

**PHYSICS**  
**PAPER – 2**  
**(PRACTICAL)**  
**(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 [ ].*

*Answer **all** questions.*

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

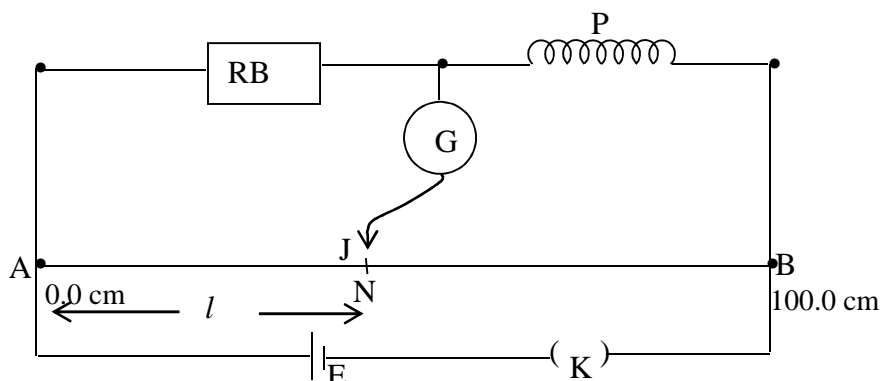
**Question 1**

**[10+2]**

**A.** This experiment determines resistivity of the material of the given wire.

You are provided with a 1 m long uniform wire AB stretched along a metre scale and provided with binding terminals at the two ends. You are also provided with a resistance box RB, a coiled resistor 'P' wound on a wooden bobbin and provided with binding terminals, a jockey 'J', a 2 V d.c. power supply (E), a plug key 'K', a centre-zero galvanometer 'G' and a few connecting wires.

(i) Set up the circuit as shown in **Figure 1** below. Ensure that all connections are tight.



**Figure 1**

- (ii) Take out 1 plug from the resistance box **RB** so that  **$R = 1$**  . By touching the jockey **J** gently at various points on the wire AB, find the null point N for which the galvanometer shows no deflection. Record  $l = AN$  in cm, correct upto **one decimal place**.
- (iii) Repeat the experiment for **five more** values of  $R$  in the range  $1 - 10$  , each time finding and recording the value of  $l$ .
- (iv) **Show any one of the readings in (iii) above to the Visiting Examiner.**
- (v) Tabulate all the **six sets** of values of  $R$ ,  $l$  and  $y = \frac{100R}{l}$ , with their units. Compute  $y$  upto **one decimal place**.
- (vi) Plot a graph of  $y$  vs  $R$  and draw the line of best fit.
- (vii) Determine the slope  $S$  of the line using  $S = \frac{\text{Change in } y}{\text{Change in } R}$ .
- Record the value of  $S$  upto **three significant figures**.
- (viii) From the graph, read and record the value  $Y_0$  of  $Y$  when  $R = 0$ .

**B.** Find and record the least count of the given screw gauge in mm. Using it, determine the diameter ‘D’ of the sample wire ‘W’. Record its value in your answer book, in mm.

Then, find the radius  $r$  of the wire in cm. Using this value of  $r$  and the value of  $Y_0$  from ‘Part A’, find the value of  $K$  where:

$$K = f r^2 Y_0 \times 10^4.$$

‘K’ is a measure of the resistivity of the material of the wire.

## Question 2

[8]

This experiment determines the focal length of a convex lens by the displacement method.

- (i) Determine the approximate focal length  $f_1$  of the given convex lens (marked M) by projecting the image of a distant object on a wall or a screen. Record the value of  $f_1$  in cm, correct upto one decimal place.

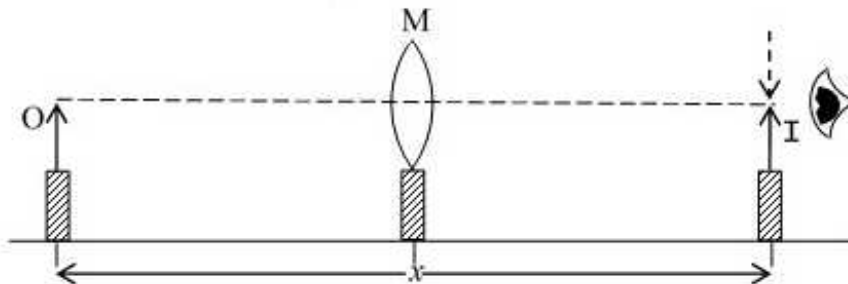
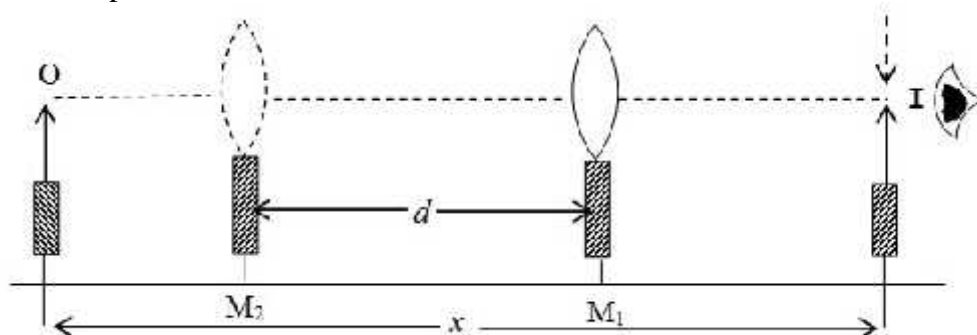


Figure 2(a)

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

- (iii) Adjust the distance  $x$  between O and I to be equal to 70 cm. Ensure that this separation is maintained throughout this particular set up.
- (iv) Move the convex lens towards the image pin I and adjust its position until the diminished and inverted image of O coincides with the image pin I.
- (v) Record the position  $M_1$  of the lens on the metre scale.



**Figure 2(b)**

- (vi) Now move the lens towards the object pin O and adjust its position as shown in **Figure 2(b)** until the magnified and inverted image of O coincides with I. Record the new position  $M_2$  of the lens.
- (vii) The difference between the two positions  $M_1$  and  $M_2$  is the displacement ' $d$ ' of the lens. Calculate and record the value of  $d$  in cm, **correct upto one decimal place.**
- (viii) Repeat the experiment to obtain **four more** sets of  $x$  and  $d$  where the range of  $x$  is between 70 cm and 100 cm. Note that parallax is to be removed by moving the lens M only.
- (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) Tabulate all the **five sets** of values of  $x$ ,  $x^2$ ,  $d$ ,  $d^2$  and  $f = \frac{x^2 - d^2}{4x}$
- (xi) Calculate 'F', the mean of the five values of  $f$  and record its value with proper unit in your answer book, **correct upto one decimal place.**

### Question 3

Show the following to the Visiting Examiner for assessment:

- (a) Project Report [7]
- (b) Physics Practical File. [3]