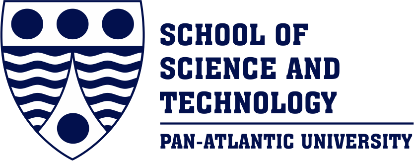
**PHY 108: GENERAL PRACTICAL PHYSICS II**

**EXPERIMENT TWO: THE REFRACTIVE INDEX OF A TRIANGULAR PRISM**

**AIM: To Determine the Refractive Index and Minimum Deviation Angle for A Triangular Glass Prism**

INTRODUCTION: Theory: When a beam of light strikes on the surface of transparent material (glass, water, quartz crystal, etc.), the portion of the light is transmitted, and another portion is reflected. The transmitted light ray has small deviation of the path from the incident angle. This is called refraction.

Refraction is due to the change in speed of light while passing through the medium. It is given by smell’s law

Where 𝑖 the angle of incident is, 𝑟 is the angle of refraction, 𝜂 refractive index if the prism When a ray of light passes through a prism, it suffers refraction as shown in fig 2.1.



We can apply Snell’s Law to the ray of light at each surface. This leads to the two equations,

The angle 𝑟1 and 𝑟2 are not independent, being related by the equation,

Where A is angle of prism. Applying the exterior angle theorem, we get,

Combining equation (3) and (4), we have equation (5)

Solving equation respectively the refractive index of the triangular glass prism is given as

Using Snell's Law and differential calculus, it may be shown that the minimum deviation occurs when the ray passes symmetrically through the prism. This result provides a very precise way to measure the refractive index of the prism. Combining this result with Snell's Law and some trigonometry, we obtain the equation 2.6

**EXPERIMENTAL PROCEDURE**

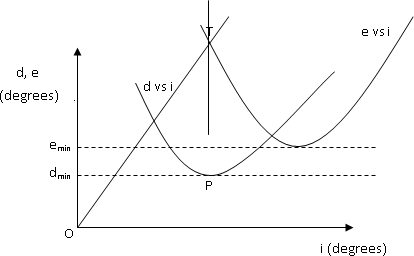
* Pin an A3 paper on the drawing board placed on the table.
* Place the given glass prism on the centre of the paper.
* Using the pencil, mark the outline **ABC** of the prism on the paper.
* Remove the prism, and using the scale and pencil, draw the normal at to face plain **AB.**
* Using the protractor, measure an incident angle **30°** from the normal.
* Fix two pins at **W** and **X** on the incident line drawn. The prism is replaced on the outline **ABC.**
* Viewing the pins from the face **AC** of the prism, two other pins **Y** and **Z** are fixed so that **W, X, Y** and **Z** are aligning.
* Remove the pins and draw a line through **Y** and **Z** to meet the face **AC** (Emergence ray).
* Draw a normal M at to face plain AC. Use the protractor, measure, and record the emergence angle
* A line NM is drawn to meet the two normal. Using the protractor, measure and record the refracted angles.
* Extended the incident ray to get to Q and extended the emergence ray to get the line NQ at R.
* Using the protractor, measure and record the angle.
* Repeat the experiment for different values of angle of incidence .
* Measure and record the values of for each of the angles of incidence at points.
* Tabulate your readings as follows:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Angle at point N | | | | | Angle at point M | | | | |
|  |  |  |  |  |  |  |  |  |  |

**DATA ANALYSIS 3.1**

1. Determine the mean values of and compare your results
2. Plot a suitable graph for each and using the same graph
3. Compare your result with those obtained in data analysis (1) and find the percentage difference.
4. Write Five (5) observations notice while carrying out this experiment.
5. Write three (3) sources of error and discussed the precautionary measures take to overcome/avoid them?

**EXPERIMENT 3.2: DEVIATION BY A TRIANGULAR GLASS PRISM**

**INTRODUCTION:** Dispersion is the phenomenon in which the phase velocity of a wave depends on its frequency. In a prism, the angle of deviation (δ) decreases with increase in the angle of incidence (i) up to a particular angle. The angle of incidence where the angle of deviation in a prism is minimum is called the minimum deviation position of the prism and that very deviation angle is known as the minimum angle of deviation.

**DATA ANALYSIS 2.2:**

From the previous experiment, **2.1** determine the corresponding value of at point for each incident angle.

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

1. Tabulate your results as shown in the table below.
2. Draw a graph with angle of incidence along the X – axis and angle of deviation () along the Y – axis.
3. The minimum deviation corresponding to the lowest bend of the curve ().
4. Using the same graph, plot along the x-axis against along the y-axis and find the minimum value of
5. Let be the point of minimum deviation. Through draw a line parallel **to** to meet the at . Join , and find its slope. {*Note that O must be the true origin (0, 0) and not an arbitrary point i.e. graph should start from (0,0)*}.
6. When light ray travel from denser to rarer medium as the angle of incidence changes from 0 to what happens to angle of deviation?
7. For a ray at normal incidence on face AB of the prism, what are the effects on faces AC and BC?