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.

A brief statement of the method may be given if necessary. The theory of the experiment is not required 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 Question 1.

Question 1 **[10]**

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

You are provided with:

(i) A lens holder

(ii) A convex lens

(iii) Two optical pins

(iv) 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.*

Mount the given convex lens (L) on the lens holder. Adjust the heights of object pin (O) and image pin (I) till their tips lie on the principal axis of the lens.

Now, arrange them as shown in ***Figure 1***:

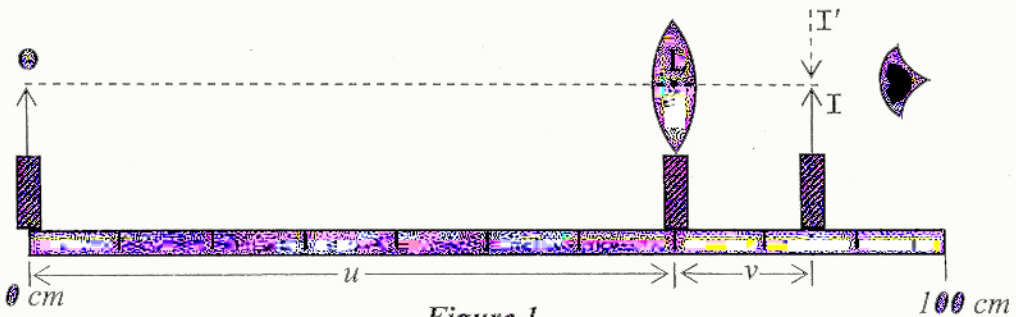

Figure 1

Object pin (O) is at zero cm mark and the lens (L) is at 70 cm mark so that the object distance (OL) = u = 70 cm. Look at the tip of the object pin, through the lens, from a distance. You will see a diminished and inverted image (I′) of the object pin.

Now, adjust the position of the image pin (I) till it coincides with I′. Thus, there is no parallax between I′ and I. Ensure that 'tip to tip' parallax is removed. Note this position (I) of the image pin and determine the image distance v = LI, correct up to **one decimal place.**

Show this reading to the Visiting Examiner.

Calculate q = $\frac{uv}{100}$ and p = $\left(\frac{u+v}{10}\right)$, both up to **one decimal place.**

Now, repeat the experiment for **five more** values of u in the range 20 cm to 70 cm. Each time, find v and calculate p and q.

Tabulate **all six sets** of values of u, v, p and q with their units given at the column head.

Plot a graph of q vs p, taking q on y axis. Take origin at (0, 0).

Draw the **line of best fit**. Find its slope 'm' using:

$$m = \frac{change\ in\ q}{change\ in\ p}$$

and record its value, correct up to **three significant figures.**

Find 'f' using $f = 10 \times m$ and record its value with proper unit, correct up to **one decimal place.**

Question 2 [7]

This experiment is based on **Wheatstone bridge** principle.

You are provided with:

(i) 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.

(ii) A 50 cm long and uniform wire R wound on a wooden frame.

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

(iv) A plug key **K**

(v) A jockey **J**

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

(vii) 0 – 2V d.c. source **E**

(viii) A few connecting wires

Set up a circuit as shown in *Figure 2* below:

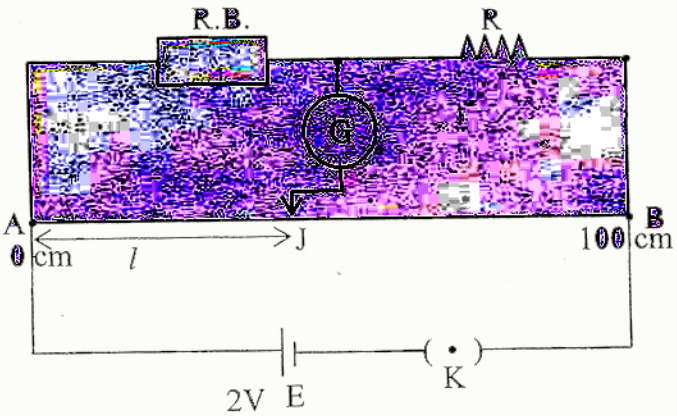

Figure 2

Ensure that all connections are tight.

Close the key K and take out 1 Ω plug from the resistance box, so that X = 1 Ω. Remaining plugs must be kept tightly closed. Gently touch the jockey on the wire AB and locate its position J for which the galvanometer G shows no deflection.

Note and record the length AJ = l in cm, correct upto **one decimal place**.

Show this reading to the Visiting Examiner.

Repeat the experiment and obtain **four more** values of l with X = 2, 3, 4 and 5 Ω.

For each value of X, compute Y $= \frac{100X}{l}$ correct up to **one decimal place** only.

Tabulate all five sets of values of X, l and Y with their units.

Plot a graph of Y against X, taking origin at (0, 0).

From the graph, read and record Y_0 the value of Y, when X = 0. [3]

Question 3

Determine the value of unknown resistance R for X = 2, 3 and 4 Ω, using:

$$R = \frac{(100 - l)X}{l}$$

Tabulate **all the three sets** of values of X, l and R.

Find and record the mean value of R, correct up to **one decimal place**, with proper unit.

Question 4

Show the following to the Visiting Examiner for assessment:

Project [7]

Physics Practical File. [3]