

PHYSICS

PAPER – 2

(PRACTICAL)

(Maximum Marks: 30)

(Time allowed: Three hours)

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

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.*

*Statement of the theory, procedure of the experiment, apparatus, circuit diagrams,
precautions are **not** required to be written 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 [].*

**Note: Procedure of the Experiment, ray diagram, circuit diagram and precautions are not to
be written in your answer booklet.**

Answer all questions.

You should not spend more than one and a half hours on each question.

Question 1

[9]

This experiment determines **emf** of the given cell, using a **potentiometer**.

You are provided with:

- A 100 cm long and uniform metallic wire **AB** fitted on a wooden board with terminals at **A** and **B**.
 - A resistance box having a range of 0 to 10 Ω or more. It is labelled as **R.B**.
 - A 4V dc source (an accumulator or an electronic battery). It is labelled as **D**.
 - A dry cell. It is labelled as ϵ .
 - A central zero galvanometer (**G**).
 - A plug key (**K**).
 - A jockey (**J**)
 - A few connecting wires.
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This Paper consists of 3 printed pages and 1 blank page.

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Turn over

- (i) Set up the circuit as shown in **Figure 1** below:

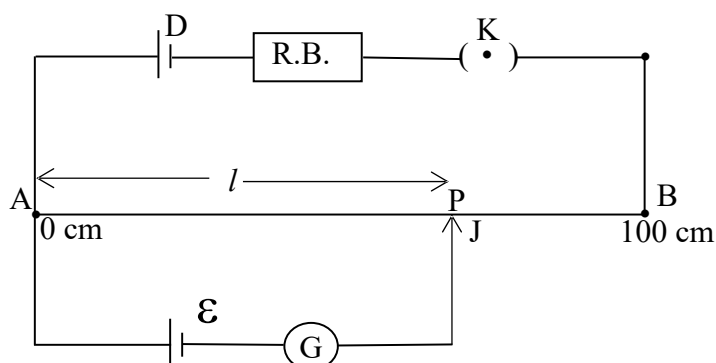


Figure 1

Ensure that all connections are **tight**.

- (ii) Keep the value of **D** at **4 V**.
 (iii) Close the key **K**. Remove 2Ω plug from the resistance box so that **R = 2Ω** .
 (iv) Now, gently touch the jockey **J** on the wire **AB** and locate the balance point **P**, such that the galvanometer shows no deflection. Ensure that all other plugs in the resistance box are kept tightly closed.

Note and record the balancing length **AP = l cm**, correct up to **one decimal place**.

- (v) Repeat the experiment for **five more** values of **R** such that **R = 3Ω , 4Ω , 5Ω , 6Ω and 7Ω** . Each time, find the balance point and obtain the balancing length **l** .
 (vi) Tabulate all **six** sets of values of **l** and **R** with their units.
 (vii) **Show any one of the readings in (vi) to the Visiting Examiner.**
 (viii) Plot a graph of **l vs R**, taking **l** on y axis and **R** on x axis.

Draw the line of best fit.

- (ix) From the graph, find **l_0** , the value of **l** when **R = 0**.
 (x) Calculate the value of ε using:

$$\varepsilon = \frac{l_0}{25}$$

and record its value with proper unit, correct up to **two decimal places**.

Question 2

[6]

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

You are provided with:

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

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

- (i) Arrange the object pin **O**, the lens **L** and the image pin **I** on an optical bench or a table top as shown in **Figure 2** below. Adjust the heights of the object pin **O** and the image pin **I** so that the tips of **O** and **I** lie on the principal axis of the lens.

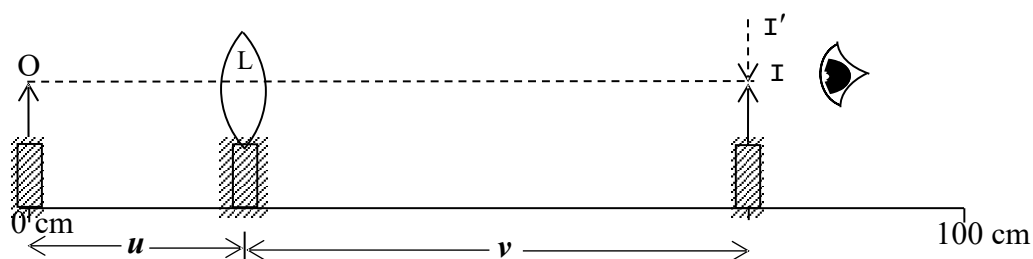


Figure 2

- (ii) Place the object pin **O** at the 0 cm mark and the lens **L** at the 30.0 cm mark, so that the object distance $u = 30.0$ cm (i.e. the distance between the lens and the object pin).
- (iii) Look at the tip of the object pin **O** through the lens from a distance so that you see an inverted image (say **I'**) of the object pin.
- (iv) Now, adjust the position of the image pin **I** in such a way, 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** and measure the image distance $v = LI$ (i.e. the distance between the lens and the image pin) in cm, correct up to **one decimal place**.
- (vi) Repeat the experiment for **four more** values of u , i.e. $u = 40.0$ cm, 50.0 cm, 60.0 cm and 70.0 cm.
- (vii) For each value of u , calculate $m = v/u$ and $f = \frac{v}{m+1}$ up to **three significant figures**.
- (viii) Tabulate all **five** sets of u , v , m and f with their units (if any).
- (ix) **Show the image position when the parallax has been removed, in any one of the readings in (vii) above, to the Visiting Examiner.**
- (x) Find **F**, the average of all the five values of f from the observation table and record its value with proper units. Write your answer up to **one decimal place**.

Question 3

Show the following to the Visiting Examiner for assessment:

Project [10]

Physics Practical File. [5]