7. <u>GLASS PRISM</u>

AIM:

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

APPARATUS REQUIRED:

Glass Prism,drawing board,pins,white paper,ruler, protractor,sharp pointed pencil.

THEORY:

A triangular prism has three rectangular lateral surfaces and two triangular bases. The line along which any two faces (refracting surfaces) of the prism meet is the refracting edge of the prism and the angle between them is the angle of the prism. For this experiment, it is convenient to place the prism with its rectangular surfaces vertical. The principal section ABC of the prism is obtained by a horizontal plane perpendicular to the refracting edge.

A ray of light PQ (from air to glass) incident on the first face AB at an angle i_1 is refracted at an angle r_1 along QR and finally, emerges along RS. The dotted lines in the figure represent the normal to the surfaces. The angle of incidence (from glass to air) at the second face AC is r_2 and the angle of refraction (or emergence) is i_2. The angle between the direction of incident ray PQ (produced forward) and the direction of emergent ray RS (produced backward) is the angle of deviation d.

PROCEDURE:

1. Fix a white sheet of paper on the drawing board with the pins.Divide the sheet by drawing a line almost in the center lengthwise.
2. Draw the outline of the prism using a sharp pointed pencil.
3. Remove the prism and label ABC.

4. Draw a normal to the surface AB.From this normal take i=30 and draw a straight linePQ, incident on the face ABof the prism.This PQ is incident ray.
5. On this ray PQ, Plae two pins about 3 cm apart.
6. Place the prism back on the outline and observe the images of these two pins through the other refracting surface AC.
7. Fix two more pins such that all the 4 pins lie on the same straight line when viewed through AC.
8. Circle these points one by one to avoid confusion.
9. Remove the glass prism and the pins.Join the image pin points by a straight line to the face AC and extend it by dotted line through the prism.Name the ray as RS, emergent ray.
10. Similarly extend the actual path of incident ray PQ by the dotted line, so that it meets the line RS at G.
11. Measure the angle SML. This angle gives the angle of deviation(d).
12. Repeat the experiment for various values of i=35,40,45,50 to get corresponding values of d. Note the angle of minimum deviation(D_m) from the values of d.
13. Plot i-d graph and note the angle of minimum deviation D_m from it.

PRECAUTIONS:
1. Angle of incidence should be between 30 and 60.
2. The pins should have sharp pins and to be fixed vertically.
3. Remove parallax while fixing the pins.
4. All 4 pins should lie on a perfect straight line when seen through the prism.

SOURCES OF ERROR:
1. The pins may not be placed vertical.
2. Measurement of angles may be inaccurate.
3. The pins may be fixed very close to each other and also close to the prism.
4. Parallax removal may not be perfect.

RESULT:

1. The angle of deviation for various angles of incidence is drawn and noted.

2. The i-d graph is plotted and is a parabolic curve.

3. The angle of minimum deviation of the prism, $D_m =$

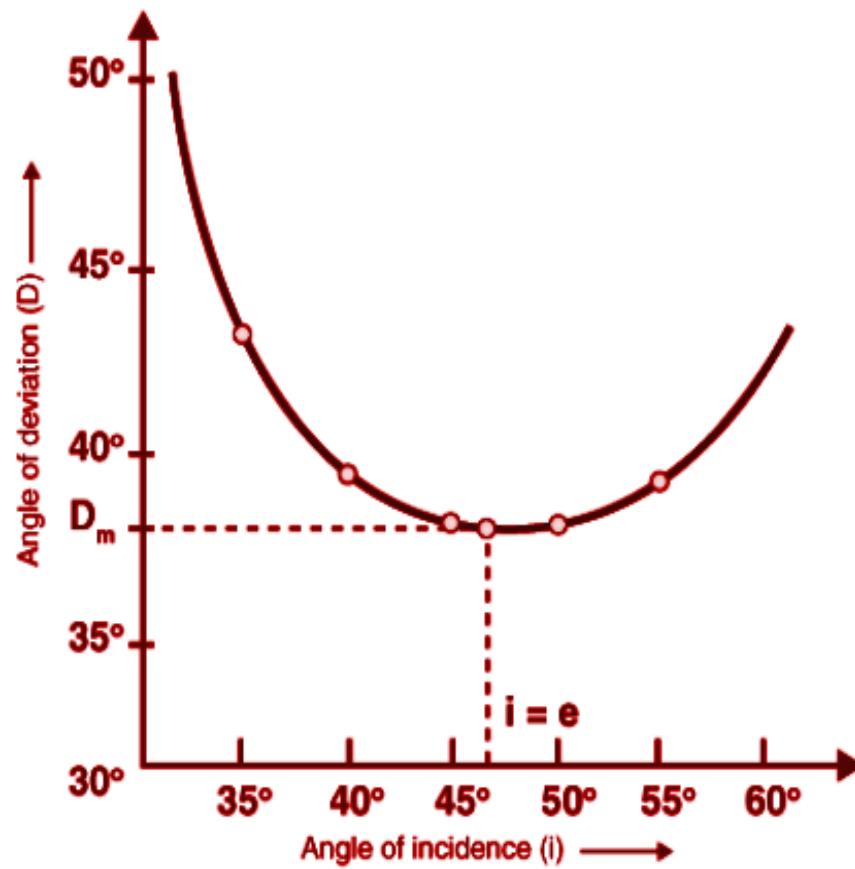## RAY DIAGRAM:
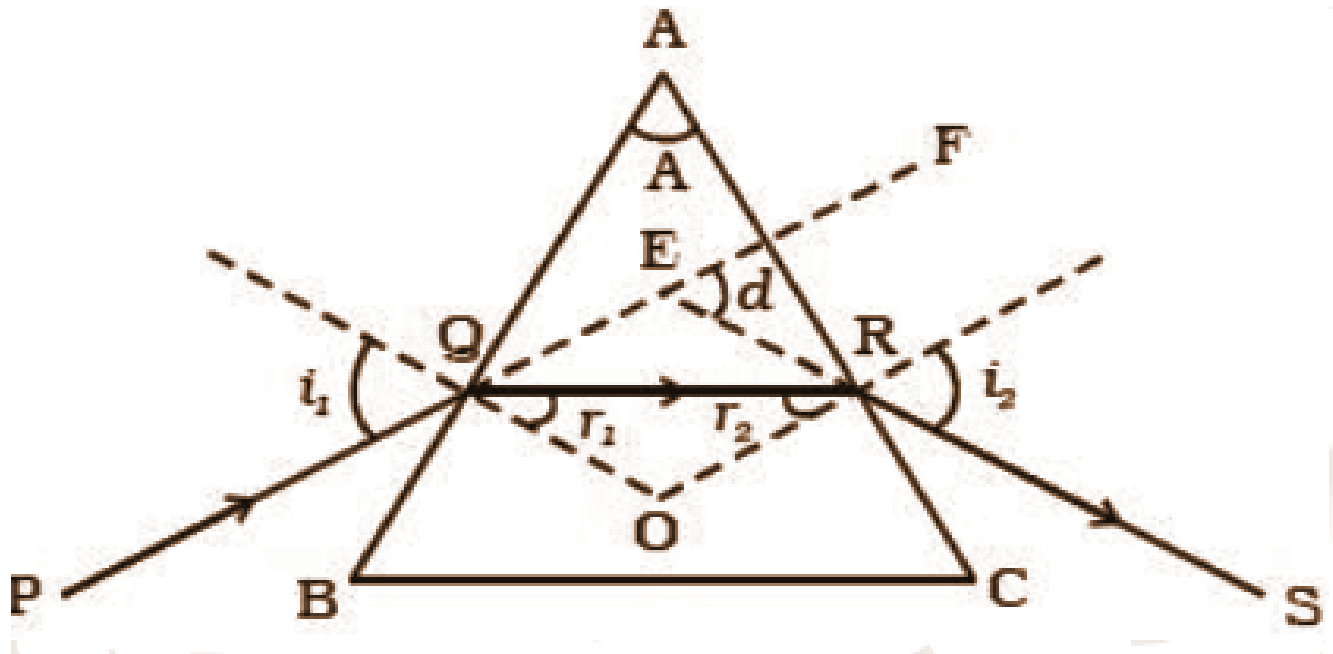
A ————— Angle of prism

i_1 ———— Angle of incidence

i_2 ———— Angle of emergence

d —— Angle of deviation (Angle between actual path of incident ray and extended emergent ray)

Model Graph

Graph between i and D

OBSERVATIONS & TABULATIONS;

Sl.No	Angle of incidence (i)	Angle of deviation (d)
1		
2		
3		
4		
5		

Angle of minimum deviation, D_m =..