

# 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.)

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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.*

*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.**

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*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  $\Omega$ .
- (d) A jockey **J**
- (e) A plug key **K**
- (f) 2V d.c. source **E**

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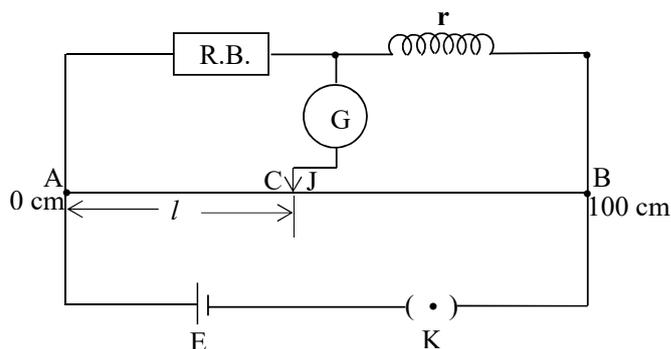
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Turn over

- (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  $1\Omega$  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  $6\Omega$ .
- (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]

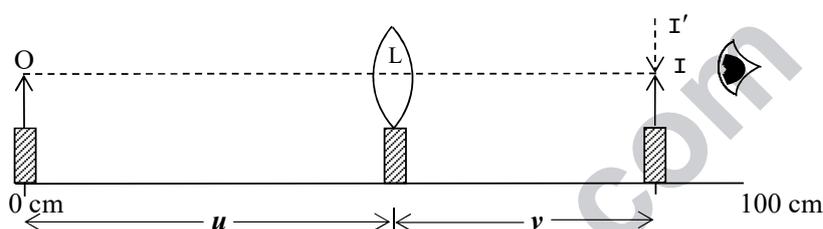
This experiment determines the **focal length** of the given convex lens by **no parallax method**.

You are provided with:

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

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

- 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**

- 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)
- 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.
- 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.
- 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**.
- 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  $v$ .
- For **each** value of  $u$ , calculate  $p = \frac{100}{u}$  and  $q = \frac{100}{v}$  and record their values upto **two decimal places**.
- Determine:

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

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

- 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]

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