535/4
PHYSICS
PRACTICAL
Paper 4
Jul./Aug. 2023
2 ¼ hours

MATIGO MOCK EXAMINATIONS BOARD
Uganda Certificate of Education

PHYSICS
(PRACTICAL)

Paper 4
2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **question 1** *and* **one** *other question. Any additional question(s) answered will* **not** *be marked.*

You are **not** *allowed to start working with the apparatus for the* **first quarter** *of an hour.*

For each question, candidates will be required to select apparatus from the equipment provided.

Marks are given mainly for 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.

Where possible, candidates should put their observations and calculations in a suitable table drawn up in advance.
All your work must be in ***blue*** *or* ***black*** *ink. Any work done in pencil will not be marked*

An account of the method of carrying out the experiment is **not** *required.*

Mathematical tables and squared papers are provided.

Slide rulers or scientific non- programmable calculators may be used

Turn Over

1. In this experiment, you will determine acceleration due to gravity using a pendulum bob. (30 marks)

(a) Measure and record the width ***y*** of the graph paper provided in metres

(b) Suspend the pendulum as shown in figure **1** below with the length ***l = 2.5y***

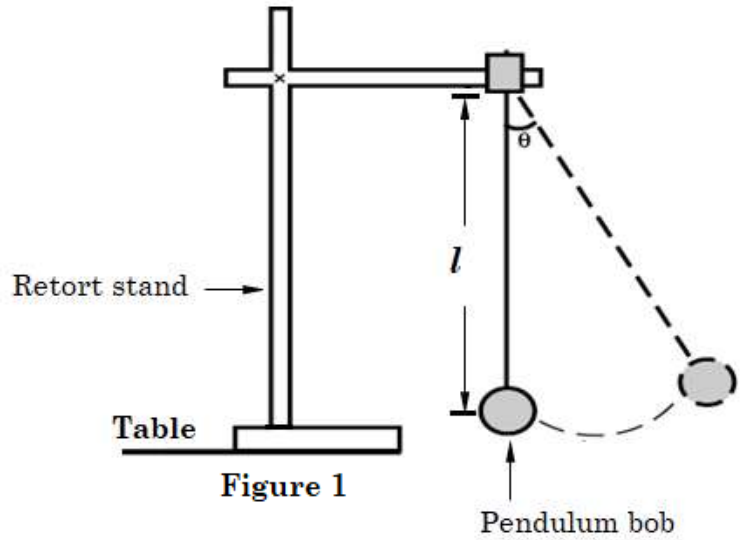

Figure 1

(c) Displace the pendulum bob through a small angle, **θ**.

(d) Release it to oscillate in a vertical plane and measure the time, **t**, for 20 complete oscillations.

(e) Find the time $\mathbf{T = \frac{t}{20}}$ for one oscillation

(f) Repeat procedures from (b) to (e) with values $l = 3.0y, 3.5y, 4.0y, 4.5y$ and $5.0y$

(g) Record your results in a suitable table including values of $\mathbf{T^2}$

(h) Plot a graph of $\mathbf{T^2}$ **(along the vertical axis)** against ***l*** **(along the horizontal axis)**.

(i) Find the slope, S, of the graph

(j) Calculate the acceleration due to gravity, g, from the expression;

$$g = \frac{4\pi^2}{s}$$

(k) State two sources of error in carrying out this experiment.

DISMANTLE THE SET UP

2. In this experiment you will determine the breadth *b*, of the glass block provided. (30 marks)

(a) Measure and record the length ***l*** of the glass block.

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

(c) Place the glass block in the middle of the plain sheet of paper and trace its outline ABCD.

(d) Remove the glass block and draw a normal MN at F such that AF = 2.0 cm.

(e) Draw a line EF at an angle $\beta = 80^0$ and fix pins P_1 and P_2 on it.

(f) Replace the glass block on its outline and fix pins P_3 and P_4 such that they appear to be in line with the images of pins P_1 and P_2.

(g) Remove the glass block and pins.

(h) Draw a line HG to pass through the pin marks of pins P_3 and P_4 to meet DC at **G** and Join **G** to **A**.

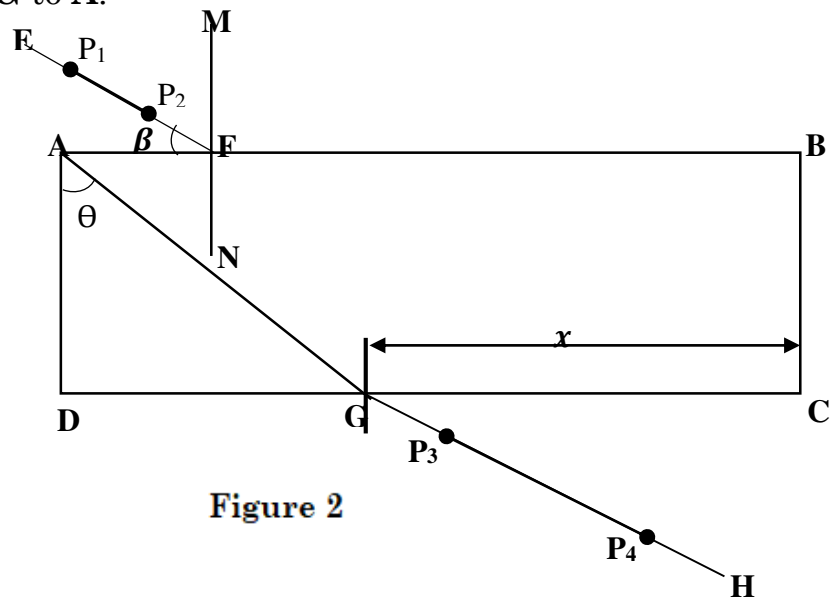

Figure 2

(i) Measure and record the angle, ***θ*** and distance, ***x***.

(j) Repeat procedures from (e) to (i) with value$\beta = 70^0\ 60^0, 50^0, 40^0,$ *and* 30^0.

(k) Record your results in a suitable table including the values of tan***θ*** and ***(l –x)***.

(l) Plot a graph of *tan*θ **(along the vertical axis)** against ***(l –x)*** **(along the horizontal axis)**.

(m) Find the slope, ***S***, of the graph.

(n) Calculate ***b*** from the expression;

$$b = \frac{1}{S}$$

(o) State one source of error in carrying out this experiment.

HAND IN YOUR TRACING PAPER TOGETHER WITH YOUR SCRIPT

3. In this experiment you will determine the constant, γ, of the resistor X provided. (30 marks)

(a) Connect the circuit as shown in the figure below.

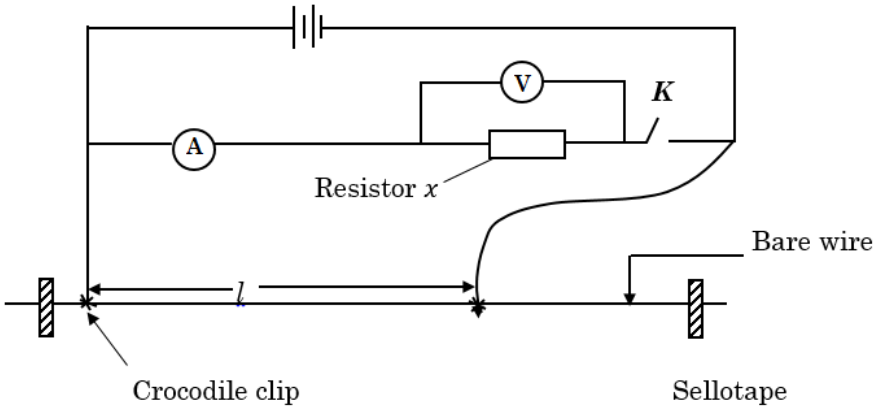

Figure 3

(b) Close the switch ***K***.

(c) Adjust the length *l* until the ammeter reading I = 0.24 A

(d) Read and record the voltmeter reading V across the resistor X.

(e) Open switch ***K***.

(f) Repeat the procedures (b) to (e) for values of I= 0.26, 0.28, 0.30, 0.32 and 0.36A

(g) Tabulate your results in a suitable table including values of $\frac{1}{I}$ and $\frac{1}{V}$.

(h) Plot a graph of $\frac{1}{I}$ **(along the vertical axis)** against $\frac{1}{V}$ **(along the horizontal axis).**

(i) Find the slope **γ** of the graph.

(j) State two causes of errors in this experiment.

END

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