

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 [].

*Answer **all** questions.
You should not spend more than one and a half hours on Question 1.*

Question 1.

[10]

This experiment is to determine the focal length of a convex lens by the $u-v$ method. Determine the approximate focal length of the given convex lens by projecting the image of a distant object on the opposite wall. Measure and record the focal length of the lens (F) in cm with correct number of significant figures.

Now arrange the object pin O , lens L and image pin I on the optical bench in such a way the tips of O and I lie on the same horizontal plane passing through the optical centre of the lens as shown in figure 1.

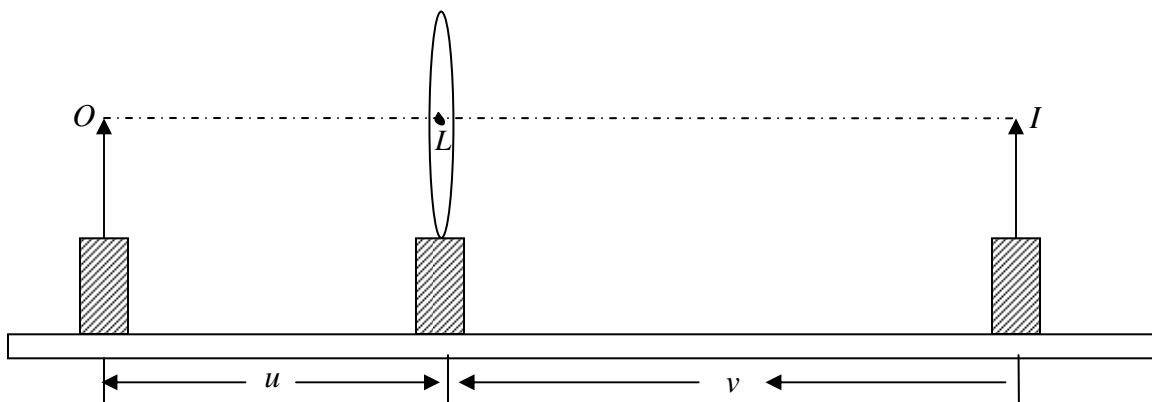


Figure 1

Now keep the lens in the middle of the optical bench and move the object pin O away from the lens till the distance between the lens and pin O is greater than $1.5F$ at least such that an inverted image of the same size is seen through the lens. Now adjust the position of the image pin I so that the parallax between the image of the object pin O and pin I is removed.

Read and record the positions of O , L and I in this position and find:

- (i) $u = LO$,
- (ii) $v = LI$ and
- (iii) $m = \frac{v}{u}$

Repeat the experiment for 4 more sets of v and u by increasing u by about 3.0 cm in each set.

Record your observation in a tabular form showing position O , L , I , $u = LO$, $v = LI$ and $m = \frac{v}{u}$.

Plot a graph of m against v . From the graph, read and record v_0 , the value of v when $m = 0$.

Record $f' = v_0$ and round off its value to *three* significant figures. Write the least count of the optical bench.

Question 2.

This experiment is to determine the resistance per unit length of the material of a given wire. Set-up the circuit as shown in figure 2(a). The d.c source is of emf 3V to 4V. The given wire AB=100cm of uniform cross-section is mounted on a board with a meter scale by the side of it. The range of resistance box RB is of the order of 10Ω. The jockey J is placed at the end B of the wire. The range of ammeter is 1A or 1.5A. The range of the voltmeter is 3V or 4V.

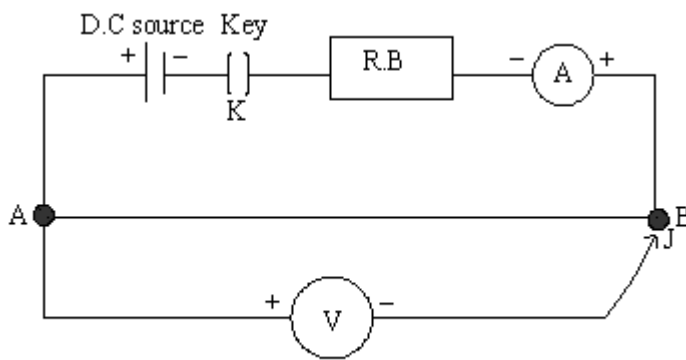


Figure 2(a)

Record the least count and range of the ammeter and voltmeter used.

Introduce a small resistance R in the resistance box and insert the key K in the plug.

Adjust R so that the ammeter reading is within the scale. Note the resistance R in the resistance box, ammeter reading I and voltmeter reading V. Repeat the experiment with different values of R and tabulate your observations (atleast 4 sets of R, I and V).

Draw a graph of V against I and determine its slope, $S = \frac{\Delta V}{\Delta I}$ upto *three* significant figures and proper unit.

The slope S is the resistance of the wire AB.

Calculate the resistance per unit length of the wire as: $r = \frac{S}{100}$ with proper unit.

(a) State the law on which the above question is based.

Question 3.

This experiment is to determine the emf of a dry cell.

Replace the voltmeter in figure 2(a) with a dry cell and a galvanometer as shown in figure 2(b).

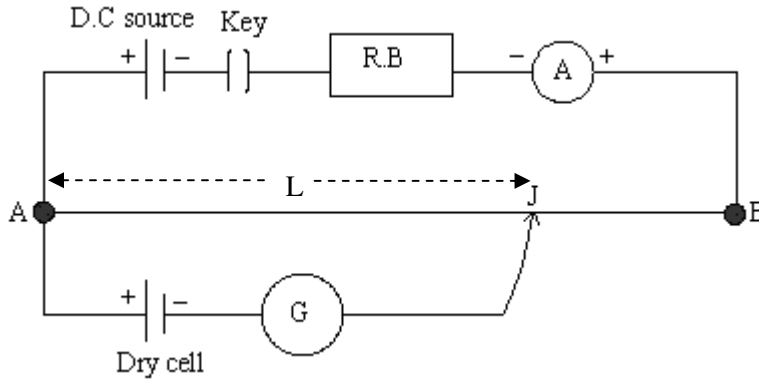


Figure 2(b)

Keep a small resistance R in the resistance box so that the galvanometer G gives deflections in the opposite directions when the jockey is placed near point A and then near point B.

Now adjust the position of the jockey so that the galvanometer G shows a null deflection.

Note the ammeter reading I and the length AJ = L cm.

Calculate the emf of the dry cell using the formula : $E = IrL$, where r is resistance per unit length of the wire AB calculated in Question 2.

Repeat the experiment taking different values of R and note the reading of the ammeter (I) and balancing length (L) each time. Take three sets of readings.

Tabulate R, I, L and E with units.

Calculate the average value of emf of the dry cell upto *three* significant figures and with proper units.