CONCEPT MAP

Ray Optics

Ray Optics : It is the branch of physics which deals with the study of light and the phenomena associated with it.

Reflection of Light : It is the phenomenon of change in the path of light without any change in medium.

Laws of Reflection:
- The incident ray, the reflected ray and the normal to the surface, all lie in the same plane.
- The angle of incident i is equal to the angle of reflection r.

Spherical Mirrors:
- Concave mirror
- Convex mirror

Mirror Formula: $\frac{1}{v}+\frac{1}{u}=\frac{1}{f}$

Linear Magnification: $m=\frac{f-v}{f}=\frac{f}{f-u}$

Dispersion of Light: It is the phenomenon of splitting of white light into its constituent colours on passing through a prism.

$\mu = A+\frac{B}{\lambda^2}+\frac{C}{\lambda^4}$

Angular Dispersion:
- $\delta_V-\delta_R=(\mu_V-\mu_R)A$
- $\delta=\frac{\delta_V+\delta_R}{2}$
- $\omega=\frac{(\delta_V-\delta_R)}{\delta}$
- $\mu=\frac{\mu_V+\mu_R}{2}$

where δ is mean deviation and μ is mean refractive index.

Refraction of Light : It is the phenomenon of change in path of light, when it goes from one medium to another.

Laws of Refraction
- The incident ray, the normal and the refracted ray all lie in the same plane.
- The ratio of the sine of angle of incidence to the sine of angle of refraction for any two media is constant for a light of definite colour.

Refraction Through a Prism:
- $\delta=(\mu-1)A$
- $i=\frac{A+\delta_m}{2}$
- $r=\frac{A}{2}$
- $\mu=\frac{\sin i}{\sin r}=\frac{\sin\left[\frac{(A+\delta_m)}{2}\right]}{\sin\left(\frac{A}{2}\right)}$

Lenses:
- Concave lens
- Convex lens

Lens Makers Formula: $\frac{1}{f}=(\mu-1)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

Thin Lens Formula: $\frac{1}{v}-\frac{1}{u}=\frac{1}{f}$

Linear Magnification: $m=\frac{h_2}{h_1}=\frac{v}{u}$

Combination of Thin Lenses in Contact:
- $\frac{1}{F}=\frac{1}{f_1}+\frac{1}{f_2}+....+\frac{1}{f_n}$
- $P=P_1+P_2+...+P_n$

Power of Lens: $P=\frac{1}{f}$

Total Internal Reflection: It is the phenomenon of reflection of light into denser medium from the boundary of denser medium with rarer medium.

Critical Angle: The critical angle for a pair of media in contact is defined as the angle of incidence in the denser medium corresponding to which angle of refraction in the rarer medium is 90°. It is represented by C.

$\mu=\frac{1}{\sin C}$

Snell's Law: $\frac{\mu_2}{\mu_1}=\frac{\sin i}{\sin r}$

Symbols Used:
- i = angle of incidence
- μ = refractive index
- u = object distance
- f = focal length
- R = radius of curvature
- δ = angle of deviation
- A = angle of prism
- β = angle subtended by image at the eye
- α = angle subtended by object at the eye
- r = angle of reflection/refraction
- m = magnification
- v = image distance
- C = critical angle
- P = power of lens
- δ_m = angle of minimum deviation