UDAAN

2025

LIGHT

- Reflection & Refraction

PHYSICS | Lecture - 04

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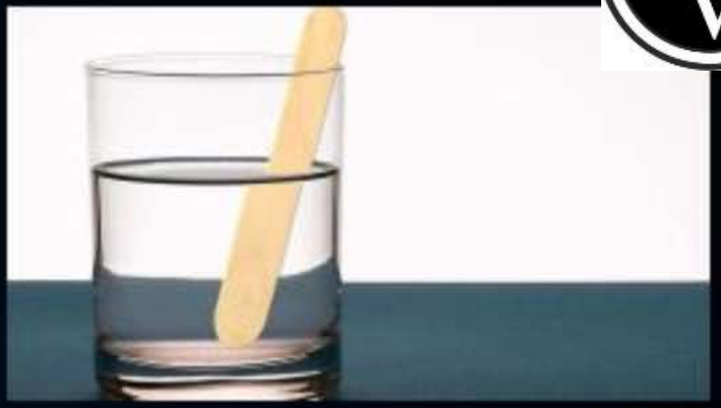
Topics to be covered

Transparent Media (Plural of Medium)
– Vacuum, air, glass, plastics, Water, Kerosene, Diamond etc.

1. Refraction of Light : Ray Theory
2. Laws of Refraction : Snell's Law (Statement only)
3. Rules of Refraction (Transiting Media)
4. Refraction through Glass Slab

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Phenomenon of Light : Refraction

ρ → Mass Density

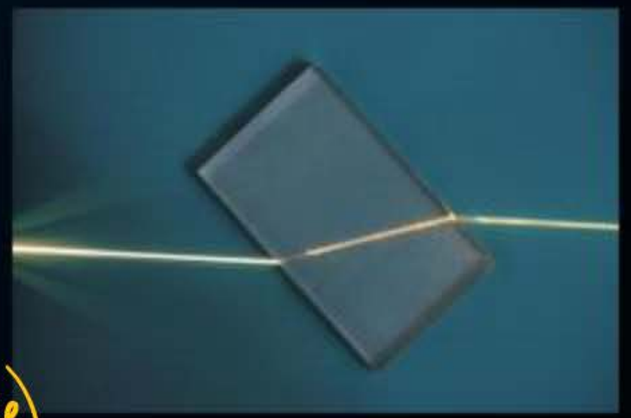
$$\rho = \frac{M}{V} \quad X$$

- Refraction of light is the **change in the direction** of a light ray passing from one medium to another. Trans. Trans. Med.

R.I ↑ Denser ↑ Bending ↑ } 'Rules'

R.I ↓ Rarer ↑ Bending ↓ }

- The bending of Light Ray is caused due to the differences in **optical density** or Refractive Index (Next lecture)



Why Bending occur?

What happens when a Light Ray Transits its medium ?

↳ Not in NCERT : Extra Baatein

Frequency of light is always constant

↓

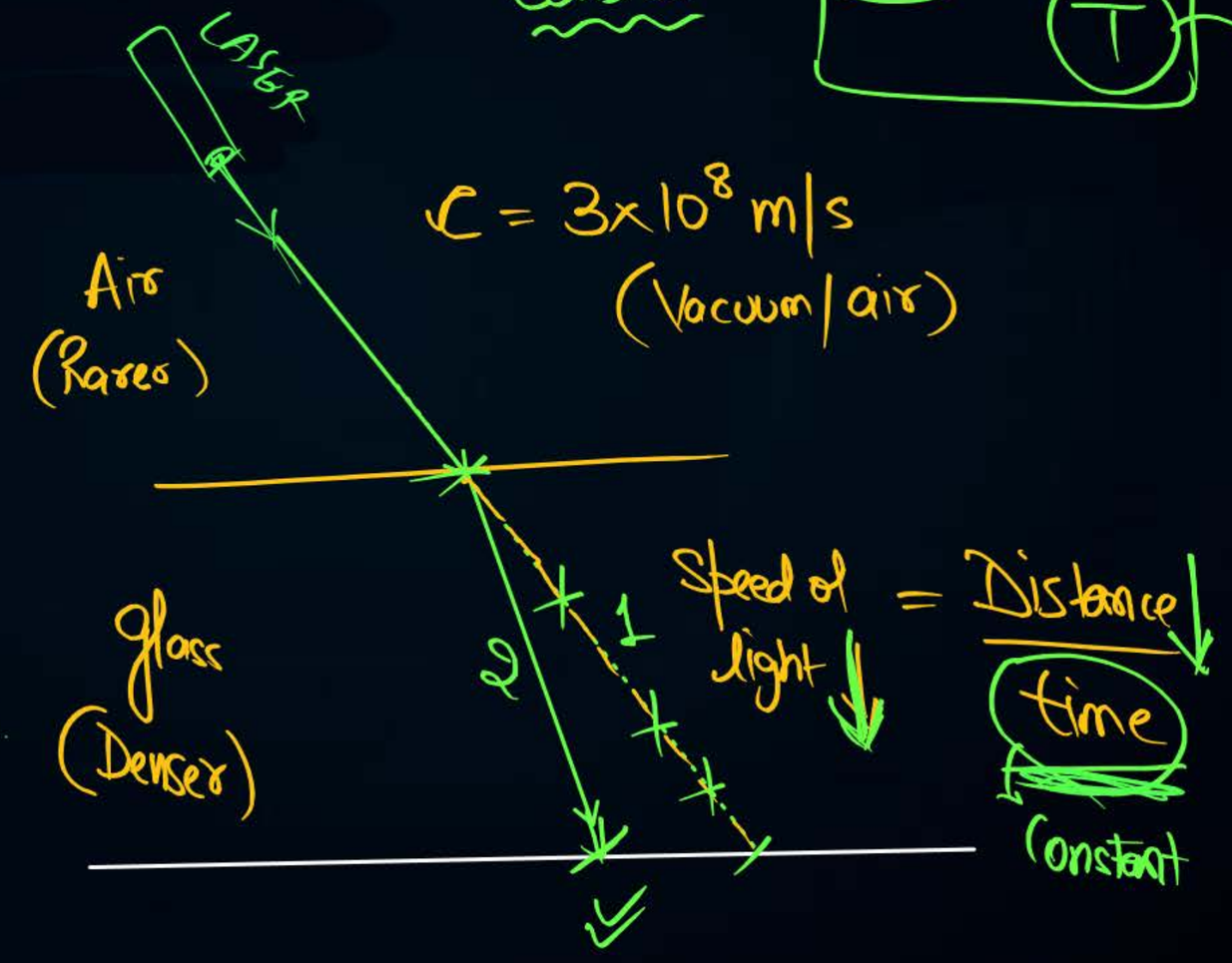
Source dependent

↓

Medium Independent.

* Note → if Medium changes
  v → constant, T → Const.
  if Source changes
  v → Change

Constant ← $v = \frac{1}{T}$ → Constant



$c = 3 \times 10^8$ m/s
(Vacuum/air)

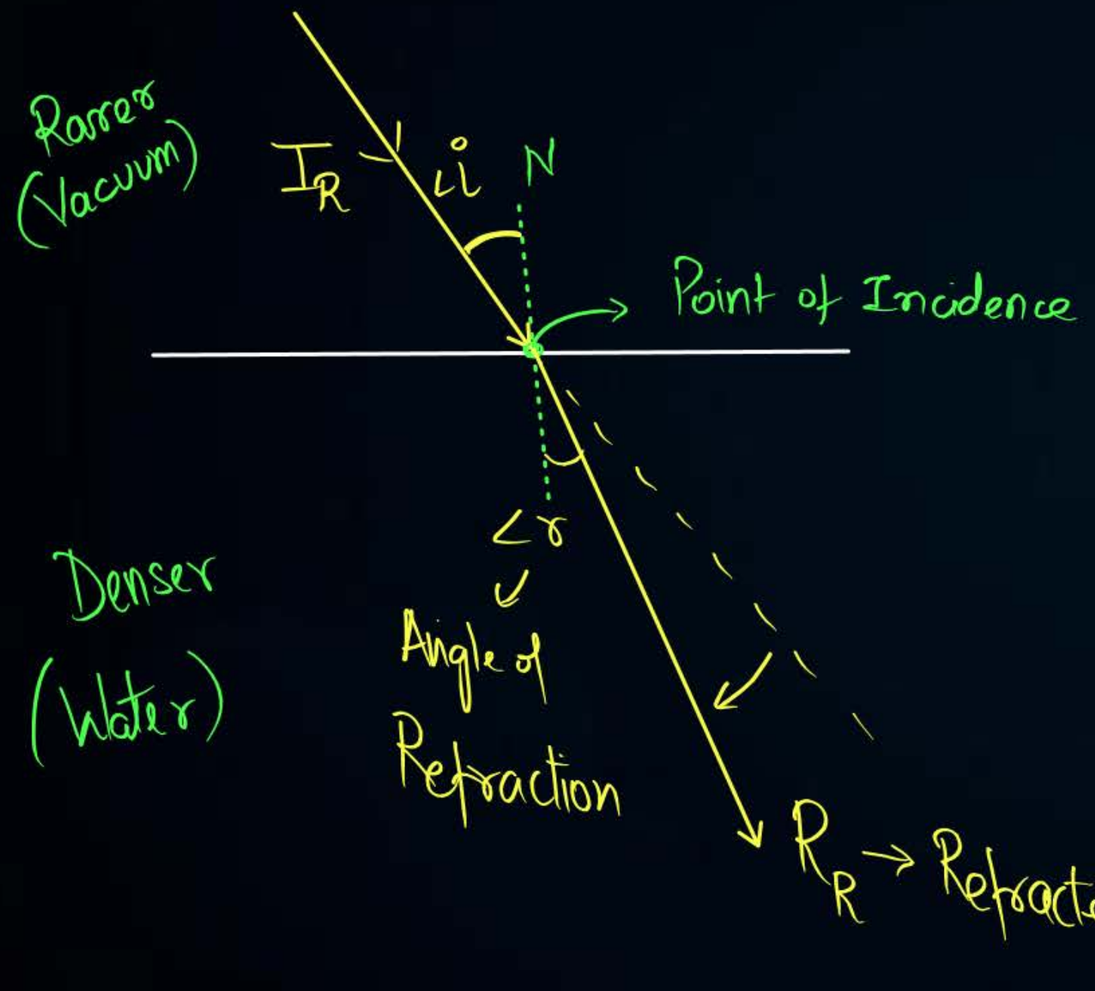
Speed of light = Distance / time

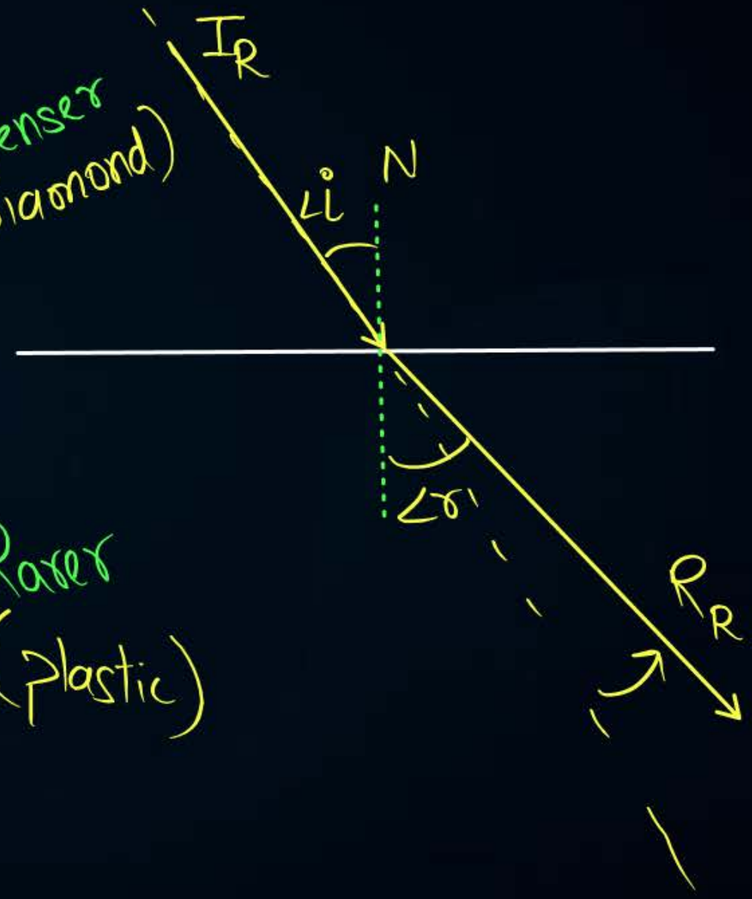
time → Constant

Rules of Refraction (Transiting Media)

(I) $R \rightarrow D$: Bends towards Normal.

(II) $D \rightarrow R$: Bends away from Normal

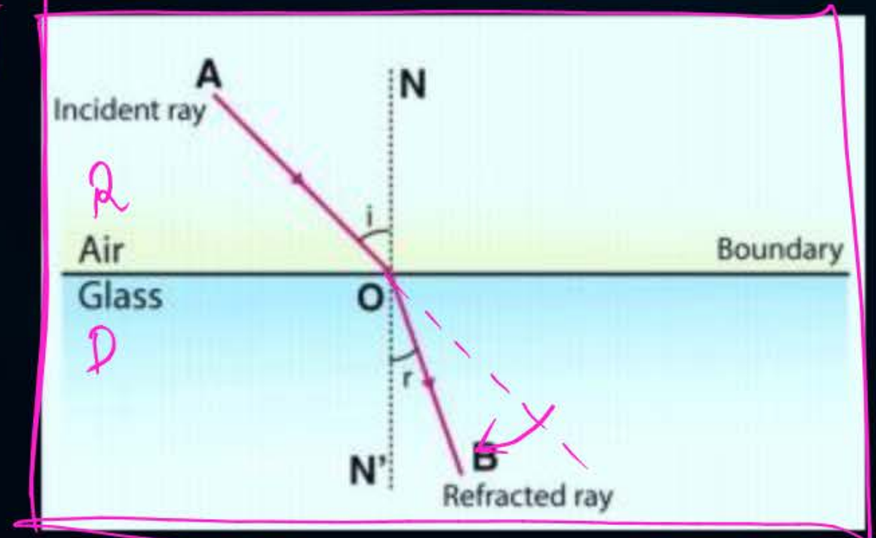




LAWS OF REFRACTION

The laws of refraction states that

- The incident ray refracted ray, and the normal to the interface of two media at the point of incidence all lie on the same plane.
- The ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant. This is also known as Snell's law of refraction.



$$\frac{\sin i}{\sin r} = \text{constant}$$

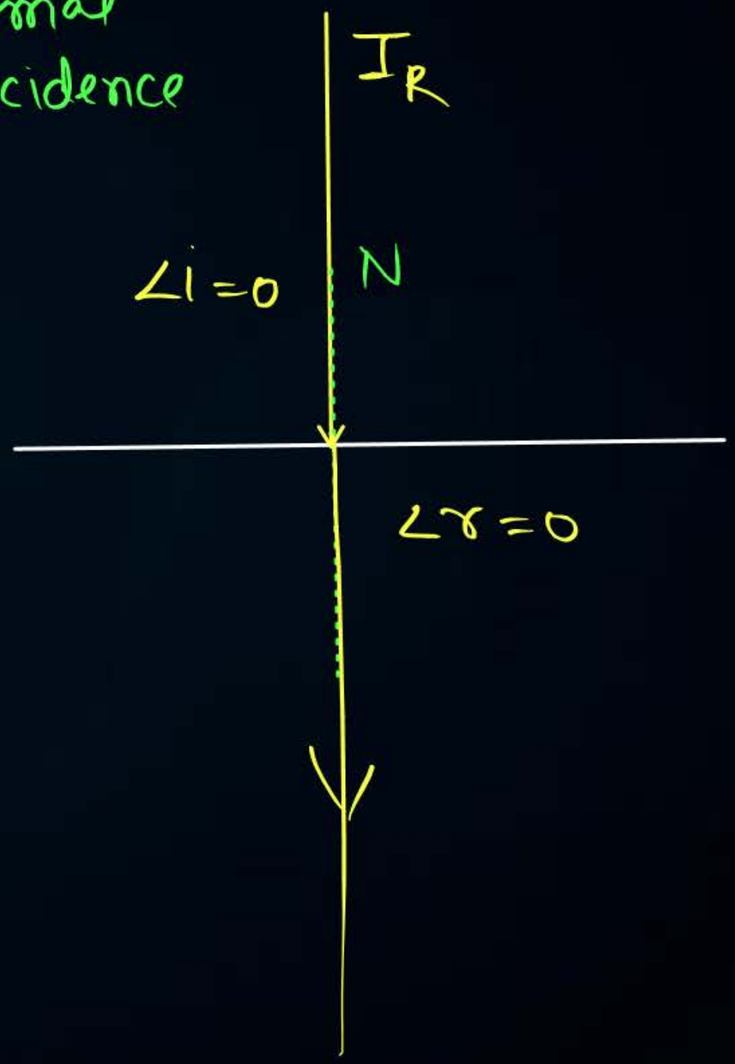
When Refraction does not occur !!!

1. When light transits the media of Same optical densities

Air
(Glass)
$\eta = 1.33$
↓
Refractive Index

Glass
$(\eta = 1.33)$

2. Normal Incidence



Refraction through Glass Slab

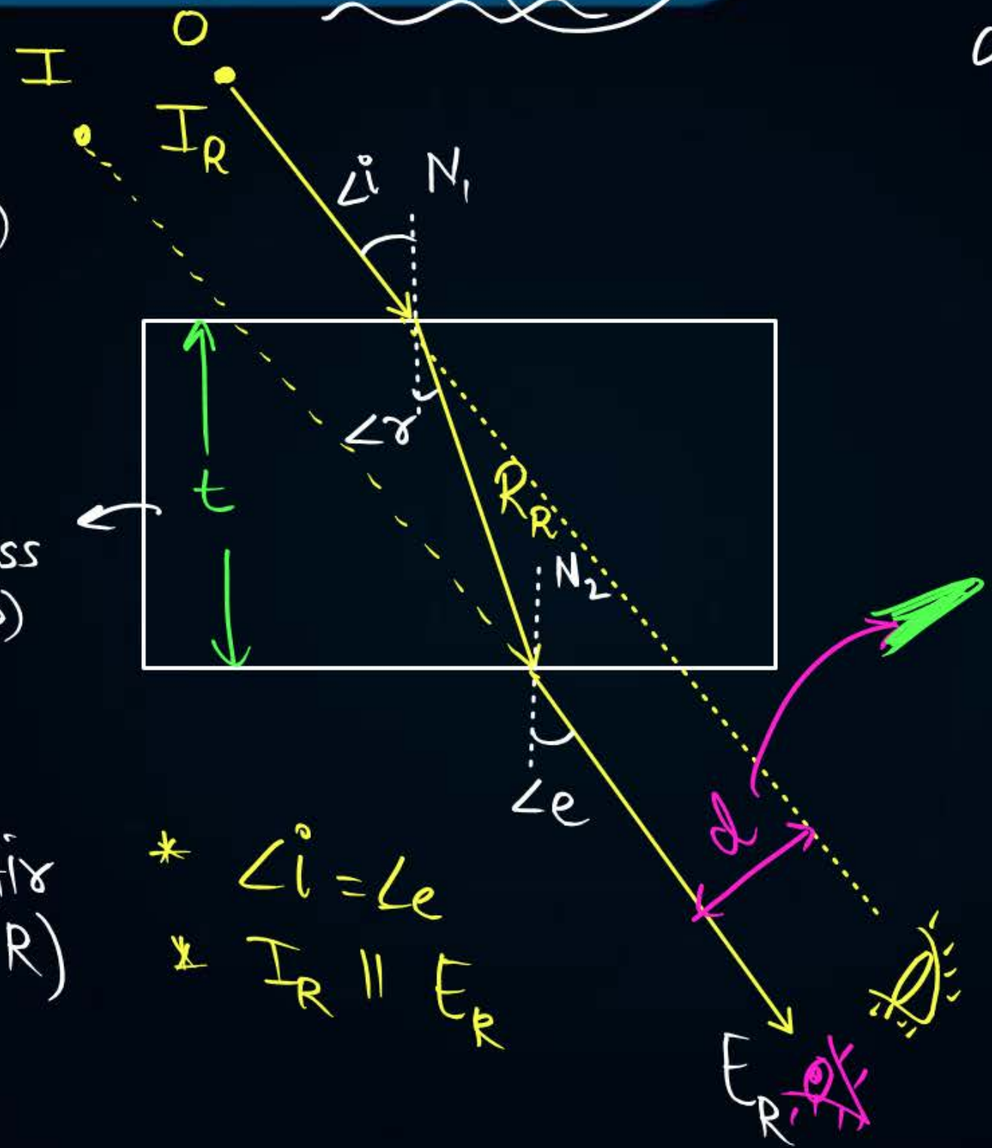
Cuboid

Glass ⇒ Kaanch

$\angle i$ → Angle of Incidence
$\angle r$ → " " Refraction
$\angle e$ → " " Emergence
I_R → Incident Ray
R_R → Refracted Ray
E_R → Emergent Ray

N_1, N_2 → Normals

d → Lateral displacement / Optical Shift



* $\angle i = \angle e$
* $I_R \parallel E_R$

(d)

Lateral displacement / shift

1. Thickness of Slab
2. Wavelength of light
3. Optical Density of Glass (R.I.)

HOMEWORK

* Notes Complete upto - 4 lecture
* Lecture Backlog → Weekend

THANK YOU