

EXPERIMENT - 4

AIM:-

This experiment determines the focal length of the given convex lens by no parallax method.

REQUIREMENTS

You are provided with

- A lens holder
- A convex lens
- Two optical pins
- An optical bench

Note - The experiment may be performed on a table top, using a metre scale, in case an optical bench is not available.

PROCEDURE

- Arrange the object pin O , the image pin I and the lens L on an optical bench or table top as shown in the figure aside so that the tips of O and I lie on the principal axis of the lens.
- Keep the object pin O at 0 cm mark and the lens L at 60.0 cm mark, so that the object distance between O and $L = u = 60.0$ cm.
- Look at the object pin through the lens, from a distance. You should see an inverted and diminished image I' .

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- iv) Adjust the position of the image pin I, so that there is no parallax between I and I'. Ensure that tip to tip parallax is removed.
- v) At no parallax, note the position of the image pin I on the metre scale upto one decimal place.
- vi) Determine the image distance v = distance between L and I, correct upto one decimal place. Record this value of v in your answer.
- vii) Repeat the experiment four more values of u if $u = 50, 40, 30, \text{ and } 20$ cm. Each time, remove the parallax and find v .
- viii) For each value of u , calculate $p = uv$, $q = u + v$ and $f = \frac{p}{q}$.
- ix) Tabulate all sets of u, v, p, q and f with their units.
- x) Show the image position when the parallax has been removed in one of the readings in ix above, to the Examiners.
- xi) Find F , which is the mean of all the five values of f .
- xii) Record the value of F correct to one decimal place with its unit, in your answer booklet.



OBSERVATION TABLE

Serial No.	u (cm)	v (cm)	$p = u \cdot v$	$q = u + v$	$f = \frac{p}{q}$
1)	60	13.5	810	73.5	$\frac{810}{73.5} = 10.89$
2)	50	14	700	64	$\frac{700}{64} = 10.93$
3)	40	14.5	580	54.5	$\frac{580}{54.5} = 10.64$
4)	30	16	480	46	$\frac{480}{46} = 10.43$
5)	20	20.5	410	40.5	$\frac{410}{40.5} = 10.12$

Mean Focal length

$$= \frac{10.89 + 10.93 + 10.64 + 10.43 + 10.12}{5}$$

$$= 10.602$$

$$F = 10.6 \text{ cm}$$

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