PRACTICAL: 3
Focal Length of Concave Mirror

AIM: To determine the focal length of concave mirror.

APPARATUS: Concave mirror optical bench, object and image pins, meter rule.

FIGURE:

PROCEDURE:
1) Determine the approximate focal length of the given concave mirror by obtaining on the wall the image of a distant tree.
2) Mount the given concave mirror on a stand and fix one pin on the other stand, then place them on the optical bench as shown in the diagram.
3) Now keep the object needle O in front of the mirror M and beyond C. Take a second needle I and place it in between the mirror and the object needle. Move the is needle I, until there is no parallax between the image of O and I on moving the eye from side to side. Measure the distance MO (u). Also measure the distance MI (v). This gives the observed object and image distance.
4) Very the position of the object bringing it progressively closer to the mirror taking care to see that a real image is obtained in each case. This will be so if object is at a distance greater than the focal length from the mirror. Repeat the above mentioned procedure to find the value of MO and MI in each case. Take atleast six observations in this manner.
5) Plot a graph v vs u. this will be curve. Draw a line OP making an angle of 45°. with either axis and meeting the curve at point P.

OBSERVATION:
i) Range of Optical bench = __________ cm
ii) Least count of Optical bench = __________ cm
iii) Rough focal length of concave mirror………FL = __________ cm.

OBSERVATION TABLE:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Position of the mirror M cm</th>
<th>Position of the Pin O cm</th>
<th>Position of the Pin I cm</th>
<th>Object Distance u cm</th>
<th>Image Distance v cm</th>
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GRAPH: \( v \text{ Vs } u \text{ (in cm)} \)

CALCULATION:

From Graph Co-ordinates \((u, v)\) of point P is…..

\((u = \ldots, \; v = \ldots)\)

\[
f = \frac{uv}{22} \ldots cm.
\]

RESULT:

\[\blacktriangleright \text{Focal Length of given Concave Mirror} = \ldots \text{ cm.}\]

Viva:-

1. What is a spherical mirror?
2. What is a real image?
3. For what position of object, the image formed by a concave mirror is magnified and erect?
4. Define the terms pole, principle axis and centre of curvature with reference to a spherical mirror.
5. What is the relationship between focal length and radius of curvature of a spherical mirror.
6. What is the difference between focus and principle focus?
7. Why the focal length of concave mirror is negative?
8. Why a driver doesn’t use a concave mirror as a rear view mirror?
9. How will you distinguish between a plane mirror, a concave mirror and a convex mirror, without touching them?
10. What type of mirror is used to obtain a real image of an object?