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) A 100 cm long and uniform metallic wire **AB** fitted on a wooden board with terminals at **A** and **B**.

(b) A resistance box having a range of 0 to 10Ω or more. It is labelled as **R.B**.

(c) A 4V dc source (an accumulator or an electronic battery). It is labelled as **D.**

(d) A dry cell. It is labelled as $\mathcal{E}$ **.**

(e) A central zero galvanometer **(G).**

(f) A plug key **(K)**.

(g) A jockey **(J)**

(h) A few connecting wires.

This Paper consists of 3 printed pages and 1 blank page.

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

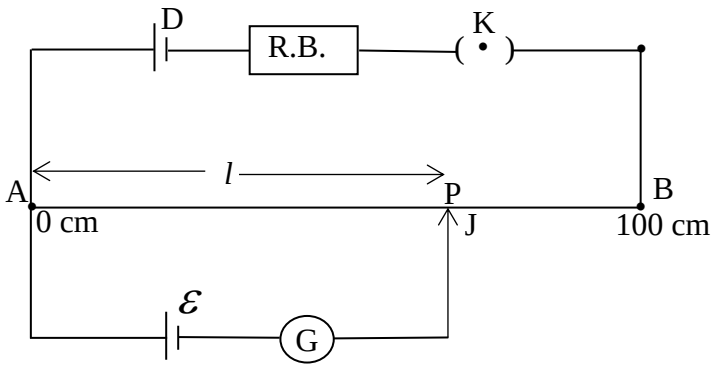

Figure 1

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 $\boldsymbol{l_0}$, 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:

(a) An optical bench

(b) A lens holder

(c) A convex lens

(d) 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.

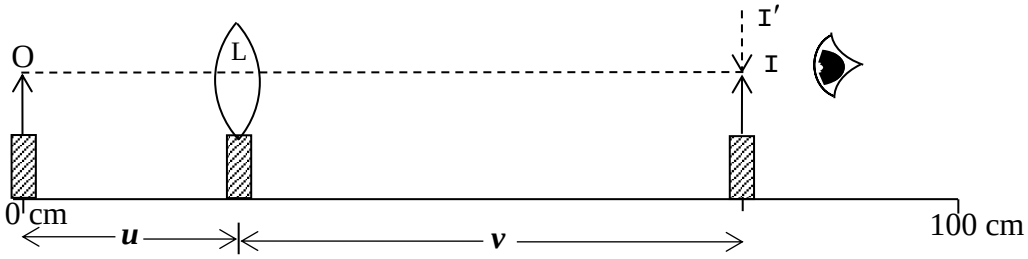

Figure 2

(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 $\boldsymbol{m} = v/u$ and $\boldsymbol{f} = \frac{v}{m+1}$ 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 (viii) 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]**