# PHYSICS

## PAPER – 2

## (PRACTICAL)

*(Three hours)*

*(Candidates are allowed additional 15 minutes for* ***only*** *reading the paper. They must* ***NOT*** *start writing during this time.)*

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ALL ANSWERS MUST BE WRITTEN IN THE ANSWER BOOKLET PROVIDED SEPARATELY.

*If squared paper is used, it must be attached to the answer booklet.*

*Marks are given for a clear record of observations actually made, for their suitability and accuracy, and for the use made of them.*

*A brief statement of the method may be given if necessary. The theory of the experiment is not required unless specifically asked for.*

*Candidates are advised to record their observations as soon as they have been made.*

*All working, including rough work, should be done on the same sheet as, and adjacent to, the rest of the answer.*

*Mathematical tables and squared paper are provided. The intended marks for questions or parts of questions are given in brackets [ ].*

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*Answer* **all** *questions.*

***You should not spend more than one and a half hours on Question 1.***

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

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

You are provided with:

(i) A convex lens

(ii) A lens holder

(iii) Two optical pins

(iv) An optical bench.

**Note:** *If an optical bench is not available, the experiment may be performed on a table top, using a metre scale.*

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**This Paper consists of 4 printed pages.**



**1213-861 B**

Mount the given convex lens **L** on a lens holder. Keep the object pin **O** to the left and the image pin **I** to the right of the lens (See ***Figure 1***). Adjust their heights till their tips lie on the principal axis of the lens.

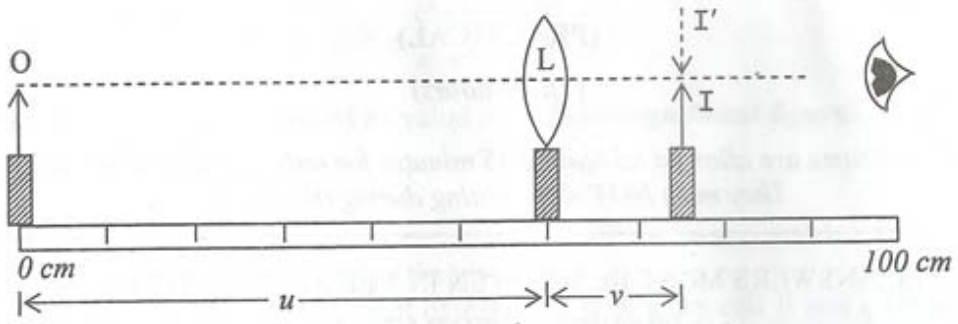


***Figure 1***

Keep the object pin at 0 cm mark and the lens at 60·0 cm mark, so that object distance OL = $u$ = 60·0 cm. Look at the object pin through the lens, from a distance. You should see an **inverted** and **diminished** image I′ of the object pin O. 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. If required, you may adjust the heights of the two pins O and I. At no parallax, note the position I of the image pin on the metre scale, correct up to **one decimal place.**

Determine the image distance $v$ = LI, correct up to **one decimal place.** Record this value of $v$ in your answer booklet. **Show this reading to the Visiting Examiner.**

Calculate **linear magnification** $m = \frac{v}{u}$, correct up to **two decimal places.**

Repeat the experiment for **five more values** of $u$ i.e. $u$ = 50 cm, 40 cm, 30 cm, 20 cm and 15 cm. Each time, remove the parallax and find $v$ and m.

Now, tabulate all **six** sets of values of $u$, $v$ and m with their **units** (if any).

Plot a graph of m vs $v$, taking m on Y axis. Do not choose the origin at (0, 0). Choose the scales such that you use more than half the graph.

Draw the line of best fit. It must be a thin and uniform line. Find its slope **S** using:

$$\mathbf{S} = \frac{\text{change in m}}{\text{change in } v}$$

Record the value of **S**, rounded up to **three significant figures.**

Then, find f, using $f = \frac{1}{S}$

and record its value in your answer booklet, correct up to **one decimal place,** with proper unit.

**Question 2** [7]

This experiment determines the resistance per unit length of the given metallic wire. You are provided with:

(i) A 100 cm long and uniform wire **AB** stretched on a wooden board with a meter scale attached to it.

(ii) A battery eliminator **D** of emf 4V.

(iii) A resistance box **R.B.** of range 0 Ω to 10 Ω.

(iv) A plug key **K**

(v) A jockey **J**

(vi) A fresh dry cell **E** kept in a battery box / holder.

(vii) 0 – 3V voltmeter **V**

(viii) 0 – 1A ammeter **A**

(ix) A central zero galvanometer **G**

(x) Connecting wires

Set up a circuit as shown in ***Figure 2*** below:

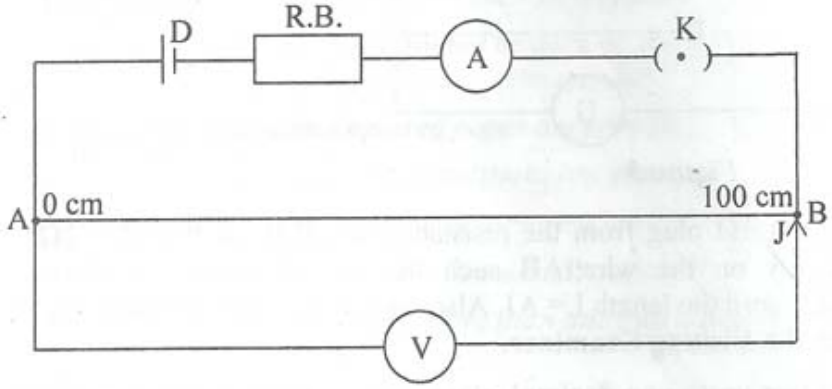


***Figure 2***

Determine and record the least count of the given ammeter and the voltmeter.

Place the jockey gently at the point B of the wire AB. Adjust the resistance R in the resistance box R.B. so that the reading of the voltmeter is maximum and the reading of the ammeter is within its scale. Record in your answer booklet, the readings R, V and I of the **resistance box, voltmeter** and **ammeter** respectively.

**Show these readings to the Visiting Examiner.**

By taking different values of resistance R in the resistance box, repeat the experiment to obtain **four more** values of V and I, with the jockey **always touching the point B** of the wire AB.

Tabulate all the **five** sets of values of R, V and I.

Plot a graph of V vs I, taking V on Y axis. Draw the **line of best fit.**
Find its slope S′ using:

$$S' = \frac{\text{change in V}}{\text{change in I}}$$

Calculate r = S′/100 and record its value up to **three significant figures,** with proper unit.

**Question 3** **[3]**

This experiment determines emf of the given cell.
Replace the voltmeter in the circuit of ***Figure 2*** with a dry cell **E** and a central zero galvanometer **G** and set up a new circuit as shown in ***Figure 3*** below:

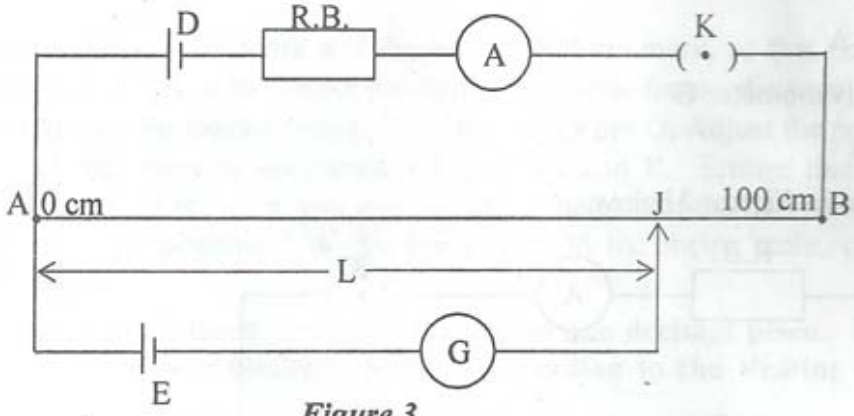


***Figure 3***

Close the key K. Take out 1Ω plug from the resistance box R.B. so that R = 1Ω. Press the jockey J gently on the wire AB such that the galvanometer shows **no deflection.** Read and record the length L= AJ. Also record the ammeter reading $I_0$. **Show these readings to the Visiting Examiner.**

Determine E = $I_0$rL, correct up to **one decimal place. (Use the value of r found in Question 2.)**

Repeat the experiment for R = 2 Ω and calculate the new value of E.

Find $\mathbf{E_m}$, the mean value of E and record its value in your answer booklet, correct up to **two decimal places,** with proper unit.

**Question 4**

**Show the following to the Visiting Examiner for assessment:**

Project **[7]**

Physics Practical File. **[3]**