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PHYSICS

Paper – 2

(PRACTICAL)

Three hours and a quarter

(The first 15 minutes of the examination are for reading the paper only.

Candidates must NOT write writing during this time).

ALL ANSWERS MUST BE WRITTEN IN THE ANSWER BOOKLET PROVIDED SEPARATELY.

Read the questions carefully and follow the given instructions.

If squared paper or graphs is used it must be attached to the answer booklet.

Marks are given for clear record of observations actually made and correct significant figures and units wherever applicable.

A statement of the method is NOT 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 workings, including rough work, should be done on the same sheet as, and adjacent to, the rest of the answer.

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 Question 1.

Question 1. **[10]**

This experiment determines the focal length (*f*) of the given lens - L by the graphical method. Determine the approximate focal length (*f*) of the given convex lens by the distant object method

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Record the value of *f* in cm with three significant figures. Mount the lens on the lens holder in between the object pin O and the image pin I on the given optical bench as shown in figure 1.

Record the range and least count of the optical bench.

Keep the lens L at a distance (*u*) = 20.0 cm from the pin O. *u* should be greater than the approximate focal length *f* measured by distant object method.

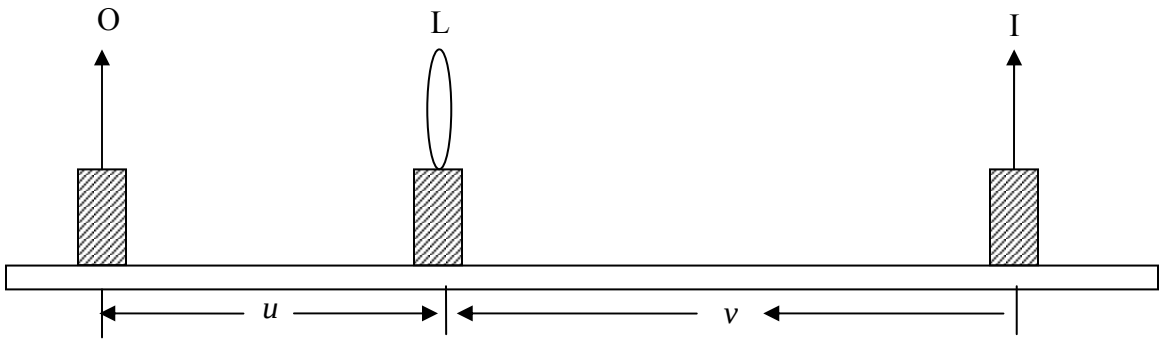

Figure 1

Adjust the position of the image pin I so that the parallax between the pin I and the inverted image of O is completely removed. Note the positions of O, L and I.

Calculate object distance (*u*) from O to L and image distance (v) from L to I.

Repeat the experiment four more times (total 5 sets) at equal intervals for the object distance (*u*) within the approximate value 4f.

Tabulate the positions O, L and I and the distances *u* and v in Table 1 with units. All entries should be in 3 significant figures.

Also tabulate the values $x = \frac{1}{u}$ and $y = \frac{1}{v}$ in Table 2 with appropriate units. All entries should be in 3 significant figures.

Plot a graph of *y* against *x*. Determine and record its slope $S_1 = \frac{\Delta y}{\Delta x}$ upto 3

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significant figures with proper units.

From the graph read the value x_0 (the value of x when $y = 0$) and y_0 (the value of y when $x = 0$)

Calculate the focal length of lens L as $F = \frac{2}{x_0 + y_0}$ up to 3 significant figures with unit.

Question 2. **[3]**

This experiment determines the emf of the given dry cell.

Set up the circuit as shown in figure 2.

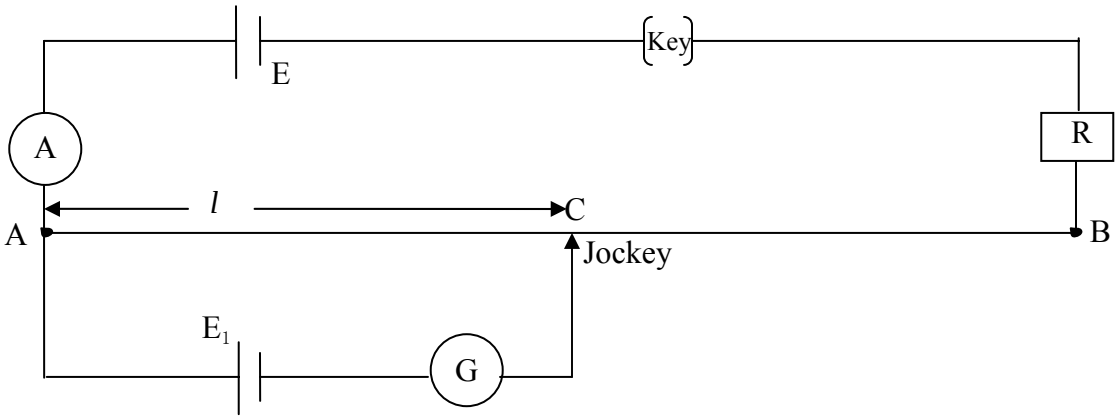

Figure 2

AB is a wire of length 100 cm mounted on a wooden board along with a meter scale fixed parallel to the wire.

E is a d.c source of emf ≈ 4V

E_1 is a dry cell

R is a resistance box

A is an ammeter

G is a galvanometer

Make sure the polarity of sources E and E_1 are the same at A of the wire AB. Connect the ammeter on the proper polarity. Keep the resistance box at the lowest R such that

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the ammeter reading is within the scale. Obtain the point C on the wire AB, on touching the jockey where there is NO deflection in the galvanometer.

Record the range and least count of the ammeter,

Note the ammeter reading I and resistance box value R.

Also note the length *l* (AC) in cm.

Repeat the experiment for four more sets (total 5 sets) for other lower values of R, noting I, R and *l* in each set.

Tabulate the above readings in a neat table 3 with units.

Note: All the ammeter readings I and AC = *l* should be in 3 significant figures throughout the experiment.

Question 3. **[7]**

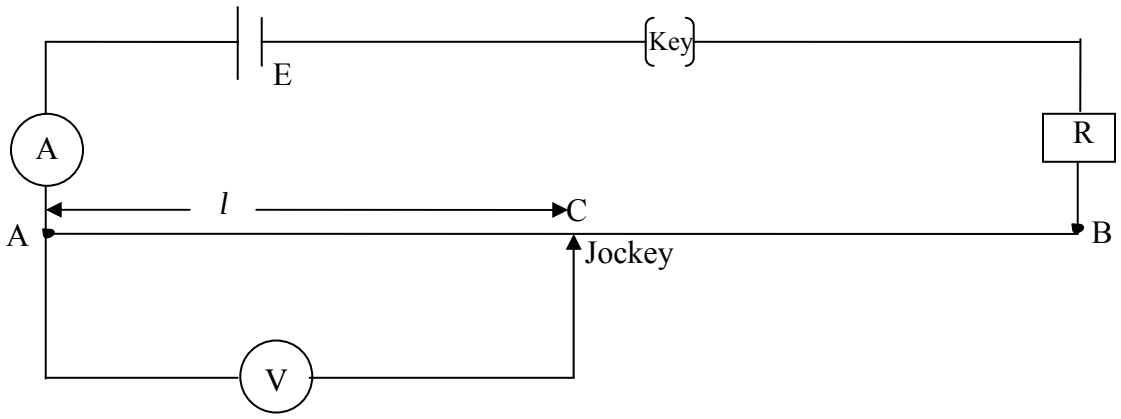

Figure 3

Disconnect the dry cell and galvanometer and connect the voltmeter V as shown in figure 3. Take care on the polarity of voltmeter.

Record the range and the least count of the voltmeter.

For the same values of R in Question 2, and for the same values of *l* (AC) in the previous experiment, obtain the corresponding voltmeter readings V.

Tabulate the values V and *l* in table 4 with units.

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Plot a graph for V against l. Draw the best fit straight line and extend the line to the extreme sides of the page.

Read and record the emf of dry cell as V_0 (value of V for $l = 0$) with unit.

Also calculate the slope $S_2 = \frac{\Delta V}{\Delta l}$ of the graph with proper unit.

Note: Maintaining 3 significant figures on all readings and results is very important.