

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 is based on **Wheatstone bridge** principle.

You are provided with:

- (a) A 100 cm long and uniform metallic wire **AB** attached to a metre scale on a wooden board. It is provided with binding terminals at its ends.
- (b) A 50 cm long and uniform wire 'r' wound on a wooden frame.
- (c) A resistance box **R.B.** of range 0 to 10 Ω .
- (d) A jockey **J**
- (e) A plug key **K**
- (f) 2V d.c. source **E**

- (g) Central zero galvanometer **G**
- (h) A few connecting wires.
- (i) Arrange the circuit as shown in **Figure 1** below. Make sure that all connections are tight.

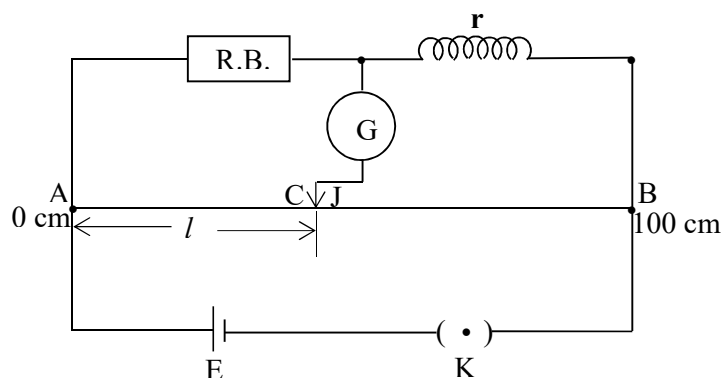


Figure 1

- (ii) Keep the value of E at $2V$.
- (iii) Close the key K and take out a 1Ω plug from the resistance box **R.B.** so that $x = 1\Omega$. Ensure that all other plugs in the resistance box are tightly closed.
- (iv) Place the jockey **J** gently at different points on the wire AB till at a certain point C , the galvanometer G shows **no deflection**. Note and record the length $AC = l$ in cm, correct upto **one decimal place**.
- (v) Repeat the experiment to obtain **five more values** of l with $x = 2\Omega, 3\Omega, 4\Omega, 5\Omega$ and 6Ω .
- (vi) For **each** value of x , calculate $y = \frac{l}{(100-l)}$, correct upto **two decimal places**.
- (vii) Tabulate all **six** sets of values of x , l and y with their **units**.
- (viii) **Show any one of the readings in (vii) above to the Visiting Examiner.**
- (ix) Now plot a graph of y vs x .
- (x) Draw the **best fit line**.
- (xi) Determine its slope S , using:

$$S = \frac{\text{Change in } y}{\text{Change in } x}$$

and record its value in your answer booklet, correct up to **three significant figures**.

- (xii) Calculate:

$$R = \frac{1}{S}$$

and record its value upto **one decimal place**, with **unit**.

Question 2**[6]**

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

You are provided with:

- (a) A lens holder
- (b) A convex lens
- (c) Two optical pins
- (d) An optical bench

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 image pin **I** and the lens **L** on an optical bench or a table top as shown in **Figure 2** below. Adjust the height of the object pin **O** and that of the image pin **I** so that their tips lie on the principal axis of the lens.

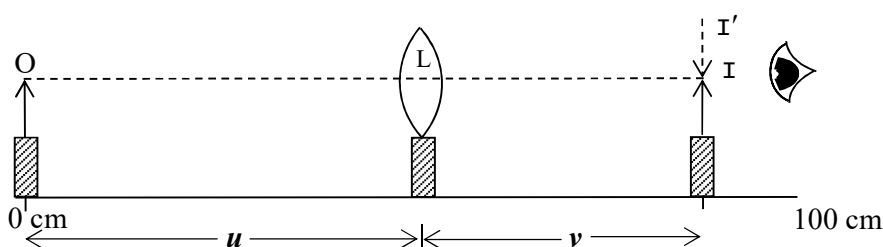


Figure 2

- (ii) Place the object pin **O** at the 0.0 cm mark and the lens **L** at the 30.0 cm mark so that the object distance $u = 30.0 \text{ cm}$ (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 (**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 record the image distance $v = LI$ (i.e. the distance between the lens and the image pin) in cm, correct upto **one decimal place**.
- (vi) Repeat the experiment for **four** more values of u , i.e. $u = 40.0 \text{ cm}$, 50.0 cm , 60.0 cm and 70.0 cm . Each time, remove the parallax and find the value of v .
- (vii) For **each** value of u , calculate $p = \frac{100}{u}$ and $q = \frac{100}{v}$ and record their values upto **two decimal places**.
- (viii) Determine:

$$f = \frac{100}{p+q}$$

for **each** set and record its value correct upto **one decimal place**.

- (ix) Tabulate all **five** sets of u , v , p , q and f with their **units**.

- (x) Show the image position when the parallax has been removed, in any one of the readings in (ix) above, to the Visiting Examiner.
- (xi) Calculate F , the mean value of f and record its value, correct upto one decimal place, with unit.

Question 3

Show the following to the Visiting Examiner for assessment:

Project [10]

Physics Practical File. [5]