P510/3

PHYSICS PRACTICAL

Paper 3

June/July 2023

3 1/4 Hours

KABALE DISTRICT JOINT MOCK EXAMINATIONS 2023

UGANDA ADVANCED CERTIFICATE OF EDUCATION

PHYSICS PRACTICAL

(Principal Subject)

P510/3

Paper 3

3 hours 15 minutes.

INSTRUCTION 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.
- Graph papers are provided.
- Mathematical tables and non-programmable calculators may be used.
- Candidates are reminded to record their observations on their scripts as soon as they are made and to plan the presentation of the records so that it is not necessary to make a fair copy of them. The working of the answers is to be handed in.
- Details on the question paper should not be repeated in the answer, nor is the theory of the experiment required unless specifically asked for. Candidates should however, record any special precautions they have taken and any particular feature of their method of going about the experiment.
- Marks are given mainly for a clear record of the observations actually made, for their suitability and accuracy and for the use made of them.

Turn Over

1. In this experiment you will determine acceleration due to gravity g

METHOD 1.

(a) Suspend the pendulum bob provided from a retort stand

(b) Adjust the length of the pendulum to 1.200m.

(c) Displace the pendulum bob through a small angle from the vertical and release to oscillate.

(d) Adjust the length of the pendulum such that the bob's height h from the ground is 0.200 m.

(e) Measure and record the time for 10 oscillations hence the period T.

(f) Repeat procedure (c) to (e) for h = 0.400, 0.600, 0.800, 1.000 and 1.200 m.

(g) Tabulate your results in a suitable table including values of T^2.

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

(i) Determine the slope S of the graph.

(j) Calculate acceleration due to gravity g from $S = \frac{-g}{4\pi^2}$.

METHOD 2.

(a) Adjust the length l_1 of the pendulum to O.500 m.

(b) Displace the bob through a small angle from the vertical and release it to oscillate.

(c) Measure and record the time for 20 oscillations, determine the period T_1.

(d) Repeat procedures (a) to (c) for a length l_2 = 1.200m and find the period T_2.

(e) Determine the value of acceleration due to gravity g from the expression $=$

$$2\pi^2\left[\frac{l_1}{(T_1)^2}+\frac{l_2}{(T_2)^2}\right]$$

(f) State three sources of errors

2. In this experiment, you will determine the focal length f, of a converging lens.

(a) Arrange the bulb, wire gauze, lens and screen as shown in figure 1.

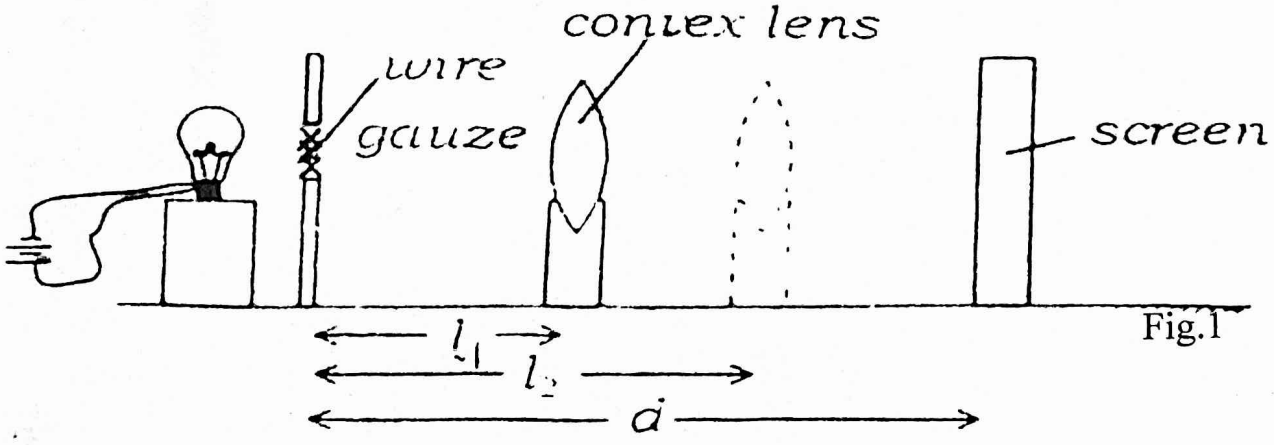

Fig.1

(b) Adjust the screen so that distance d = 70.0 cm.

(c) Place the lens between the screen and the wire gauze and move it near the wire gauze to obtain a magnified image of the wire gauze on the screen.

(d) Measure and record distance l_1.

(e) Keeping the gauze and the screen fixed, move the lens towards the Screen to obtain a sharp diminished image of the wire gauze on the Screen.

(f) Measure and record distance l_2.

(g) Repeat procedures (b) to (g) for values of d = 65.0, 60.0, 55.0, 50.0 and 45.0 cm.

(h) Record your results in a suitable table including values of $x = (l_2 - l_1)$ and $y = (d^2 - x^2)$.

(i) Plot a graph of y against d.

(j) Find the slope S, of the graph.

(k) Calculate the focal length f, of the lens from 4f = S.

(l) State 3 sources of errors.

3. In this experiment, you will determine the electrical resistivity p, of the material of the wire Q provided.

Method I

(a) Connect the dry cells, ammeter and the wire Q as shown in the circuit in figure 2.

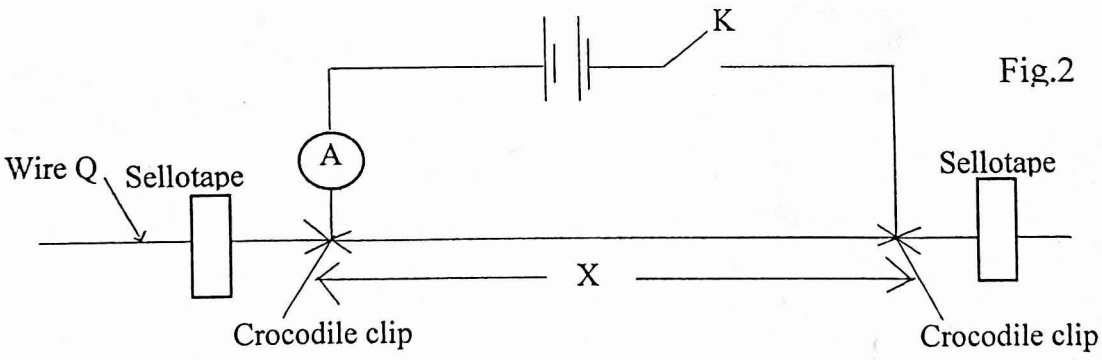

Fig.2

(b) Staring with $x = X_1 = 20.0$ cm, record the ammeter reading I_1 when K is closed.

(c) Open switch K.

(d) Adjust $x = X_2 = 70.0$ cm, record the ammeter reading I_2 when K is closed.

(e) Determine the resistivity p_1, from the expression

$p_1 = 1.6 \times 10^{-7}\varphi$ where $= \frac{100(I_1 - I_2)}{I_1 I_2 (x_2 - x_1}$; x_2 and x_1 all in cm.

Method II

(a) Connect the circuit as in figure 3.

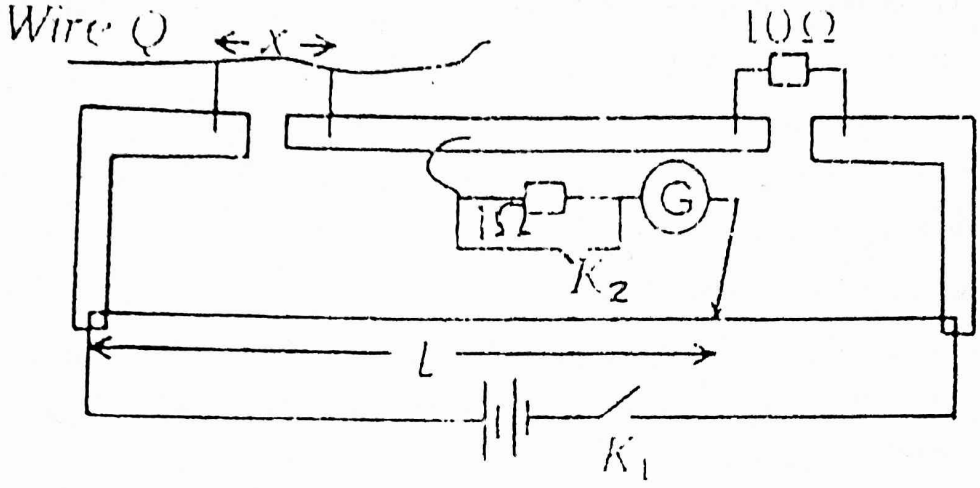

Fig.3

(b) Close K_1.

(c) Starting with length, x = 20.0 cm, find the balance point.

(d) With switch K_2 closed, determine accurate balance length *l*.

(e) Repeat procedures (c) and (d) for values of x =30.0, 40.0, 50.0, 60.0, 70.0 and 80.0cm.

(f) Tabulate your results in a suitable table including values of $\frac{1}{l}$ and $\frac{1}{x}$.

(g) Plot a graph of $\frac{1}{l}$ against $\frac{1}{x}$.

(h) Find the slope S of the graph.

(i) Calculate the resistance per metre δ of Q from the expression $\delta = \frac{1}{S}$

(j) Measure and record the diameter D of the wire Q.

(k) Calculate the electrical resistivity, p, of the material of the wire from the relation

$$p = \frac{\pi b^2 \delta}{4}$$

END