# 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).*

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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]**

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 ~ 2f and the image pin I on the other side of the

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lens as shown in figure 1(a).

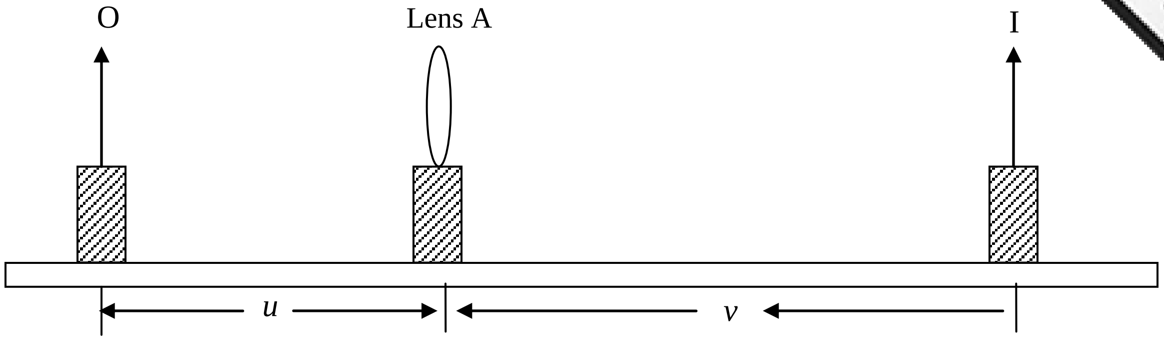


*Figure 1(a)*

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 (~ 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).

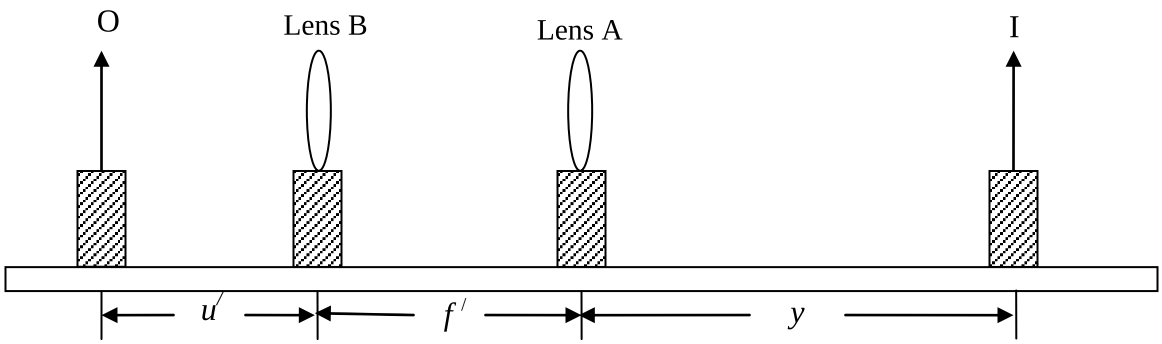


*Figure 1(b)*

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

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,

$S = \frac{\Delta y}{\Delta x}$ (change in y $\div$ change in x). 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.

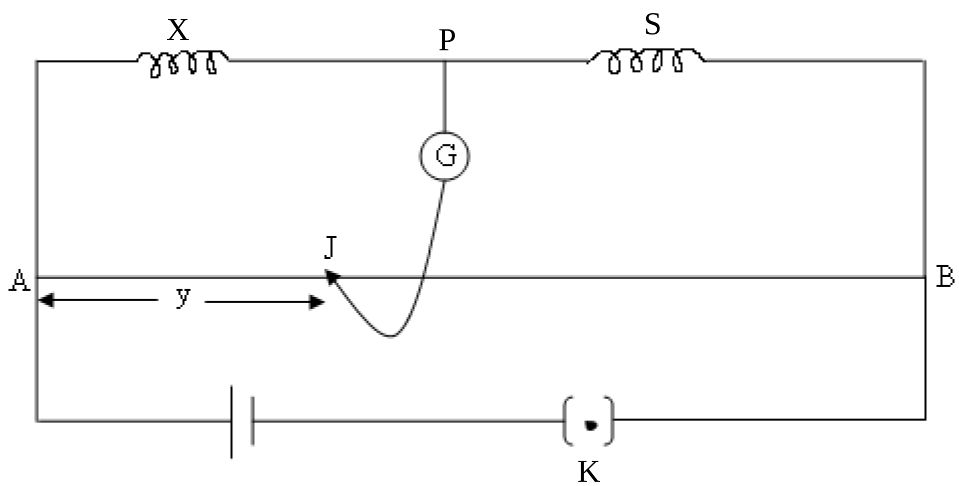


*Figure 2*

S is a 4 Ω 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*).

(a) Write down the *four* resistors forming Wheatstone bridge network in the circuit diagram, figure 2.

(b) 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).

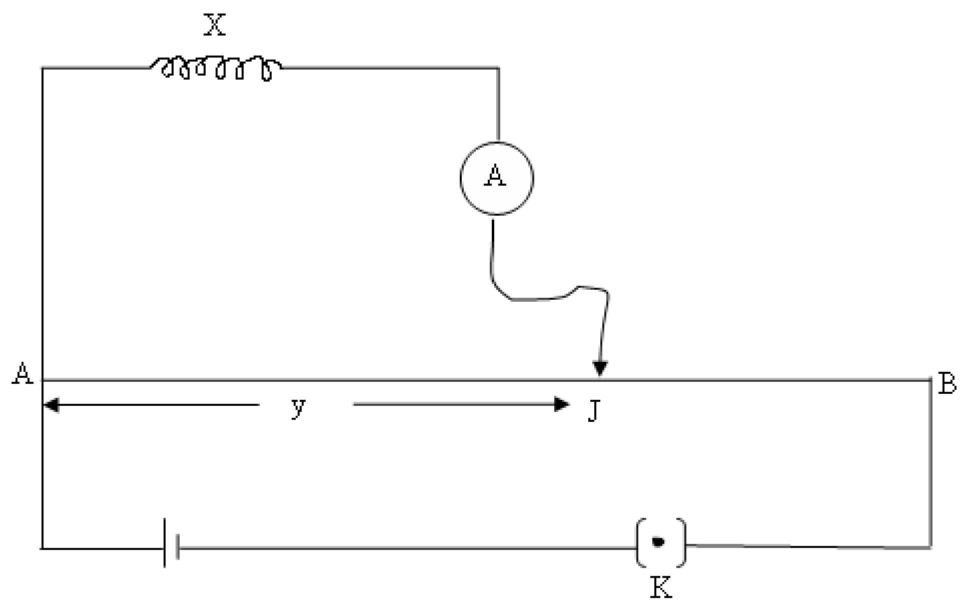


*Figure 3*

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.