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 start 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 in the answer booklet.

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]**

(a) You are given two convex lenses marked A and B. Determine the focal length of lens A by the distance object method by projecting the image of the distance object on the screen or wall. Measure the distance of the image from lens directly by a meter ruler. Let this be f_1. Record the values of f_1 in cm upto 3 significant figures. *Show your first set of tabulated readings to the Visiting Examiner.*

Repeat the procedure three more times and find the mean focal length (F) and write the value with proper unit.

b) Set-up the experiment as shown in figure 1.

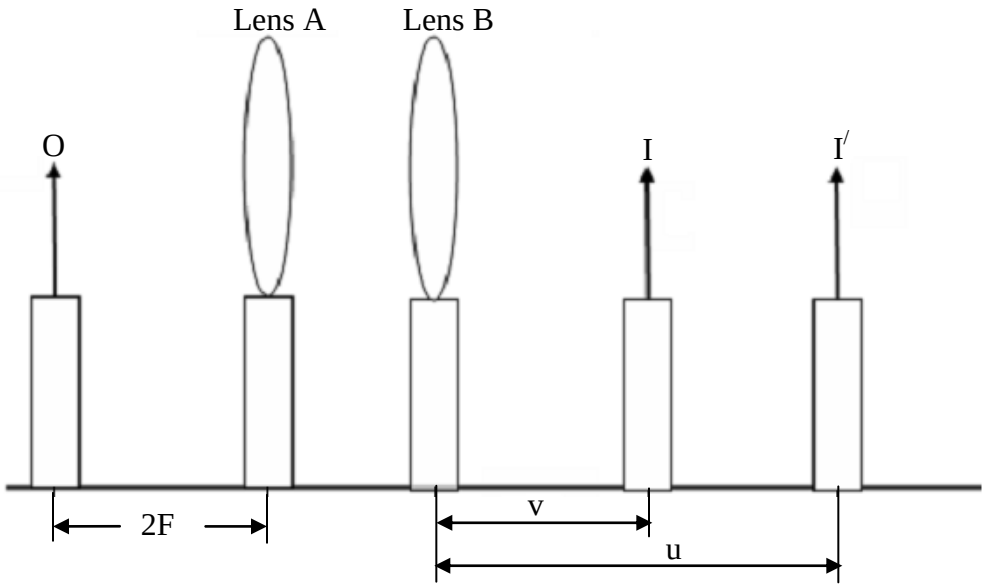

Figure 1

Place lens A and B between object pin O and image pin I on the optical bench. The tips of the two pins and the optical centers of the two lenses must be at the same horizontal level.

The distance between the object pin O and the lens A should be about 2F, where F is the approximate focal length of the lens A determined in part (a). Adjust the position of lens B, until an inverted image of the pin O is seen through the lenses A and B.

Place lens B on the optical bench and carefully remove the parallax by adjusting the image pin I. After removing parallax, measure the distance (BI= v) between lens B and image pin I. Note the position of lens B.

Remove lens B, but keep object pin O and lens A in same position. Move the image pin I to new place I' so that there is no parallax between the image of the object pin O and image Pin I'.

Now measure the distance (u) between the position of the Lens B and image ($I^{/}$). See figure for the distance 'u'.

Repeat the experiment to obtain four more set of values by increasing the distance between lens A and lens B by 2cm each time.

Tabulate the values of u, v, $x = \frac{100}{u}, y = \frac{100}{v}$. Record the values of *x* and *y* upto three significant figures.

Plot the graph of *y* against *x*.

From the graph, find *y*-intercept (y_1) and calculate $F' = \frac{100}{y_1}$ with proper unit and give the answer up to three significant figures.

Question 2. **[6]**

Set up the circuit diagram as shown in figure 2. AB is a wire labelled W_1 and CD another wire labeled W_2. Both are 100 cm long mounted on a meter scale separately. R is a resistor and G a galvanometer.

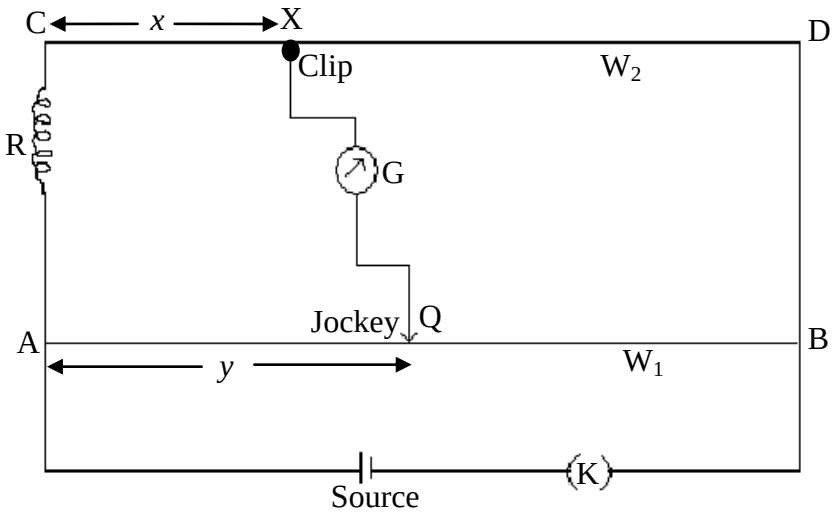

Figure 2

Close the key (K) in the circuit and fix the clip at X on wire W_2, where *x* = CX=15cm. Slide the jockey on AB and obtain balance point Q. Measure *y* = AQ.
Show your first set of tabulated readings to the Visiting Examiner.

Repeat the experiment for four more values of *x* in the range 15 to 80cm, and obtain the respective values of *y*.
Tabulate the values of x and y.

Draw the graph of *y* against *x* and find the slope (s). Give the answer upto 3 significant figures.

(i) What is the principle of this experiment?
(ii) Is there any condition between points CX, XD and AQ and QB when the galvanometer is balanced? Give the condition if yes.

Question 3. **[4]**

Set up the experiment as shown in figure 3.

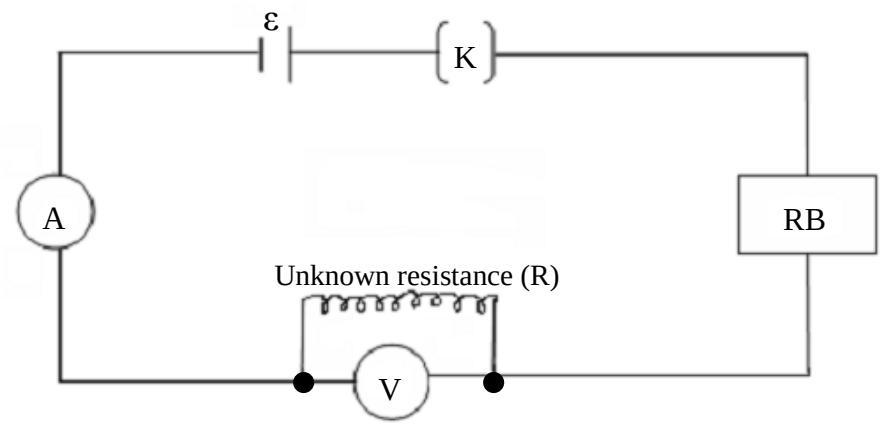

Figure 3

The ammeter, unknown resistance and the battery accumulator of emf 2V are connected in series. The voltmeter must be parallel to the unknown resistance.

Record the least counts and the ranges of the voltmeter and ammeter .

Now take out 1Ω plug from the resistance box and plug in the KEY. Note the reading of ammeter and voltmeter and tabulate the values with units.

Repeat the experiment four times with the values 2Ω, 3Ω, 4Ω and 5Ω in the resistance box. Find the ratios of the values of voltmeter to the values of ammeter for all sets of data and record it in the same table.

Answer the following questions briefly.
(i) Which Law is used in question 3? Is this law universal?
(ii) What will happen if the voltmeter is connected in the circuit in series?