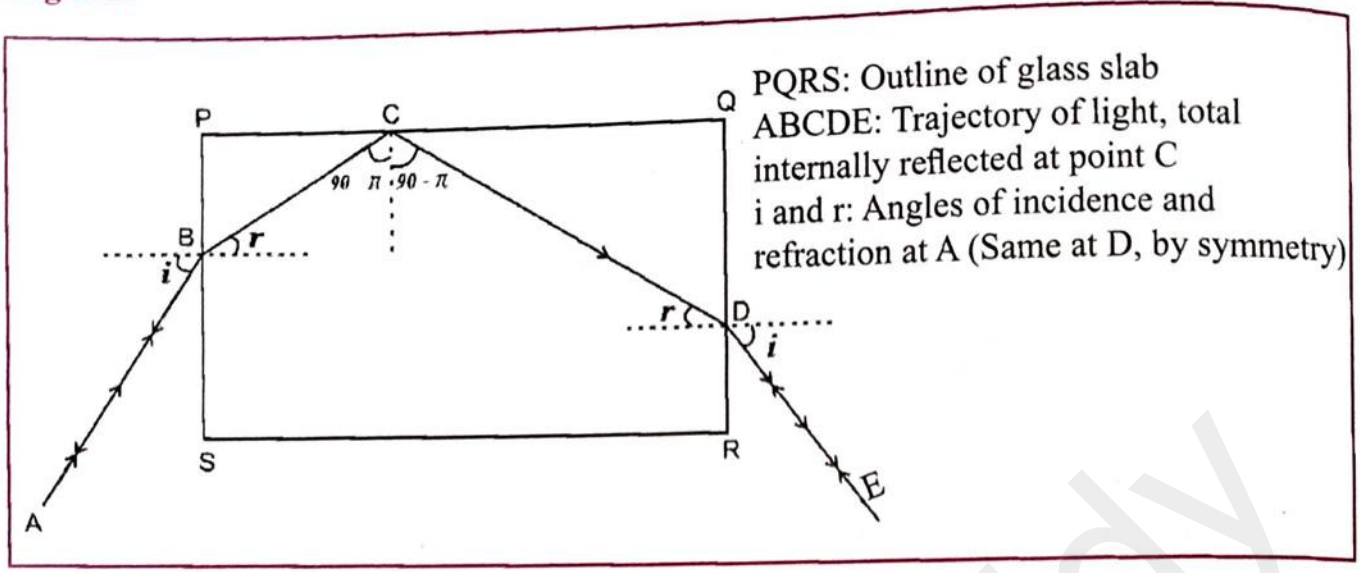
## ACTIVITY NO. 6
## REFRACTIVE INDEX OF GLASS BY TOTAL INTERNAL REFLECTION

**Aim :** To determine refractive index of glass by total internal reflection.

**Apparatus :** Glass slab, plain white paper, laser pointer, geometrical instrument box.

**Diagram:**




PQRS: Outline of glass slab
ABCDE: Trajectory of light, total internally reflected at point C
i and r: Angles of incidence and refraction at A (Same at D, by symmetry)

**Theory:**

At B, $i < 90°$

$\therefore r < i_c$

$\therefore$ At C, $(90-r) > i_c$

Thus, at point C, there will always be total internal reflection. Then at D, we get same angles, by symmetry.

**Procedure:**

1. Place the glass slab on white paper fixed the wooden drawing board.
2. Hold the laser pointer very close (touching the glass slab) along the width side (shorter side of glass slab) of it.
3. Initially place the laser beam perpendicular to the glass surface ( angle of incidence 0 degree) at the point B such that PB is lesser than half the width of the glass slab.
4. Observe the refracted beam
5. Vary the angle of incidence by just changing the angle made by laser pointer with respect to the surface of glass slab.
6. Note the intensity of light refracted to air medium from surface PQ of glass slab and intensity of light reflected back in to the glass slab.
7. Find the position of the laser pointer (minimum angle of incidence) at which the light incident on the surface PQ is reflected back it to glass slab. ($i_c$).
8. Mark the position of laser pointer using pencil and draw the incident ray and measure the angle of incidence. Complete the ray diagram as shown in figure to get the path BCD. Draw the direction of emergent ray as same as that of incident ray following the path of the emergent laser beam. Measure the angle of incidence at the surface PQ. (for condition noted in point 6).
9. Calculate the refractive index of glass slab.

**Observation Table :**

| Obs. No. | Angle of incidence $i_c$ | $\mu = \frac{1}{\sin i_c}$ |
|---|---|---|
| 1 | 40° | $\mu = \frac{1}{\sin 10°} = \frac{1}{0.6427} = 1.5$ |
| 1 | 41° | $\mu = \frac{1}{\sin(\sin)} = \frac{1}{0.6528} = 1.5$ |

**Result:**

Value of refractive index n= .....

**Precations:**

1. Use laser properly.
2. Mark points properly on the reflected ray laser beam.

**FOR NOTES**

* The quated range varies because of sufficient physical poly types.

* Power 'per unit area' in apparatus for fields in there dimensions. In two dimensions, we might went the product of effort and flow to power per unit length. In one dimension as in a attemped- element made vs weight want it the suply power.

* We assume that the equalise describing the fields are linear.

**Remark and sign of teacher:** .....