535/3

PHYSICS

Paper 3

Jul./Aug. 2019

2 ¼ Hours

UTEB JOINT MOCK EXAMINATIONS, 2019

Uganda Certificate of Education

PHYSICS

Paper 3

2 hours 15 minutes

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 observations 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.
- Whenever possible, candidates should put their observations and calculations in a suitable table drawn in advance.
- An account of the method of carrying out the experiment is not required.
- Squared papers are provided.
- Mathematical tables, slide rules and silent non-programmable calculators may be used.

1. In this experiment you will determine the relative density of **paraffin** provided.

(30 marks)

(a) Clamp the metre rule vertically.

(b) Suspend the spring with a pointer on the clamp besides the metre rule.

(c) Suspend a beaker from the spring using a thread as shown in the figure 1 below.

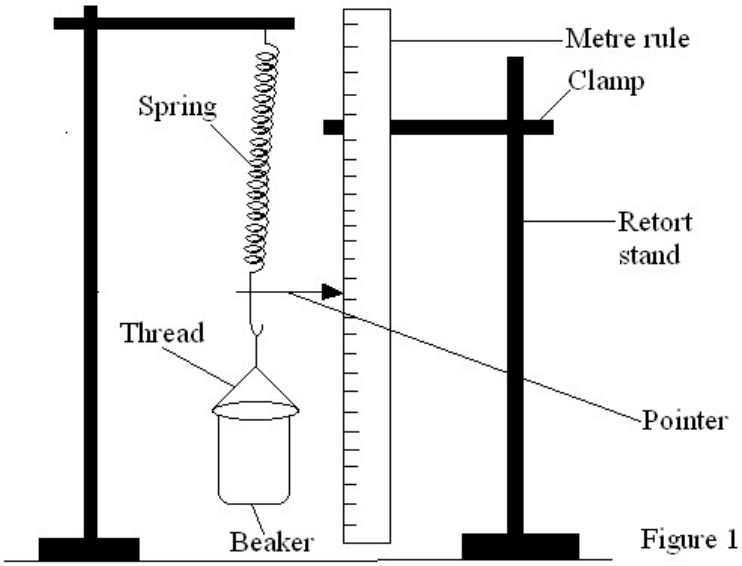


Figure 1

(d) Record the initial position p_0 of the pointer on the metre rule.

(e) Pour $50cm^3$ of water into the beaker and record the new position p_1 of the pointer.

(f) Find the extension $y = p_1 - p_0$ produced and record your results in a suitable table.

(g) Repeat procedures (e) to (f) for $100cm^3, 150cm^3, 200cm^3$ and $250cm^3$ of water.

(h) Remove the beaker, empty and dry it.

(i) Repeat procedures (c) to (g) for $50cm^3, 100cm^3, 150cm^3, 200cm^3$ and $250cm^3$ of paraffin.

(j) Find the extension $x = p_2 - p_0$ produced in each case in step (i) and record your results in a suitable table.

(k) Plot a graph of y against x.

(l) Determine the slope s of the graph.

(m) Determine the relative density of paraffin given that:

Relative density of paraffin $= \frac{1}{s}$

2. In this experiment you will determine the refractive index, n, of the glass slab.

(a) Fix the plain sheet of paper provided onto the soft-board.

(b) Place the slab on the sheet of paper with its largest face facing you.

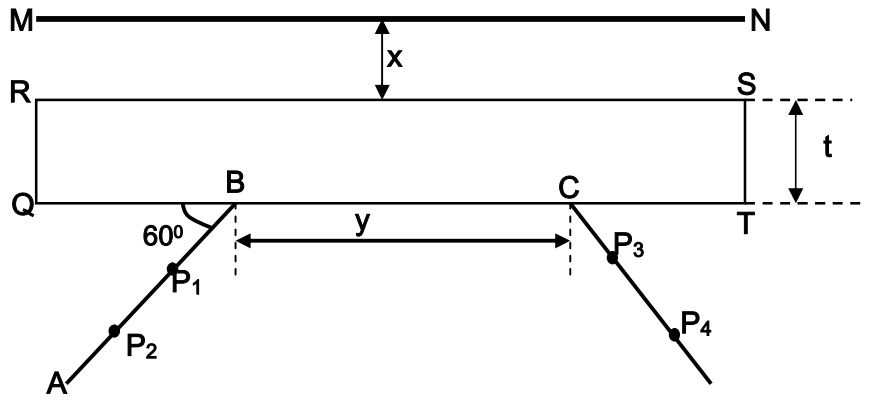
(c) Trace the outline of the slab and then remove it.

(d) Draw a line **AB** (**B** marked about 2cm from **Q**) making an angle of 60^0 with **QT**.

(e) Fix two pins P_1 and P_2 vertically on AB.

(f) Draw a line MN parallel to RS at a distance , X=1.0cm.

(g) Replace the slab and place mirror with its reflecting face facing RS on MN as shown below.



(h) Looking through the face **QT** of the slab, fix two pins P_3 and P_4 so that they appear to be in line with the image of P_1 and P_2.

(i) Remove the slab and the mirror and draw a line through P_3 and P_4 to meet QT at **C**.

(j) Measure the length, y, of **BC**.

(k) Repeat produces **(f)** and **(j)** for values of x= 1.5,2.0,2.5,3.0,3.5 and 4.0cm.

(l) Tabulate your results including values of **xy**, and **I** = $\mathbf{4}x^2 + \mathbf{3}y^2$.

(m) Plot a graph of **I** against **xy**.

(n) Find the **I**-intercept, **c,** of the graph.

(o) Measure thickness, **t,** of the slab.

(p) Calculate the refractive index ,**n**, of the material of the slab from the expression, $n = \sqrt{\left(\frac{3t^2}{c} + \frac{1}{4}\right)}$

NB: Hand in your tracing paper together with the rest of your work.

3. In this experiment, you will determine the internal resistance of the dry cell provided. **(30 marks)**

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

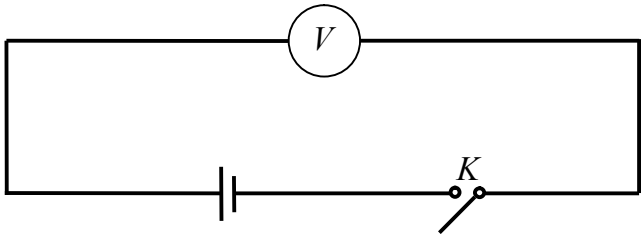


Fig. **3**

(b) Close switch, K .

(c) Read and record the voltmeter reading, E.

(d) Disconnect the circuit and connect the circuit shown in figure **4**, with $l_o = 1.00$ m.

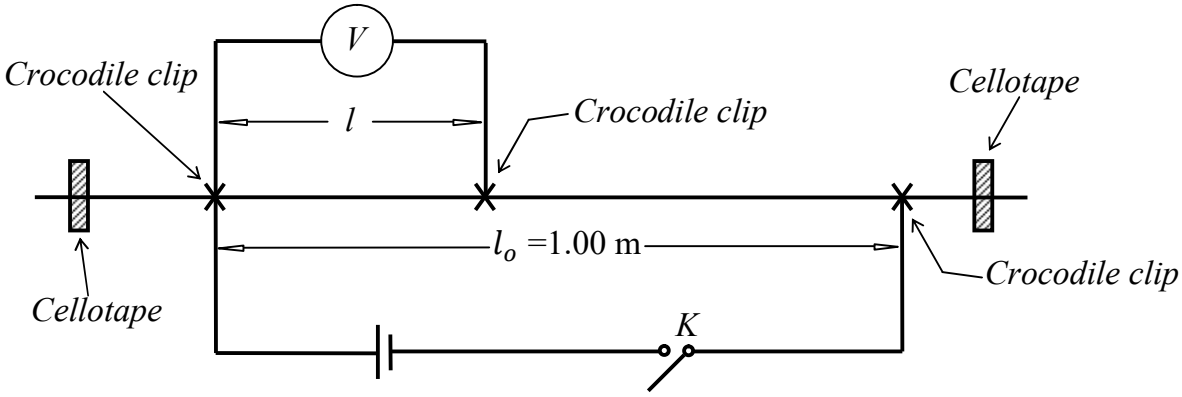


Fig. **4**

(e) Starting with length, $l = 0.100$ m, close switch *k*.

(f) Read and record the voltmeter reading V.

(g) Open switch, *K*.

(h) Repeat the procedures (e) to (g) for values of $l = 0.200, 0.300, 0.400, 0.500,\ \ 0.600$ and 0.700 m.

(i) Record your results in a suitable table.

(j) Plot a graph of V against l.

(k) Find the slope, s, of the graph.

(l) Calculate the internal resistance, r, of the cell from the expression

$$\boldsymbol{r = 3.7\left(\frac{E}{s} - l_o\right)}$$