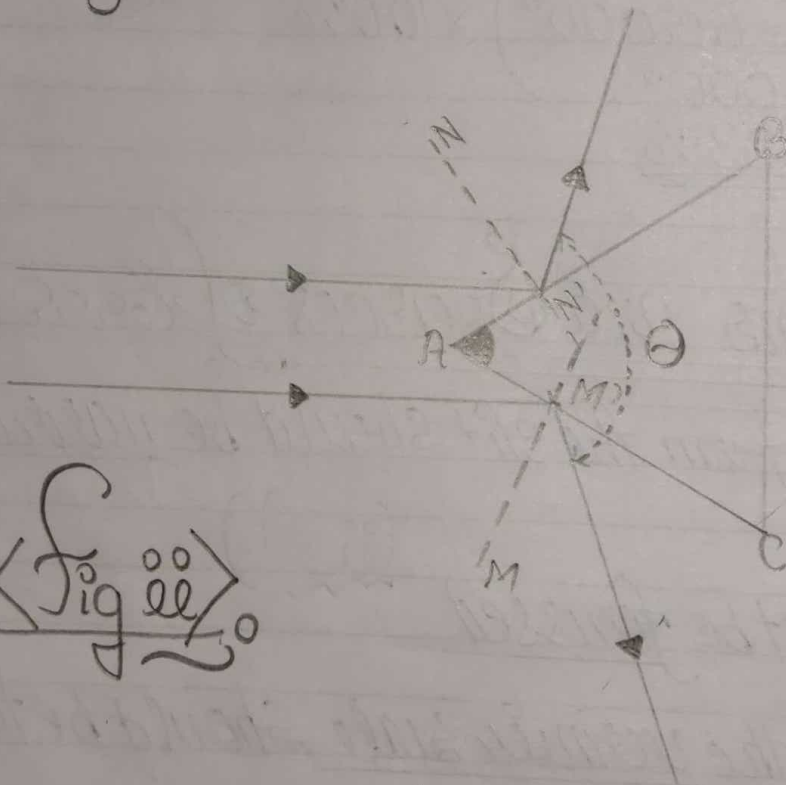


Experiment no 2



<Fig i>



<Fig ii>

Diphae

// Experiment No. 2 //

- 1) Aim \rightarrow To determine the refractive index of the material of the prism using Spectrometer
- 2) Apparatus required \rightarrow Spectrometer, Glass Prism, Sodium Lamp, Spirit Level, Magnifying Glass.
- 3) Formula Used \rightarrow The formula for obtaining the refractive index of a prism is this \rightarrow

$$\Rightarrow \mu = \frac{\sin(A + \delta_m)}{\sin(\frac{A}{2})}$$
 Here A is the Angle of Prism and δ_m is the Angle of Minimum Deviation

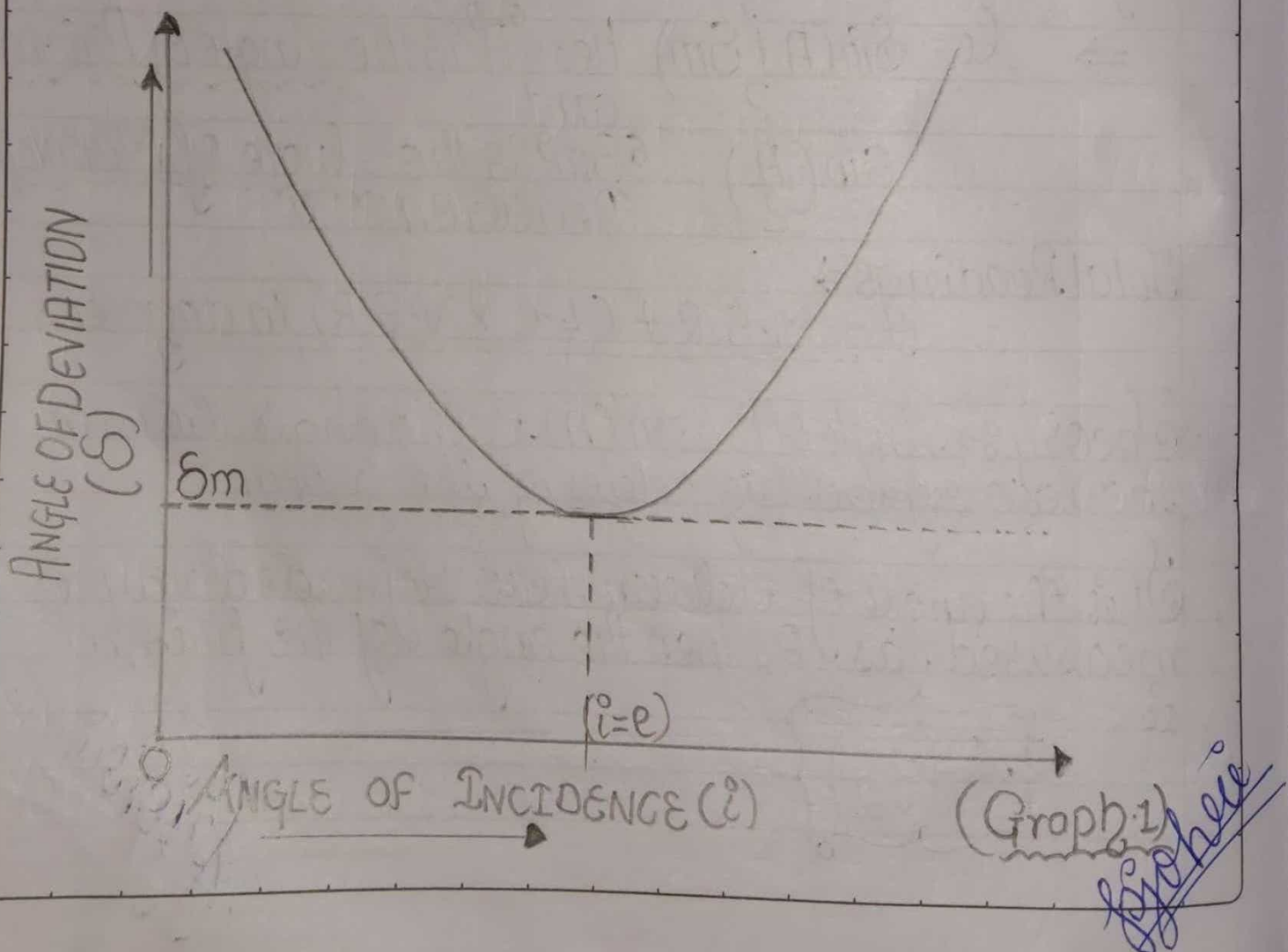
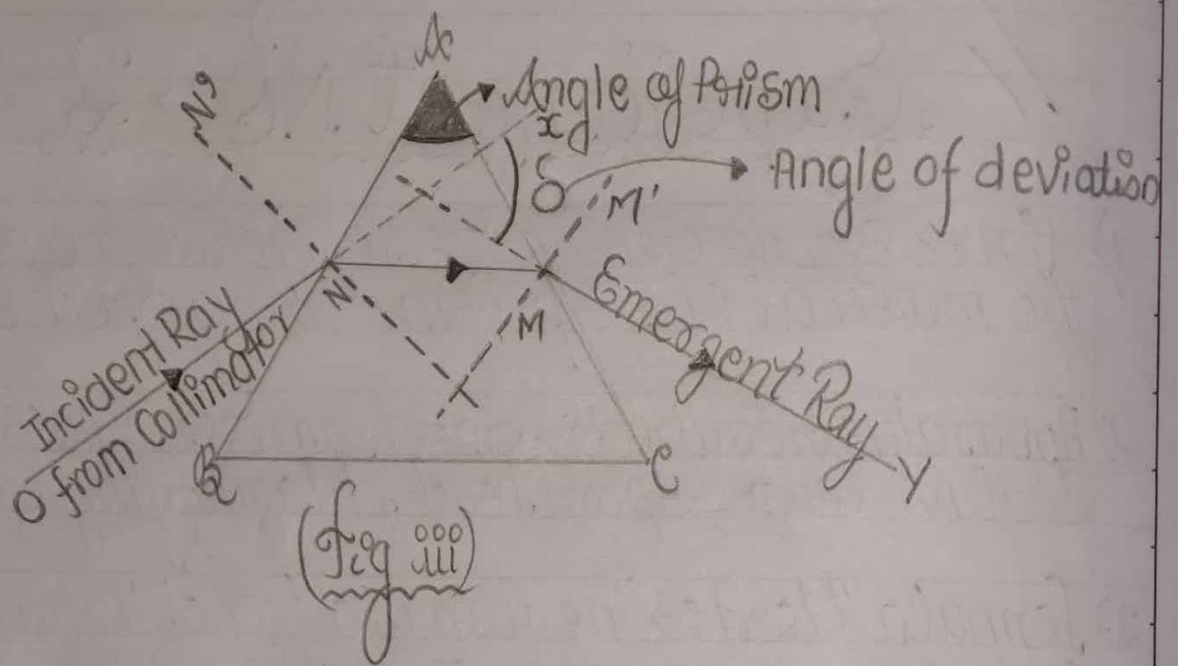
Total Readings \Rightarrow M.S.R + (L.C \times V.S.R) in degrees

- 4) Theory \rightarrow Angle of Prism (A) is the angle between the two refracting edges of the prism

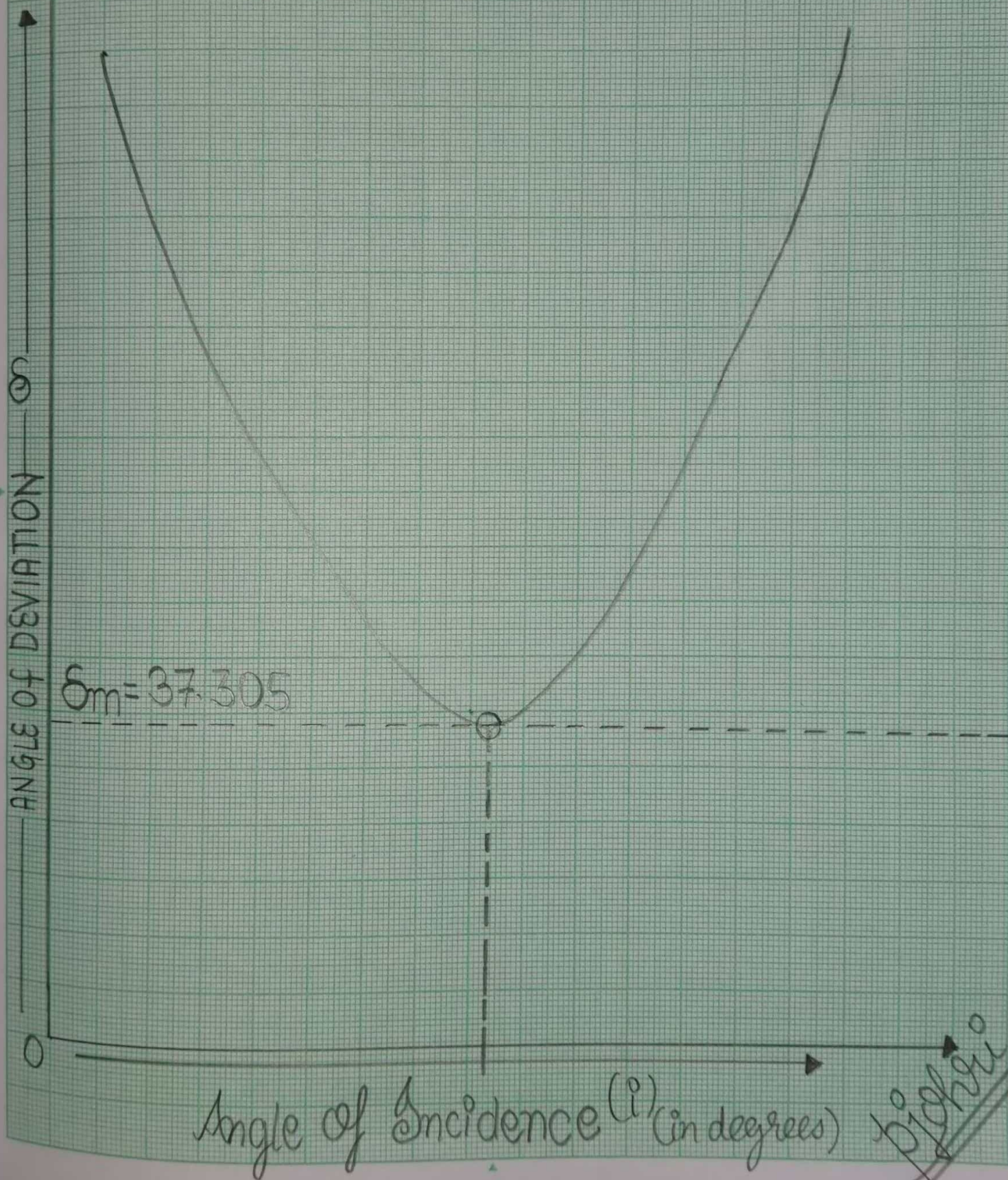
It is the angle of between two refracted rays is measured as θ , then the angle of the prism is

$$\star \left\{ A = \left(\frac{\theta}{2} \right) \right\}$$

Pijari



EXPERIMENT NO: 02



P. J. K. R.

Q) When light from O coming in a straight line should move towards X . But because of prism it deviates and reaches a point Y . If I extrapolate the line Y backwards, I get angle of deviation (δ) at a particular angle of incidence i . It means how much the incident light has deviated from point X to point Y at a particular angle of incidence.

Q) When we plot a graph between Angle of incidence and angle of deviation (δ) we find that as we increase the angle of incidence, the angle of deviation first decreases and then increases. When the angle of deviation is minimum that angle is known as angle of minimum deviation which depends upon the angle of incidence.

Least count of the Spectrometer \Rightarrow

Least count of an instrument gives the minimum measurement that can be taken from that instrument.

Least count of Spectrometer \Rightarrow

Pijush

$$\left[\frac{1 \text{ MSD}}{\text{No. of divisions on Vernier scale}} \right] = \text{Least count}$$

$$\text{If } 20 \text{ MSD} = 10^\circ,$$

$$1 \text{ MSD} = \left\{ \frac{10^\circ}{20} \right\}$$

No. of divisions on Vernier scale $\Rightarrow 30$

$$\text{Least count} = \left(\frac{1}{60} \right)^\circ = \underline{\underline{1 \text{ minute}}}$$

Bijhari

Observation:->

1) Determination of the Least count of the Spectrometer

Least count = $\frac{1 \text{ MSD}}{\text{no of divisions on vernier scale}}$

As $20 \text{ MSD} = 10^\circ$

So $\left(\frac{10^\circ}{20}\right) = 1 \text{ MSD}$

No of divisions on Vernier scale = 30

Least count = $\left(\frac{1}{60}\right)^\circ = 1 \text{ minute} = 1'$

2) Angle of Prism should be taken as 60°

3) Rays of Light parallel through a collimator.

S. No	TELESCOPE READING (in degrees)			DIRECT READING (in degrees)			Difference between two positions	Mean (Sum of values / 6)
	M.S.R	V.S.R	Total	MSR	VSR	Total		
1)	V ₁	75	0.33	75.33	112	0.43	112.43	37.1
	V ₂	255	0.30	255.30	292	0.8	292.80	37.5
2)	V ₁	76	0.93	76.93	114	0.73	114.73	37.8
	V ₂	257	0.23	257.23	294	0.03	294.03	36.8
3)	V ₁	76	0.20	76.20	113	0.66	113.66	37.46
	V ₂	256	0.16	256.16	293	0.33	293.33	37.17

37.305

Pooja

Calculations:->

$$\text{Mean} \Rightarrow \frac{(37.1 + 37.5 + 37.8 + 36.8 + 37.46 + 37.17)}{6}$$
$$= 37.305 \text{ } (\delta m)_{\text{mean}}$$

$$\mu = \frac{\sin\left(\frac{A + \delta m}{2}\right)}{\sin\left(\frac{A}{2}\right)}$$

(A = Angle of Prism)
 δm = Angle of min. deviation

$$\mu = \frac{\sin\left(\frac{60 + 37.305}{2}\right)}{\sin\left(\frac{60}{2}\right)}$$

$$\mu = \frac{\sin(48.6525^\circ)}{\sin(30^\circ)}$$

$$\mu = \frac{0.750716713}{(1/2)}$$

$$\mu = 1.501433427$$

Result:-> The Refractive Index of the Prism using Spectrometer comes out to be

$$\mu = 1.50143327 //$$

Syahr

5) Result \Rightarrow The Refractive Index of the prism using Spectrometer comes out to be

$$\mu = 1.50143327 \text{ Ans.}$$

6) Percentage error \Rightarrow

$$= \frac{\{\text{Measured value} - \text{Exact value}\} \times 100\%}{\text{Exact value}}$$

$$= \frac{(1.50143327 - 1.500000000) \times 100\%}{1.500000000}$$

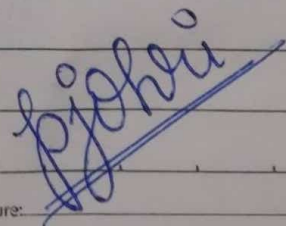
$$= \frac{0.095551333\%}{0}$$

7) Precautions and Sources of Error \Rightarrow

1) Light coming from the slit should be narrow and bright

2) Telescope must be focussed.

Teacher's Signature:



- 3) Readings of the vernier scale should be taken carefully.
- 4) Prism table should be levelled with a spirit level before placing prism.

Byohie