

ACTIVITY- 5(Lateral deviation on a Glass Slab)

AIM: To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.

APPARATUS:

Drawing board, rectangular glass slab, white sheet of paper, adhesive tape (cello-tape), drawing pins, a meter scale, pins, protractor, sharp pencil and eraser.

PRINCIPLE:

When a ray of light is incident on a rectangular glass slab, it is refracted through it. It emerges out of the slab parallel to the direction of the incident ray. The emergent ray suffers only a lateral displacement. For a given angle of incidence and a pair of media, the lateral deviation is proportional to the thickness of the glass slab.

PROCEDURE:

1. Fix a white sheet of paper on the drawing board with the help of cello-tape or drawing pins.
2. Place the glass slab lengthwise symmetrically at the center of the paper sheet and mark its boundary PQRS on the paper sheet with a sharp pencil.
3. Draw a normal at a point B on the face PQ. Draw a line AB, representing the incident ray, making an angle θ_1 the angle of incidence with the normal.
4. Fix two pins with sharp tips, about 8 to 10 cm apart, vertically on the line AB.
5. Observe the images of the two pins through the face opposite of the glass slab. Fix two more pins about 8 to 10 cm apart, vertically on the white paper sheet carefully with their tips in line with the tips of the images of first two pins. Take care that the tips of all the pins appear to be on a straight line.

6. Remove the glass slab and mark the pin prick positions of the pins on the white paper sheet with a pencil. Draw a straight line CD, representing the emergent ray, passing through the points, meeting the face SR at C.
7. . Draw the line BC to represent the refracted ray. Draw a normal at the point C on the face RS; making an angle of emergence e with the normal. Measure the angle of incidence θ_1 and angle of emergence θ_4 with a protractor. Write the values of these angles on the white paper sheet.
8. Extrapolate AB forward to meet the face RS of the glass slab.
9. Check if the emergent ray CD is parallel to the incident ray AB along the original direction. It is laterally deviated by a perpendicular distance EC. Measure the lateral deviation $EC = d$ and also the thickness of the glass slab.
- 10.. Repeat steps 2 to 9 by changing the angle of incidence.
11. Repeat the steps 2 to 10 by using glass slabs of different thickness. Measure the lateral deviation and the thickness of the glass slab each time. Also write the values of θ_1 (i) and θ_4 (e) on the white paper sheet each time.
12. Record observations in tabular form with proper units

RESULT:

1. The ray of light emerging from a glass slab is parallel to the incident ray direction, but is laterally deviated.
2. The lateral deviation of the emergent ray with respect to the incident ray is directly proportional to the thickness of the glass slab.

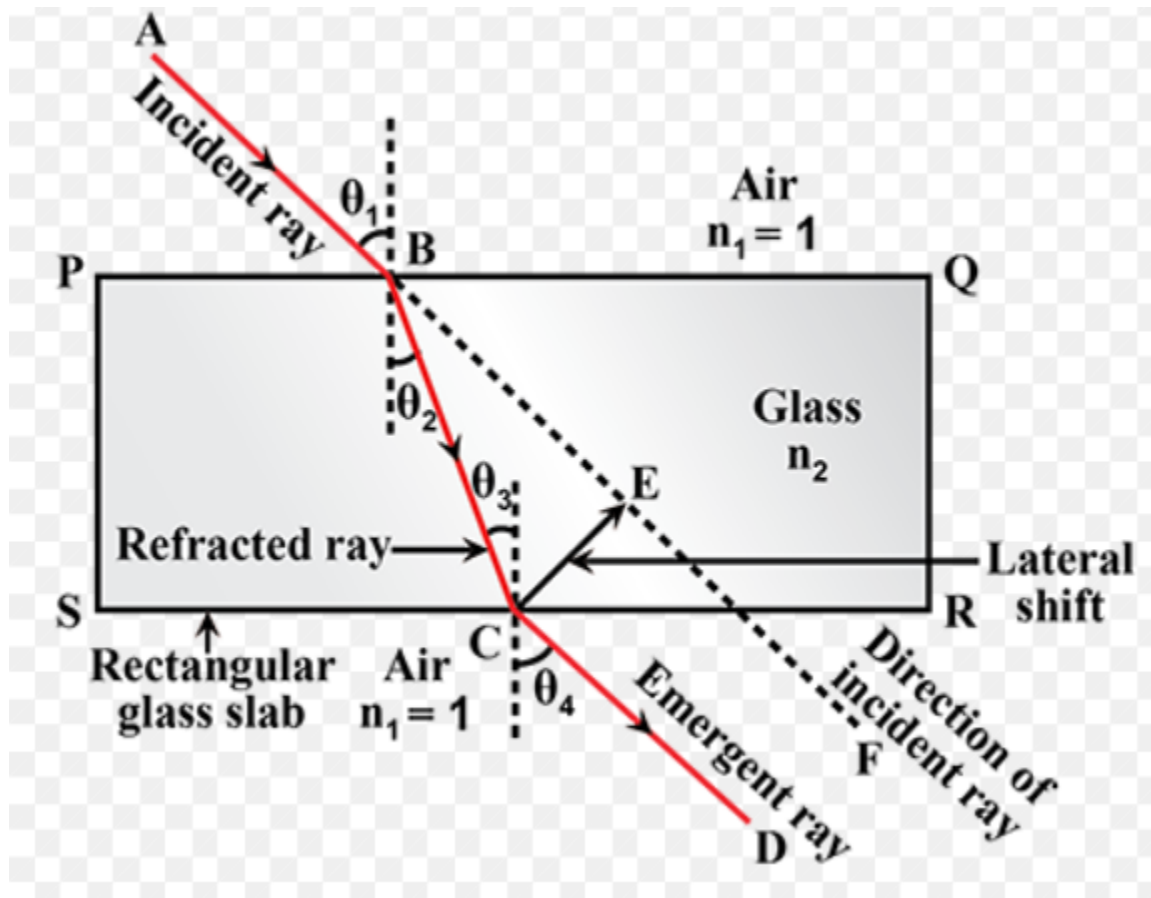
PRECAUTIONS:

1. Use a sharp pencil for geometrical work.
2. Take a glass slab of uniform thickness.
3. Pins should be fixed vertically

SOURCES OF ERROR:

1. Personal error in the measurement of angles.
2. If the feet of pins are not in the same straight line in the drawing board, an error takes place in the path of incident ray and emergent ray.

DIAGRAM



OBSERVATIONS:

Sl.No	Angle of incidence (i)	Angle of emergence (e)	Lateral Deviation (d)
1	30	30	1.5cm
2	40	40	1.1cm