535/3
PHYSICS
PRACTICAL
Paper 3
Oct./Nov. 2020
2¼ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

PHYSICS
(PRACTICAL)

Paper 3

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

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

You will **not** *be 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 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 observations as soon as they are made. Where possible, candidates should put their observations and calculations in a suitable table drawn 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.*

Graph paper is provided.

Mathematical tables and silent non-programmable calculators may be used.

1. In this experiment, you will determine the constant, E, of the metre rule provided. *(30 marks)*

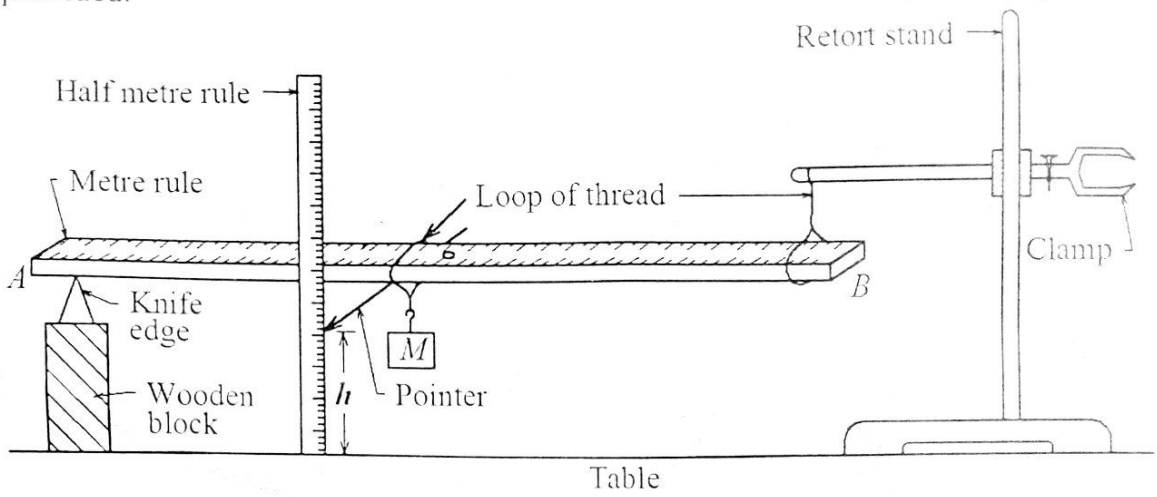

Fig. 1

(a) Attach a pointer underneath the 50 cm mark of the metre rule AB using a piece of sellotape.

(b) Place a wooden block on the table such that it rests on its smallest cross-sectional area.

(c) Place a knife edge on top of the wooden block.

(d) Tie a loop of thread at the 50 cm mark of the metre rule.

(e) Tie a loop of thread at the 99.0 cm mark of the metre rule.

(f) Place the 1.0 cm mark of the metre rule on the knife edge.

(g) Suspend the loop of thread at the 99.0 cm mark of the metre rule from the retort clamp.

(h) Adjust the set up so that the metre rule is horizontal as shown in figure 1.

(i) Measure and record the height, h_o of the pointer from the table surface.

(j) Suspend a mass, M = 100 g from the loop of thread at the 50 cm mark.

(k) Measure and record the new height, h, of the pointer.

(l) Determine the depression, $d = (h_o - h)$.

(m) Repeat procedure (j) to (l) for M = 200, 300, 400, 500 and 600 g.

(n) Record your results in a suitable table.

(o) Plot a graph of, d, against M.

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

(q) Calculate the constant, E, from the expression:

$$E = \frac{7.5\times10^{7}}{S}.$$

DISMANTLE THE SET UP OF THE APPARATUS

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

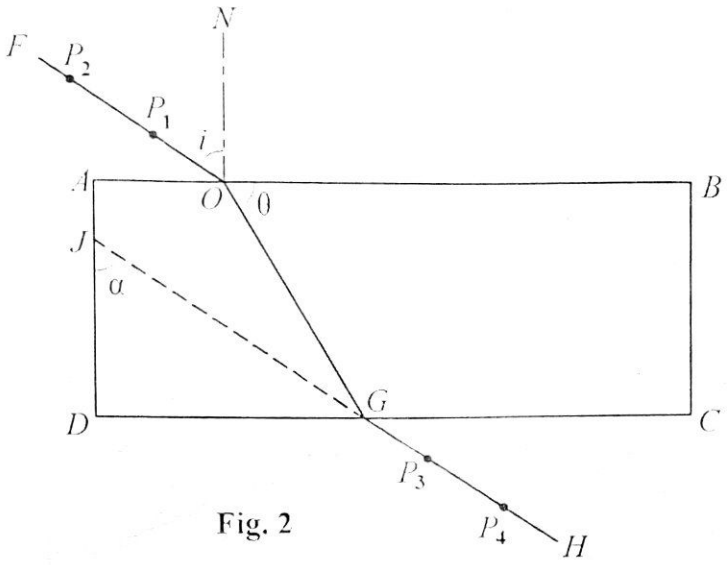

Fig. 2

(a) Fix a plain sheet of paper on the soft board.

(b) Place the glass block on the plain sheet of paper and trace its outline *ABCD*.

(c) Remove the glass block from its outline.

(d) Draw a normal *ON* on the line *AB* at *O*, such that $AO = 2$ cm as shown in figure **2**.

(e) Draw a line *OF*, such that the angle $i = 35^0$.

(f) Replace the glass block on its outline.

(g) Fix pins P_1 and P_2 along *OF*.

(h) While viewing from *DC*, fix pins P_3 and P_4, such that they appear in line with images of P_1 and P_2.

(i) Remove the glass block.

(j) Draw a line through P_3 and P_4 to meet *DC* at *G*.

(k) Join *O* to *G*.

(l) Extend *HG* to meet *AD* at *J*.

(m) Measure and record angles θ and α.

(n) Repeat procedure (e) to (m) for $i = 40^0, 45^0, 50^0, 55^0$ and 60^0.

(o) Record your results in a suitabe table including values of $\cos\theta$ and $\sin\alpha$.

(p) Plot a graph of $\cos\theta$ (**along the vertical axis**) against $\sin\alpha$ (**along the horizontal axis**).

(q) Determine the slope, S, of your graph.

(r) Find the constant, μ, from the expression:

$$S = \frac{1}{\mu}.$$

HAND IN YOUR TRACINGS TOGETHER WITH YOUR ANSWER SHEETS

3. In this experiment, you will determine the constant, β, of bare wire labelled W. *(30 marks)*

(a) Record the value of the standard resistor R, provided.

(b) Connect the circuit shown in figure **3**.

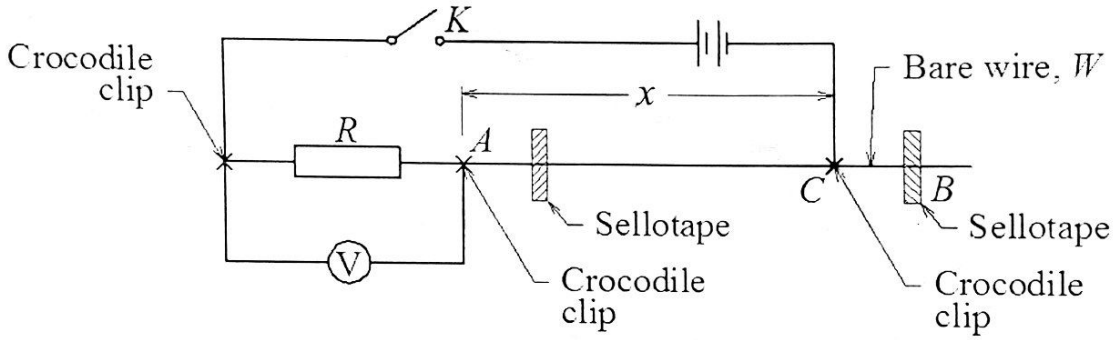

Fig. 3

(c) Adjust the length AC of the bare wire to $x = 0.200$ m.

(d) Close switch K.

(e) Read and record the voltmeter reading, V.

(f) Open switch K.

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

(h) Record your results in a suitable table including values of $\frac{x}{R}$ and $\frac{1}{V}$.

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

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

(k) Calculate the constant, β, of the wire, W, from the expression:

$$\beta = 3\ S.$$

END