--------------------------------------6th Chapter--------------------------------------------

1. Formula of light path, = ?

Hints: µ = medium refraction, =Length of path passed by light through zero medium, t = time

A. = µ(ans.)

B. =

C.= t

D. =

Ans: *l*0 = µ*l*

Prove:

Suppose, through any medium µ refractions, light crossed the length in t time. If the velocity of light is c through that, t =

Now, if the velocity of light is c0 through zero medium, the length of the path that light crosses through zero medium at t time will be -

= c0t = But = µ

= µ

1. Value of ?

Hints:

A. = 0 (ans.)

B. = 1

C. = -1

D. = 0.1

Ans: = 0

Prove:

The total path of light will be the least or most or more stable . In all cases we get the mathematical form of this condition from calculus,

= 0

1. Which is the second formula for refraction? (Page: 181 | FIG : 6.2)

Hints: µ1 = Refraction of the first medium, µ2 = refraction of the second medium, i = আপাতন কোণ, r = refraction angle

A. µ1 sin I = µ2 sin r (ans.)

B. = 0

C. sin I = sin r

D. µ1 sin I > µ2 sin r

Ans: µ1 sin I = µ2 sin r

Prove:

According to the Fermat’s policy, the value of L will be extreme or degraded or fixed when = 0.

Now, light length = µ1 + µ2 = µ1 + µ2

= µ1 ( + µ2 1/2

Therefore, = [µ1 ( + µ2 1/2]

= µ1 () ( + µ2 () -1/2

On condition,

µ1 () ( + µ2 () -1/2 = 0

or, µ1  - µ2

or, µ1  = µ2

From 6.2 we get, ∠RPO = ∠PON = i আপাতন কোণ

and ∠SQO = ∠QON’ = r = refraction angle

So, sin i = =

and, sin r = =

Therefore, 6.2 The equation stands out,

µ1 sin I = µ2 sin r

4. For the bottom of the round convex resorator, + = ? (Page: 182 | FIG: 6.3)

Hints:

A. + = (ans.)

B. + =

C. + =

D. + =

Ans: + =

Prove:

## (γ – α) = µ (γ – β)

## or, γ – α = µγ – γβ or, µβ – α = µγ -γ

## or, µβ – α = (µ - 1)γ … …(i)

## Α, β and γ corners will also be very small as the surface of the sphere is very small. When the angles are expressed in radian equation (i) stands,

## µ - = (µ - 1)

## or, - = … …(ii)

## Now, assuming the real wealthy custom of the sign, that is, all the real distances from the poles of the sphere surface are positive and all unrealistic distances are negative, we get

## target distance,

## Mirror distance,

## curvature radius,

## Now, by placing the value in equation number (ii),

## - =

## Or, + =

1. If the air is regressed from the dense medium, + = ?

Hints:

A. + = (ans.)

B. + =

C. + =

D. + =

Ans: + = (ans.)

Prove:

## We know, - =

## or, + =

## Now, If light is reflected in the air from the thick medium, it will form -

## + =

1. Which is the general equation of the focus distance of the lens? [ ]

Hints: = focal length of lens, target distance, µ = medium refraction, r1 = radius of the curvature of lens's first surface, radius of the curvature of lens’s second surface

A. = ) (ans.)

B. = ( -

C. = )

D. = )

Ans: = )

Prove:

## + = ) … …(i)

When the target is at an infinite distance in front of a lens, where the beam is formed is the main focus of the lens and its distance from the light center is called focus distance.

Therefore, ∞ then . So using equation no. (i) we get,

+ = )

Again, = ) which is the general equation of the focus distance of the lens.

1. Horoscope of magnification, ?

Hints: = The nearest distance to the clear vision of the eye, = Focal length of lens, target distance, reflection distance

A. (ans.)

B.

C.

D.

Ans:

Prove:

1. In case of convex lens, the horoscope of magnification, ?

Hints: target distance, reflection distance, = focus distance of convex lens, = the nearest distance to the clear vision of the eye

A. (ans.)

B.

C. - (1 + )

D. - (1 - )

Ans:

Prove: For the convex lens, from the general equation of the lens,

+ =

or, + =

or, - = -

but, m = -

therefore,

1. In case of concave lens, the horoscope of magnification, m = ?

Hints: target distance, reflection distance, = Focus distance of concave lens, = the nearest distance to the clear vision of the eye

A. (ans.)

B.

C. - (1 - )

D. - (1 + )

Ans:

Prove:

For the concave lens, from the general equation of the lens,

+ =

or, + =

or, - = -

but, m = -

therefore,

1. In case of unrealistic image of convex lens, v2 negative and fe positive then M = ?

Hints: M = magnification, distance of object from concave lens, = Distance of reflection from convex lens, Distance of reflection from concave lens,Distance of reflection from convex lens, = the nearest distance to the clear vision of the eye

A. M = - (ans.)

B. M =

C. M = -

D. M =

Ans: M = -

Prove:

For the lens, from the general equation of the lens,

+ =

or, + =

or, - = -

but, m = -

therefore, … …(i)

Similarly for concave lenses,

… …(ii)

We know, M = m1 × m2

or, M = … …(iii)

again, M = m1 × m2 = ( - ) × ( - ) or, M = -

But in case of unrealistic image of convex lens, v2 negative and fe positive,

M = -

1. For the final image in the case of convex lens = then, M = ?

Hints: M = magnification, distance of object from concave lens, = Distance of reflection from convex lens, Distance of reflection from concave lens,Distance of reflection from convex lens, = the nearest distance to the clear vision of the eye

A. M = - (ans).

B. M = -

C. M =

D. M =

Ans: M = -

Prove:

For the convex lens, from the general equation of the lens,

+ =

or, + =

or, - = -

but, m = -

therefore, … …(i)

Similarly for concave lenses,

… …(ii)

We know, M = m1 × m2

or, M = … …(iii)

again, M = m1 × m2 = ( - ) × ( - ) or, M = -

But in case of unrealistic image in the convex lens, negative and positive,

M = -

But, = as the final image is formed at the point near the eye.

So, M = -

1. When the image is formed at a minimum distance of clear vision of the eye, then magnification, M = ?

Hints: = the nearest distance to the clear vision of the eye, = Focus distance of concave lens, = Focus distance of convex lens, target distance, reflection distance

A. M = (ans.)

B. M =

C. M =

D. M = -

Ans: M =

Prove:

Magnification, M =

or, M =

If the image is formed at a minimum distance of clear vision of the eye, then magnification will be –

M =

1. What is the condition for the deviation angle to be minimal?

Hints: δ = deviation angle, δm = minimum deviation angle, = আপাতন কোণ, = emission angle A. = and = (ans.)

B. ≠ and =

C. = and

D. = and =

Ans: = and =

Prove:

When the angle and the emission angle are equal, the angle of deviation is minimal i.e.

= and =

1. Deviation angle in prism, δ = ?

Hints: δm = minimum deviation angle, = আপাতন কোণ, = emission angle, =

A. δ = + (ans.)

B. δ = +

C. δ = A - +

D. δ =

Ans: δ = +

Prove:

1. The refraction of element of prism, µ = ?

Hints: δm = minimum deviation angle, = আপাতন কোণ, = emission angle, =

A. µ = (ans.)

B. µ =

C. µ = A (δm – 1)

D. µ =

Ans: µ =

Prove:

We know, deviation angle in prism, δ = +

and, =

In the minimum deviation position = and = and δ = δm  i.e. the value of the deviation angle is minimal.

So, r1 =

δm = +

= 2

Therefore,

Now, if the refraction of element of prism is µ then -

µ = =

1. Deviation of light beam in narrow prism, δ = ?

Hints: Narrow prism = Resorating angle is not larger than 4° - 6°, = আপাতন কোণ, = emission angle, µ = the refraction of element of prism, = ,

A. δ = (Ans.)

B. δ =

C. δ = +

D. δ =

Ans: δ =

Prove:

The resorating angle of prisms that are not large in 4° - 6° are called narrow prisms.

If a beam appears at a very small angle on a narrow prism, i.e., if it appears almost perpendicular, then the deviation angle will be –

δ = +

and, µ = =

Now, as and are very small so and will be small too. So,

µ = = [As is very small, so

therefore, δ = µ + µ = µ = µ

so, δ =

1. The dispersive power of thin prism, ω = ?

Hints: µy = Refraction of the element of prism subject to yellow light, µr = refraction of the element of prism subject to red light, = resonating angle of prism

A. ω = (ans.)

B. ω =

C. ω =

D. ω =

Ans: ω =

Prove:

In the case of thin prism, the difference in the deviation of the pelvis at both ends of the spectrum and the ratio of the deviation of the middle pelvis is called dispersive power. Which is also expressed by ω.

Deviation of the middle-beam, δ = then

ω = =

therefore, ω =