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 [ ].

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*Answer **all** questions.*

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

Question 1 **[10+2]**

This experiment determines **resistivity** of the material of the given wire. It 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 connecting terminals at its ends.

(b) A coiled resistor **P** on a wooden frame with terminals.

(c) A resistance box **R.B.** of range 0 to 10 Ω.

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

(e) 2V d.c. source **E**.

(f) A jockey **J**.

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

(h) A specimen wire **W**.

(i) A micrometer Screw Gauge

(j) A few connecting wires

(A) (i) Arrange the circuit as shown in ***Figure 1*** below. Make sure that all connections are tight.

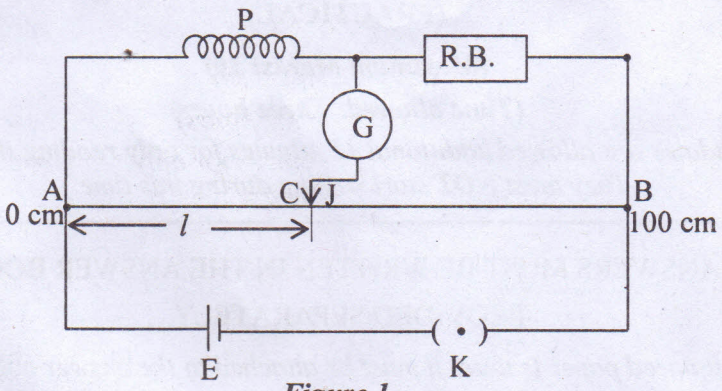

Figure 1

(ii) Keep the value of E at 2V.

(iii) Close the key K. Take out a 1Ω plug from the resistance box R.B so that $x = 1\Omega$.

(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 $y = \frac{100}{l}$ 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 line of best fit.

(xi) Determine its slope S, using:

$$S = \frac{change\ in\ y}{change\ in\ x}$$

and record its value in your answer booklet.

(B) (i) Determine the **least count** of the given Screw Gauge and record its value in mm.

(ii) Using this Screw Guage, determine the diameter 'd' of the given specimen wire W in mm and record its value in your answer booklet.

(iii) Now calculate K where:

$$K = \frac{\pi d^2}{200S} \times 10^6$$ (where S is the value of the slope determined in Q.1A.)

and record its value in your answer booklet.

(Note: K is a measure of resistivity of the material of the given specimen wire.)

Question 2 [8]

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: *The experiment may be performed on a table top, using a metre scale, in case an optical bench is not available.*

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

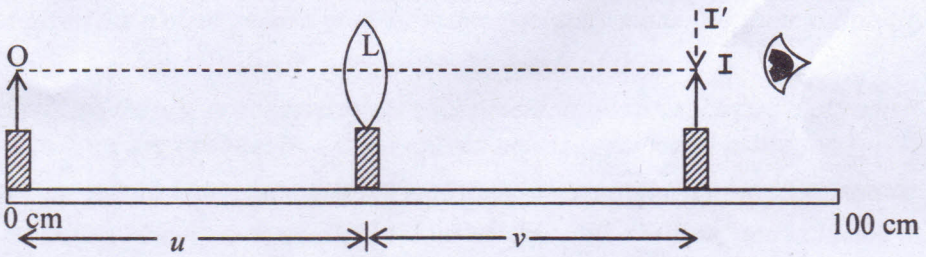

Figure 2

(ii) Keep the object pin O at 0 cm mark and the lens L at 60·0cm mark, so that the object distance between O and L = u = 60·0 cm.

(iii) Look at the object pin through the lens, from a distance. You should see an inverted and diminished image I′.

(iv) Adjust the position of the image pin I, so 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 on the metre scale, correct upto **one decimal place**.

(vi) Determine the image distance v = distance between L and I, correct upto **one decimal place**. Record this value of v in your answer booklet.

(vii) Repeat the experiment for **four more** values of u, i.e. u = 50 cm, 40 cm, 30 cm and 20 cm. Each time, remove the parallax and find v.

(viii) For each value of u, calculate $p = uv$, $q = u + v$ and $f = \frac{p}{q}$.

(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) Find **F**, which is the **mean** of all the **five** values of f.

(xii) Record the value of **F** correct upto **one decimal place** with its unit, in your answer booklet.

Question 3

Show the following to the Visiting Examiner for assessment:

Project [7]

Physics Practical File. [3]