## Refraction through a Glass Slab and Optical Path.

(1) Lateral shift

The refracting surfaces of a glass slab are parallel to each other. When a light ray passes through a glass slab it is refracted twice at the two parallel faces and finally emerges out parallel to its incident direction i.e. the ray undergoes no deviation $\delta=0$. The angle of emergence (e) is equal to the angle of incidence (i)

The Lateral shift of the ray is the perpendicular distance between the incident and the emergent ray, and it is given by $M N=t \sec r \sin (i-r)$

Normal shift
Normal shift $O O^{\prime}=x=\left(1-\frac{1}{\mu}\right) t$
Or the object appears to be shifted towards the slab by the distance x


## (2) Optical path:

It is defined as distance travelled by light in vacuum in the same time in which it travels a given path length in a medium.


Note: Since for all media $\mu>1$, so optical path length $(\mu x)$ is always greater than the geometrical path length ( x ).

