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WORK INSTRUCTION

1.0 EXPERIMENT NO: BO/01

2.0 NAME OF EXPERIMENT: DISPERSIVE POWER

3.0 0BJECTIVE: DETERMINATION OF DISPERSIVE POWER OF THE MATERIAL OF A PRISM

4.0 PRINCIPLE: If A is the angle of the prism and ∂_m is the minimum deviation of a ray of monochromatic light refracted through the prism in a principle section, then the refractive index of the material of the prism μ_λ for the light of the given wavelength is expressed by

$$\mu_\lambda = \frac{\sin\frac{(A+\delta_m)}{2}}{\sin\frac{A}{2}} \quad \text{..... (1)}$$

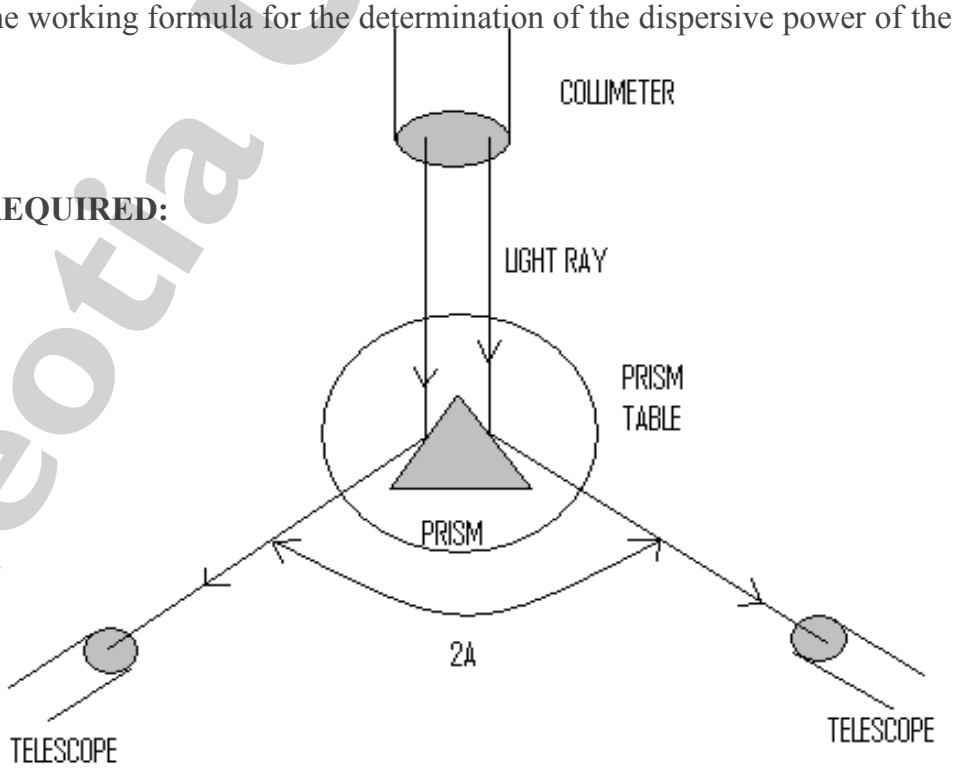
if μ_1 and μ_2 are the refractive indices of the material of the prism for lights of two given colours and μ is the refractive index of the material for the mean colour between the two given colours, then the dispersive power of the material of the prism ω between the wavelength region considered is given by

$$\omega = \frac{\mu_1 \sim \mu_2}{\mu - 1} \quad \text{..... (2)}$$

Equations (1) & (2) are used as the working formula for the determination of the dispersive power of the material of a prism.

5.0 TOOLS/APPARATUS REQUIRED:

5.1 Spectrometer
5.2 Mercury lamp
5.3 Prism
5.4 Sprit level



DISPERSIVE POWER SET - UP

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Procedure :

Using spirit level, level the base of the spectrometer, prism table, telescope and collimator.

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At the minimum deviation position of prism for yellow line, adjust the telescope and collimator for parallel rays

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Determine the vernier constant (V.C.) of the spectrometer

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Place the prism perpendicular to the collimator axis

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There will be two refracted images in two sides of the prism

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Touching the cross-wire on the image in both sides and take the reading of two vernier position Determine the angle (A) of the prism from tab. 2

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Place the prism at the minimum deviation position and take the reading of two vernier position for three different colours

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Take direct reading of the telescope

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Determine the angle of minimum deviation from tab. – 5

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Determine the refractive index of three different colours

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Determine the dispersive power of the material of the prism using equn. – 2

Tabulation:

TABLE-1

Determination of vernier constant (V.C.) of the spectrometer

…… divisions(say m) of the vernier scale=…… divisions (say n) of the main scale

Value of 1 smallest circular scale division (l_1) (min/sec)	Value of 1 division of the vernier scale $\frac{n}{m}$ (min/sec)	Vernier constant of the spectrometer v.c. $(1-\frac{n}{m}) \times l_1$ (min/sec)

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TABLE-2
Determination of the angle (A) of the prism

Vernier scale	Reading of the 1st position of the telescope			Reading of the 2nd position of the telescope			2A = (a ~ b) (deg)	Mean 2A (deg)	Angle (A) of the prism (deg)
	Main scale reading m_s (deg)	Vernier no. v_s	Total $m_s + v_s$ x v.c (deg). (a)	Main scale reading m_s (deg)	Vernier no. v_s	Total $m_s + v_s$ x v.c (deg). (b)			
1st Vernier									
2ndVernier									

TABLE-3
Reading of the telescope at the position of minimum deviation :

Colour of the line	Vernier scale	No. of obs.	Main scale reading m_s (deg)	Vernier no. v_s	Total $m_s + v_s$ x v.c (deg).	Mean reading (deg).
Red	1st Vernier	1				d_1
		2				
		3				
	2nd Vernier	1				d_2
		2				
		3				
Yellow	1st Vernier	1				d_3
		2				
		3				
	2nd Vernier	1				d_4
		2				
		3				
Blue	1st Vernier	1				d_5
		2				
		3				
	2nd Vernier	1				d_6
		2				
		3				

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TABLE-4
Direct reading of the telescope:

Vernier scale	No. of obs.	Main scale reading m_s (deg)	Vernier no. v_s	Total $m_s + v_s$ x v.c (deg).	Mean reading (deg).
1st Vernier	1				d_7
	2				
	3				
2nd Vernier	1				d_8
	2				
	3				

TABLE-5
Determination of angle of minimum deviation:

Colour of the line	Angle of minimum deviation δ_m (deg).		Mean δ_m (deg).
	1st Vernier	2nd Vernier	
Red	$d_1 \sim d_7$	$d_2 \sim d_8$	
Yellow	$d_3 \sim d_7$	$d_4 \sim d_8$	
Blue	$d_5 \sim d_7$	$d_6 \sim d_8$	

TABLE-6
Determination of dispersive power of the material of the prism:

Angle (A) of the prism (deg	Colour of the line	δ_m (deg).	Refractive index	Dispersive power $\omega = (\mu_1 \sim \mu_2)/(\mu-1)$
	Red		μ_1	
	Yellow		μ	
	Blue		μ_2	

Discussion:
You have to write all the difficulties you faced during the experiment and their remedies. Also you have to mention some way out that one should adopt during the practical to have a better result.

Viva voice: go through the chapter of young's modulus and elasticity from these books.

1) OPTICS - Ghatak
2) OPTICS – K. G. Majumdar
3) ADVANCED PRACTICAL PHYSICS- Ghosh & Majumdar
4) PRACTICAL PHYSICS- Rakshit, Chatterjee & Saha