EXPERIMENT No: 3

Aim : To find the focal length of a convex mirror using a convex lens.

Apparatus : An optical bench with four uprights, convex mirror, convex lens, a mirror holder, a lens holder, two needles and a scale.

Theory : The focal length of a convex mirror is given by :

$$f = \frac{R}{2}; \text{ Where R = radius of curvature of the mirror.}$$

Procedure :

1) **Determine the rough focal length of the convex lens.**
2) **Clamp the holder with the lens at the centre of the optical bench. Place the object needle approximately at 1.5 times the rough focal length of the lens.**
3) **Clamp the holder with the mirror behind the lens at some distance in such a way that the reflecting surface is facing the lens. See the inverted image of the object and adjust the height of the needle so that it touches the tip of the image. Note the position of the lens and the mirror.**
4) **Remove the convex mirror and place the image needle on the same side. With one eye closed see the inverted image of the object and adjust the tip of the image needle so that it touches the tip of the image. Move the eye to left or right and remove the parallax tip to tip. Note the position of the lens and the image needle.**
5) **Repeat the steps 2 – 4 to obtain 4 pair of values of LP and LI. Find the mean focal length of the convex mirror.**

Observations :

Rough focal length of the convex lens = _____ cm
Mean focal length of the convex mirror = _____ cm

Result :

The focal length of the given convex mirror = _____ cm

Precautions:

1. **While removing parallax, the eye should be kept at least 30cm from the needle**
2. **Tip to tip parallax should be removed.**
3. **The convex mirror should be placed close to the convex lens.**

Sources of error :

1. **Focal length of the lens may not be small**
2. **Parallax removal may not be perfect.**

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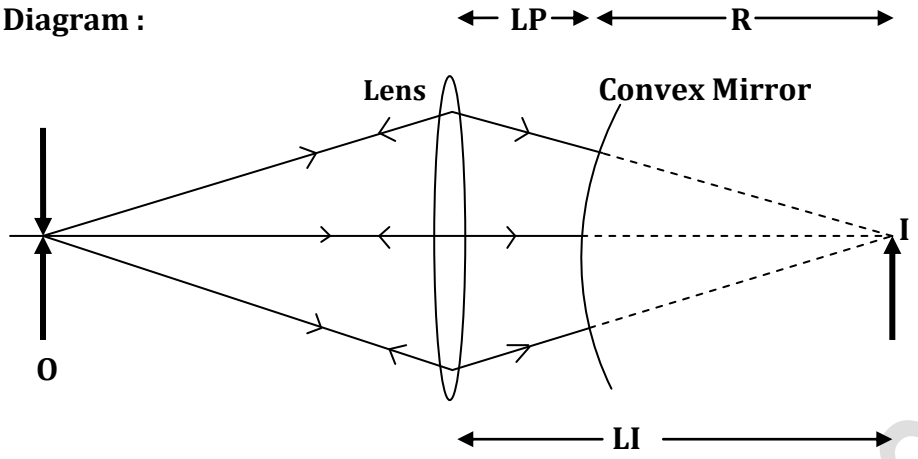
Ray Diagram :



Observation Table

Sr. No	LP (cm)	LI(cm)	R = LI – LP (cm)	Focal length f = R/2 (cm)
1				
2				
3				
4				

Mean focal length of the convex mirror = _____ cm

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