KAMPA A INTEGRATED SECONDARY SCHOOLS EXAMINATIONS BUREAU

KAMSSA

SET ONE

KAMSSA PRE REGISTRATION EXAMINATIONS 2025

Uganda Advanced Certificate of Education

PHYSICS
PAPER 3

3hours 15minutes

INSTRUCTIONS TO CANDIDATES:

- Answer **question 1** and one other question. You will not be allowed to start working with the apparatus for the **first quarter** of an hour.
- Marks are given mainly for a clear record of the observation actually made, for their suitability and accuracy and for the use made of them.
- Candidates are reminded to record their observation as soon as they are made. Whenever possible, candidates should put their observation and calculations in a suitable table drawn in advance.
- An account of the method of carrying out the experiment is not required.
- Squared paper is provided.
- Mathematical tables and silent non programmable calculator may be used

Turn Over

Question one

In this experiment, you will determine the moment of inertia, I of a bicycle spoke provided

Procedure:

a) Measure and record the mass m of the bicycle spoke.

b) Suspend the spoke horizontally using the threads provided.

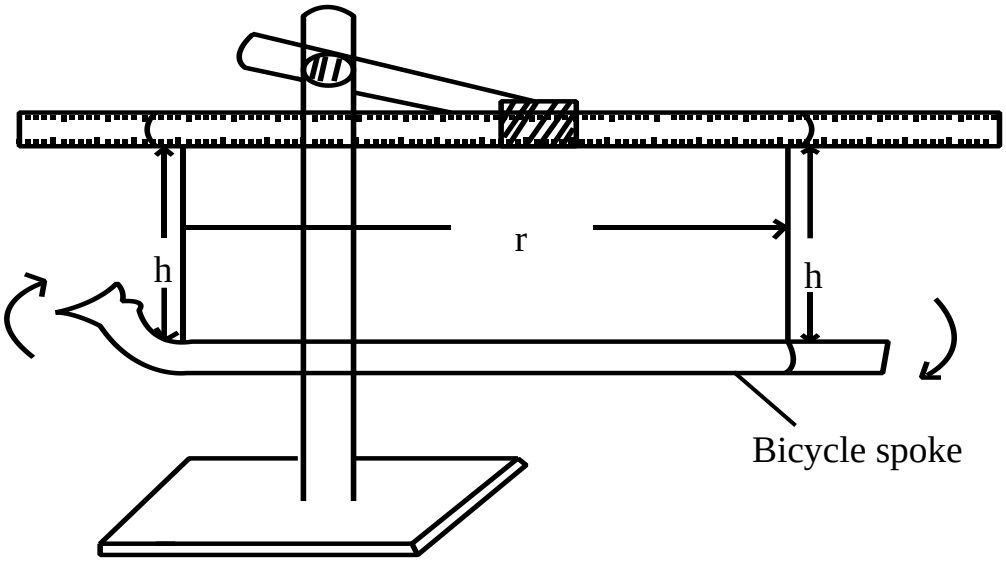

Fig: 1

c) Adjust the threads such that r=20.0cm and that the threads are equidistant from the centre of the spoke.

d) Keeping the threads parallel, adjust them so that h=15.0cm.

e) Displace the ends of the spoke through a small angle about the vertical axis through the centre of the spoke.

f) Measure the time for 20 oscillations, hence find the period T

g) Repeat procedures (d) to (f) for h=20.0, 25.0, 30.0, 35.0, 40.0, and 45.0cm

h) Tabulate your results including values of T^2

i) Plot a graph of T^2 against h (in meters).

j) Determine the slopes S of the graph.

k) Calculate the moment of inertia, I from the expression, $S = \frac{16TI^2}{mg^2}$

Question 2

2. In this experiment, you will determine the constant, S of the glass block provided using two methods.

METHOD 1

a) Measure and record the length, of the glass block.

b) Draw a line on the plain sheet of paper.

c) Place the glass block with the smallest area over the line.

d) Hold a pin horizontally so that its pointed end is adjacent to the glass block as shown in **figure.2**

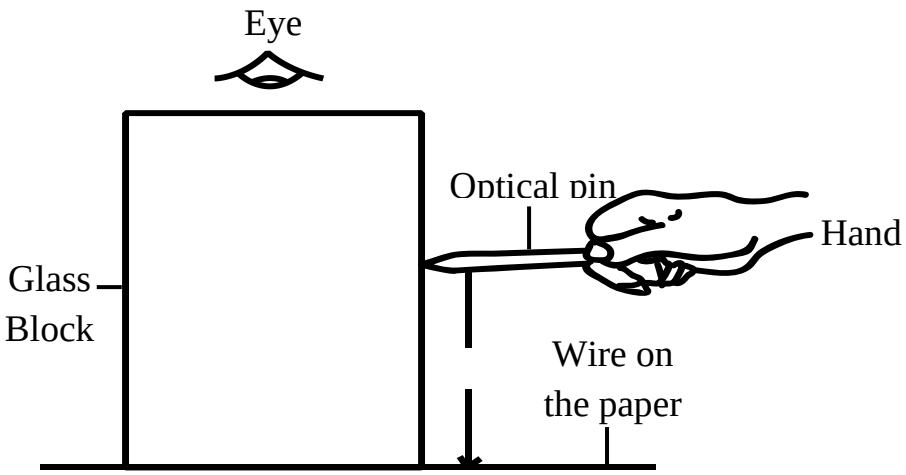

Fig. 2

e) Adjust the position of the optical pin until it appears to coincide with the image of the line as seen through the glass block.

f) Measure and record the height, y of the pin from the line on the sheet of paper.

g) Calculate the constant, S of the glass block from the expression.

$l = s(l - y)$

METHOD II

a) Measure and record the width b, of the glass block.

b) Fix the plain sheet of paper on the soft board using drawing pins.

c) Place the glass block in the middle of the plain sheet of paper with the largest face top most; and draw its outline XYZW as shown in figure 3.

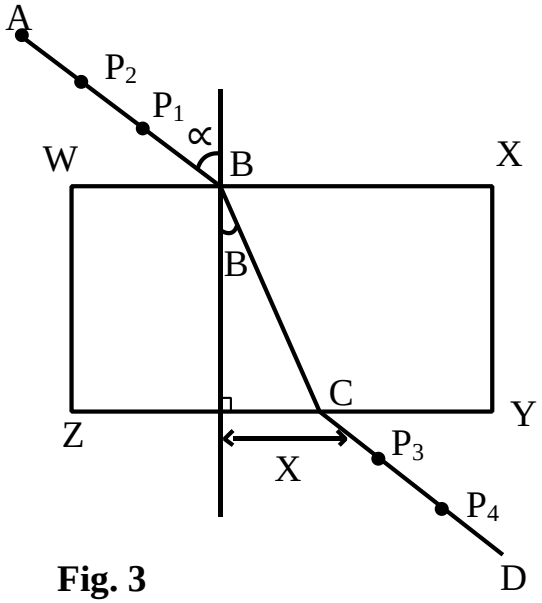

Fig. 3

d) Remove the glass block.

e) Draw a perpendicular to WX at B such that $WB = \frac{1}{4}(WX)$

f) Draw a line AB such that angle $\propto = 20^0$

g) Replace the glass block.

h) Stick two optical pins P_1 and P_2 on the line AB.

i) While looking through the glass block from side YZ, stick pins P_3 and P_4 such that they appear to be I line with the images of P_1 and P_2.

j) Remove the glass block and pins.

k) Draw a line through P_3 and P_4 to meet YZ at C

l) Join C to B

m) Measure and record angle B, and distance, X

n) Repeat procedures(f) to (M) for $\propto=25^0, 30^0, 40^0, 50^0$ and 60^0

o) Tabulate your results, including values of $\sin x$ and $\frac{x\cos\beta}{b}$

(p) Plot a graph of $\sin \propto$ against $\frac{x\cos\beta}{b}$

q) Find the slope; S, of the graph.

N.B. Hand in the tracing paper used in the experiment together with your results.

Question three

In this experiment, determine the electrical resistivity of the material of the wire provided.

PART 1

a) Measure and record, in meters, the diameter, d, of the wire labelled P.

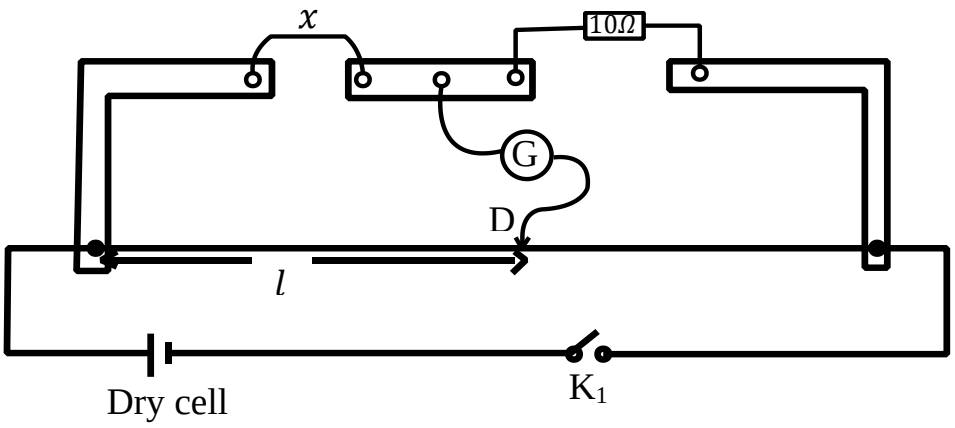

Fig. 4

b) Connect the circuit shown in the diagram in Fig 4

c) Starting with $x = 0.200m$, close switch K_1.

d) Move the sliding contact along the bridge wire to a point D where the galvanometer shows no deflection.

e) Measure and record, in meters, the balance length l.

f) Open switch K_1

g) Repeat procedures (c) to (f) for values of x=0.300, 0.400, 0.500, 0.600, 0.700 and 0.800m.

h) Tabulate your results. Include in your table values of $\frac{1}{x}$ and $\frac{1}{l}$

i) Plot a graph of $\frac{1}{x}$ against $\frac{1}{l}$ and determine the slope, S_1, of the graph.

j) Calculate the resistivity $\emptyset$ from $S_1 = \frac{10T_1d^2}{4\emptyset_1}$

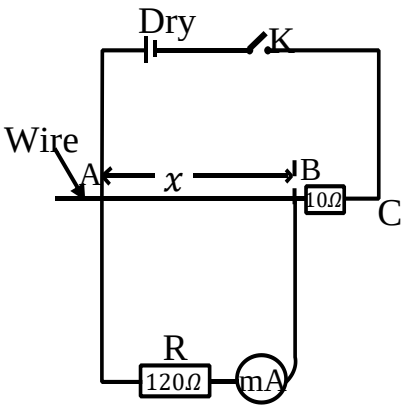

Fig. 5

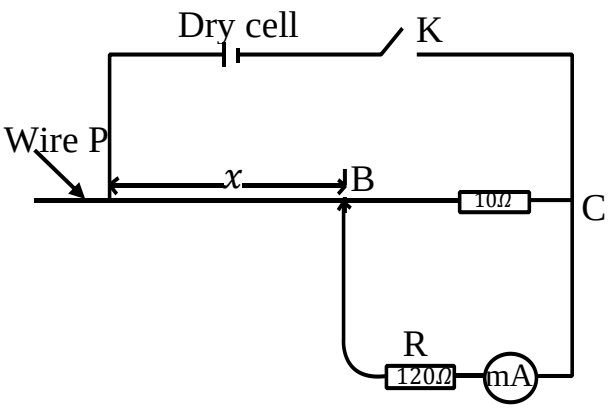

Fig. 6

PART II

a) Connect the circuit as shown in fig 5

b) Starting with $x = 0.200m$, close switch K

c) Record the reading, θ_1, of the millimeter.

d) Open switch K

e) Disconnect the resistor R and the milliameter and connect them as in Fig 6

f) Close switch K

g) Record the reading, θ_2 of the milliameter.

h) Repeat procedures (b) to (q) for values of x=0.300, 0.400, 0.500, 0.600, 0.700 and 0.800m.

i) Tabulate your results including values of $\frac{\theta_1}{\theta_2}$ in your table.

j) Plot a graph of x against $\frac{\theta_1}{\theta_2}$ and determine the slope S_2 of the graph.

k) Calculate the resistivity $\emptyset_2$ from the expression $S_2 = \frac{10\pi d^2}{4\emptyset_2}$

l) Comment on the values of $\emptyset_1$ and $\emptyset_2$

END