

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**

This Paper consists of 4 printed pages.

- (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.

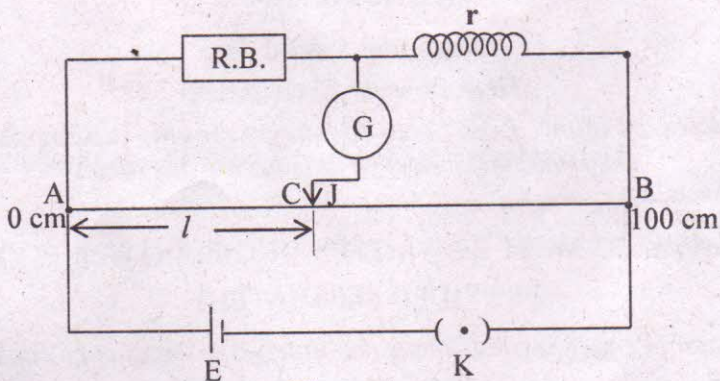


Figure 1

- (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.

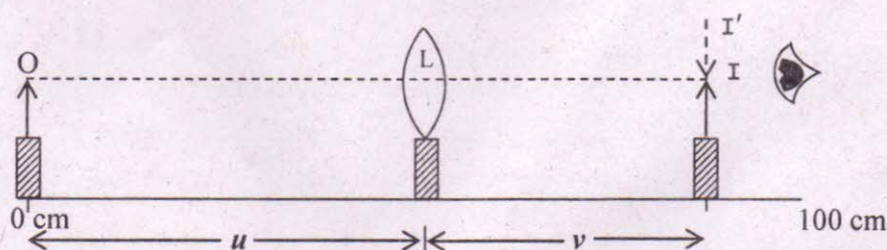


Figure 2

- (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 $u = 30.0$ 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. $u = 40.0$ 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]