Experiment No : 11

Aim : To determine the angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation.

Apparatus : Drawing board, prism, drawing pins, a white sheet of paper, graph paper and a protractor.

Theory : If A is the angle of the prism and δ_m is the angle of minimum deviation, then the refractive index of the prism is given by,

$$n = \frac{Sin\ \frac{(A+\delta m)}{2}}{Sin\ \frac{A}{2}}$$

Procedure:

1. Fix the white sheet on the drawing board by fixing all the four corners using pins.
2. Draw a straight line XY parallel to the length of the paper in the middle of the paper.
3. Keep the prism in such a way that one of its side AB is parallel to the line and draw its outline.
4. Remove the prism and draw a perpendicular MN. Draw another straight line PQ measuring 35^o from MN. This is the angle of incidence.
5. Fix two office pins on the line PQ, one close to the prism and the other at least 10mm from the first pin.
6. Look for the pins from the side AC of the prism and closing one eye, fix two more pins in such a way that all the four pins appears to be in a straight line.
7. Remove the pins and join the points with a straight line RS.
8. Remove all the pins and the prism. Extent the line PQ and measure the angle formed between the lines PQ and RS. This angle is the angle of deviation δ.
9. Repeat the above steps for different angles 40^o, 45^o, 50^o and 55^o.
10. Plot a graph between angle of incidence and angle of deviation. From the graph, find the angle of minimum deviation δ_m.

Result : (i) The $i - \delta$ graph indicates that as the angle of incidence increases, the angle of deviation decreases, reaches a minimum value and then increases.
(ii) Angle of minimum deviation δ_m = _____

Precautions :

1. The pins should be vertical
2. The distance between the pins should be at least 10mm.
3. The same angle of the prism should be used for all the observations.

Sources of Error:

1. There could be parallax error
2. Measurement of the angle may be wrong.

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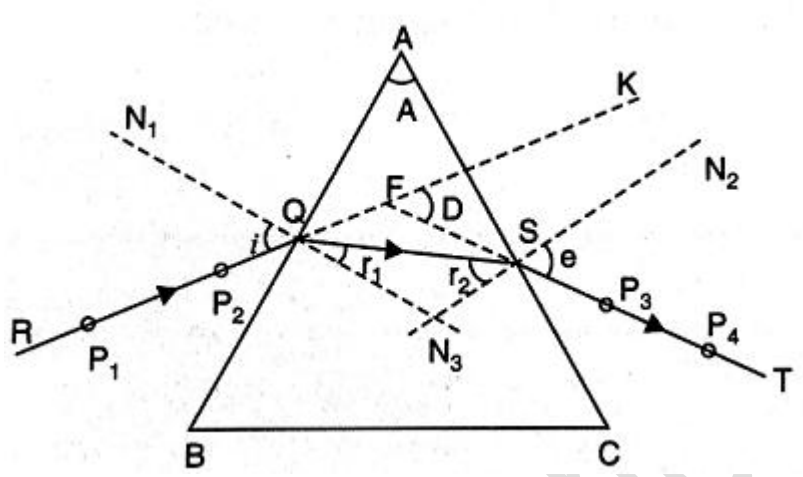
Fig :



Observation Table :

Serial No :	*Angle of incidence* (i)	*Angle of deviation* (δ)
1	35°	
2	40°	
3	45°	
4	50°	
5	55°	

Angle of the prism : _____

From the graph, angle of minimum deviation δ_m = _____

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