

**Question 1****[10]**

Determine the focal length of the given convex lens based on the procedure given below.

You are provided with the required materials and procedure to carry out this experiment. Follow the procedure correctly, perform the experiment and present the findings in your answer script. (Note: DO NOT copy the theory, principle, materials required and procedure of the experiment).

**Theory:**

The focal length of a lens is calculated using a graphical method with the equation

$$f = \frac{u_0 + v_0}{4}$$

Where,  $u_0$  = value of  $u$  on x-axis

$v_0$  = value of  $v$  on y-axis

**Materials required:**

Apparatus	Quantity
Optical bench	1
Convex lens	1
Lens holder	1
Optical pins	2
Pin holders	2
Meter rule	1
Magnifying glass	1

**Procedure:**

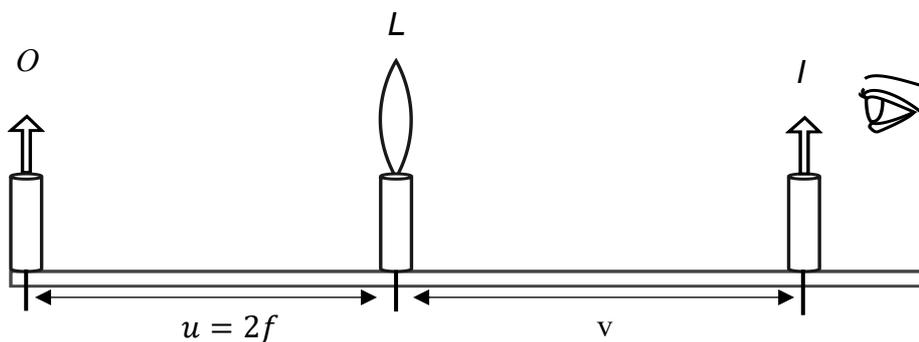
Step 1. Write the hypothesis for the experiment.


Step 2. Identify the variables (independent, dependent, controlled).


Step 3. Determine the approximate focal length  $f$  of the given convex lens by the distant object method. Record the value of  $f$  in cm.


Step 4. Record the range and least count of the optical bench.


Step 5. Mount the lens  $L$  on the lens holder in between the object pin  $O$  and the image pin  $I$  on the given optical bench as shown in **Figure 1: Experimental setup**



**Figure 1:** *Experimental setup*

Step 6. Position the lens  $L$  at a distance  $u = 2f$  from the pin  $O$ .

Step 7. Adjust the pin  $I$  until parallax is removed.

Step 8. Record the positions of O, L, I, u, and v in Table 1: Focal length of given lens by u-v method with appropriate units (Show your first set of readings to the Visiting Examiner).

**Table 1:** Focal Length of Given Lens by u-v Method

Sl. No	O (cm)	L (cm)	I (cm)	$u = L - O$ (cm)	$v = I - L$ (cm)
1					
2					
3					
4					
5					

Step 9. Repeat the experiment to obtain four more readings by increasing the object distance u by 5 cm each.

Step 10. Plot a u-v graph using a suitable scale to represent u along x-axis and v along y-axis using the graph attached in page number 5. Then draw a smooth curve of best fit.

Step 11. On the u-v curve, draw a diagonal line from the origin making an angle of  $45^\circ$  with the x-axis and mark the point as P.

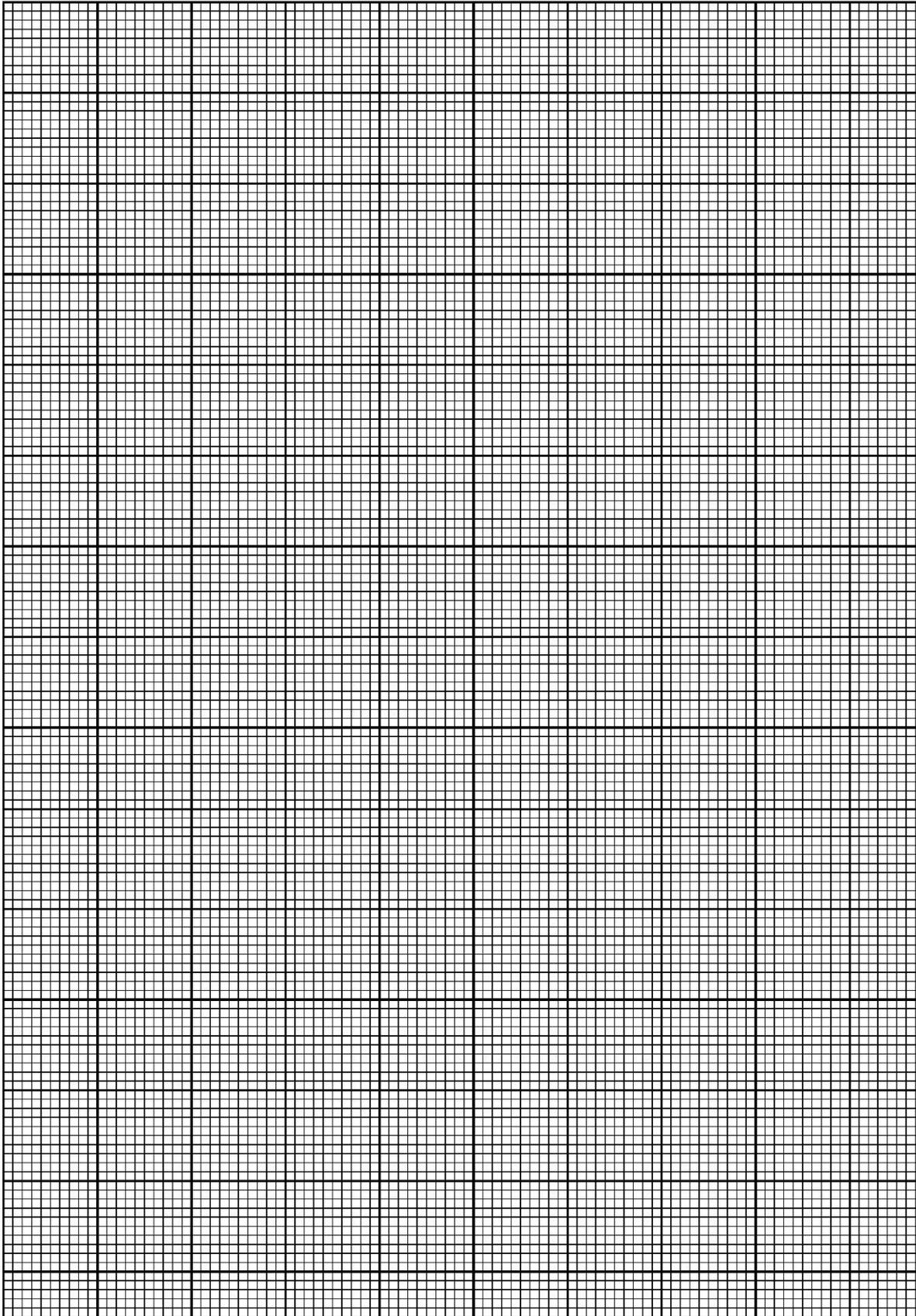
Step 12. From the point P, draw a vertical line on to x-axis and record the value as  $u_0$ .

Step 13. From the point P, draw a horizontal line on to y-axis and record the value as  $v_0$ .

Step 14. Calculate the focal length of lens as  $f = \frac{u_0 + v_0}{4}$  up to three significant figures with appropriate unit.

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**Question 2****[10]**

Determine the specific resistance of the given wire using meter bridge.

You are required to include details of the following components of your experiment.

i. Aim of the experiment


ii. Hypothesis


iii. Theory (only working formula and meaning of variables)

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iv. Materials required


v. Identify variables (independent, dependent and controlled)


vi. Observation (Record up to 3 sets of readings) **(Show your first set of readings to the visiting examiner).**

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vii. Result


viii. Conclusion and verification of hypothesis
