

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 determines the focal length of a convex lens by combining it co-axially with another convex lens. You are provided with two lenses marked A and B. Obtain the approximate focal length (f) of the lens A using the distant object method. Record your observation. Mount the lens A upright on an optical bench. Keep the object pin O near one end of the bench with the lens A at a distance $\sim 2f$ and the image pin I on the other side of the

lens as shown in figure 1(a).

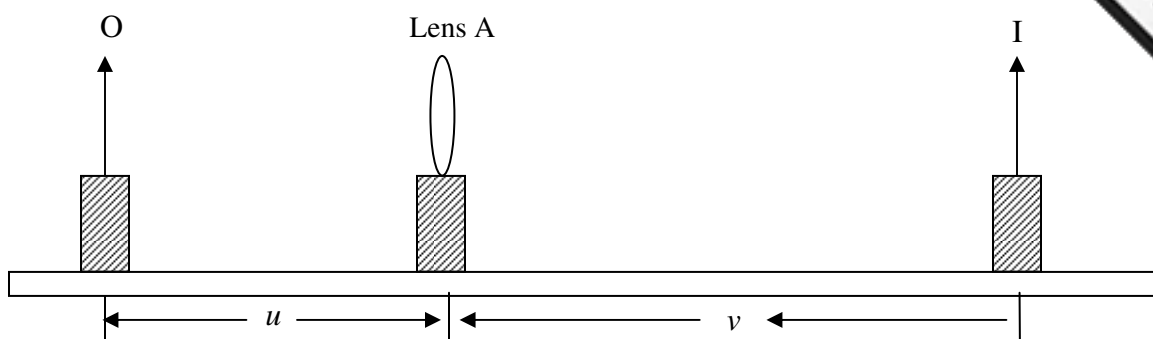


Figure 1(a)

Adjust the position of the image pin I to remove the parallax between the image pin I and the inverted image of the object pin O. Measure the distance v and u ($\sim 2f$). Record the values in a numbered row.

Calculate the focal length of the lens A using the formula given below.

$$\frac{1}{f'} = \frac{1}{u} + \frac{1}{v}$$

Record the value of f' with proper unit upto *three* significant figures.

Now arrange the lenses A and B co-axially at the same height on the optical bench between the object pin O and the image pin I as shown in figure 1(b).

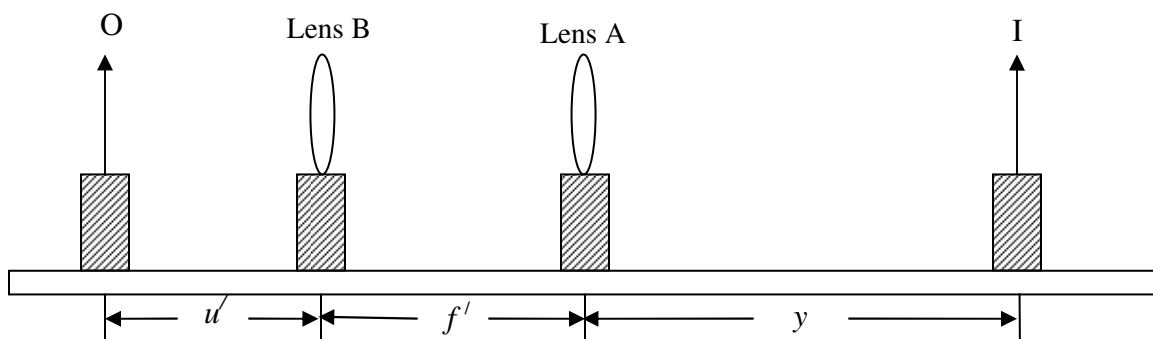


Figure 1(b)

Adjust the distance between the lenses A and B equal to f' . This separation should be constant throughout the experiment.

Adjust the position of the object pin O until its inverted image is seen through the combination of lenses. Adjust the position of image pin I to remove the parallax between image pin I and image of the object pin O. Measure the distance $u' = OB$ and $y = AI$.

Repeat the experiment to obtain *four* more sets of u' and y , increasing the value of u' by 10 cm s^{-1} after each reading. Tabulate *five* sets of u' , y and $x = \frac{100}{u'}$.

Compute x upto *three* significant figures. Plot a graph of y against x and determine its slope,

$$S = \frac{\Delta y}{\Delta x} \text{ (change in } y \div \text{change in } x\text{)}. \text{ Calculate: } F = 10\sqrt{S}$$

Record the value of F with its proper unit if any upto *three* significant figures.

Question 2.

[5]

This experiment uses the principle of Wheatstone bridge, balancing a network of four resistors in which a current flows. Set up the circuit as shown in figure 2.

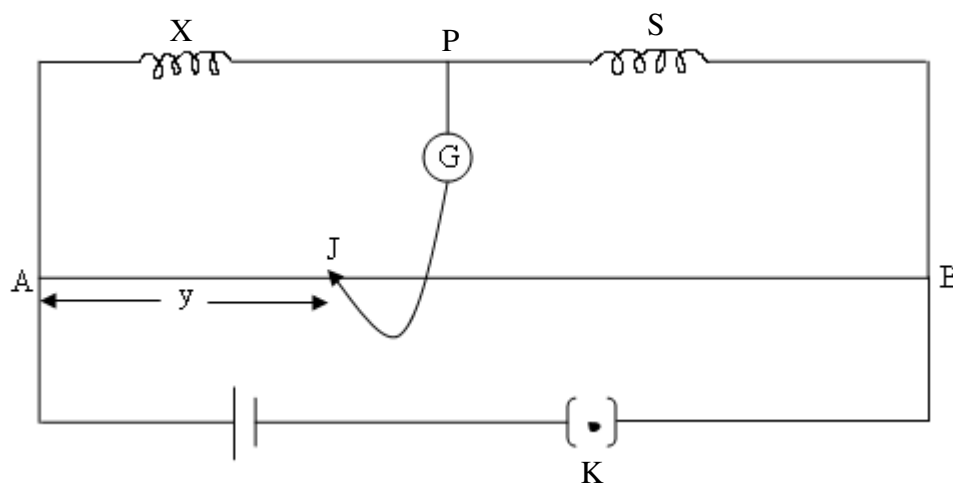


Figure 2

S is a $4\ \Omega$ coiled resistor of length 100 cm , X is a coiled resistor and G is a centre zero galvanometer. Insert the key K . By touching the jockey at different points on the wire AB , find the point J on it such that the galvanometer shows no deflection. Record the distance y (AJ).

- Write down the *four* resistors forming Wheatstone bridge network in the circuit diagram, figure 2.
- Write down *two* pairs of potential differences and *two* pairs of current which are equal.

- (c) Using the principle of Wheatstone bridge, find the value of the unknown resistance X .
- (d) If the coiled resistor S is 25 cm, on which side of J will the new balance point be?

Question 3.

[5]

Remove the connection of the resistor S from P and B from the circuit set-up in Question 2 (Figure 2).

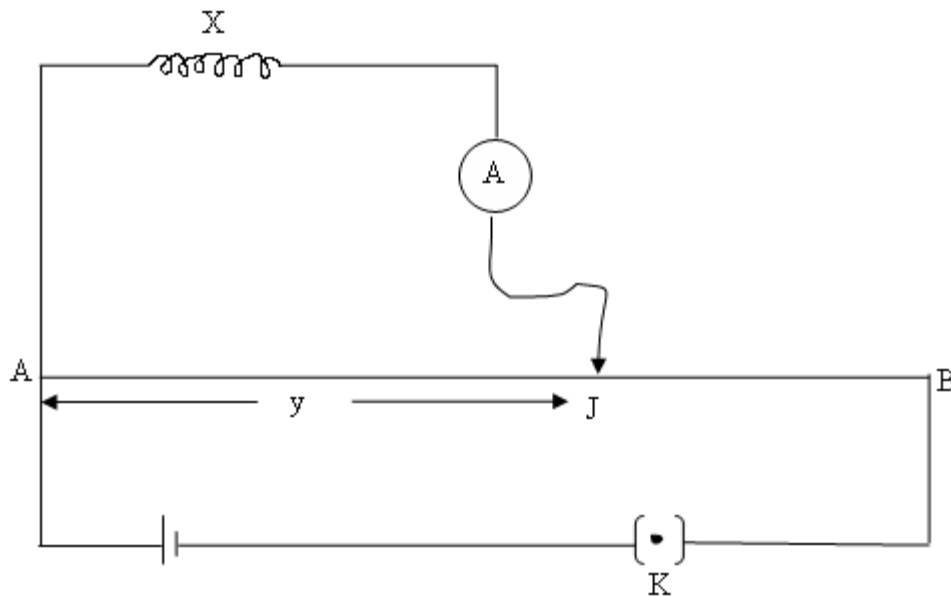


Figure 3

Replace the galvanometer with an ammeter of range 1-1.5A as shown in figure 3.

Touch the jockey at J such that $AJ = y = 20$ cm. Note the ammeter reading I . Repeat the experiment *four* more times increasing the value of y each time by 20 cm and note the ammeter readings.

Write down the values of $AJ = y$ and ammeter readings (I) in a tabular form.

Plot a graph of y versus I and obtain the slope $S = \frac{\Delta y}{\Delta I}$ upto *three* significant figures and give its unit.

Mention the emf of the d.c source used.