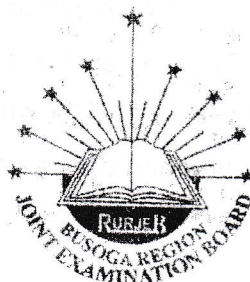
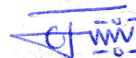


P510/3
PHYSICS
PRACTICAL
PAPER 3
AUG 2017
3 ¼ hr

OSPINA JUNIOR'S

PRODUCTS



BUSOGA REGION JOINT EXAMINATION BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATION 2017

PHYSICS

PRACTICAL

Paper 3

3 HOURS 15 Minutes

SATURDAY: 12TH/08/2017

MORNING: 9:00AM – 12:15PM

INSTRUCTIONS TO CANDIDATES:

- Answer **Question 1** and **one** other question.
- Any additional question will **not** be marked.
- Candidates are **not** allowed to use the apparatus for the **first fifteen minutes**.
- Graph papers are provided.
- Non-programmable scientific electronic calculators may be used.
- Candidates are expected to record on their scripts all their observations as these observations 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 experiments required unless specifically asked for. Candidates should, however record any special precautions they have taken and any particular feature of the method of going about the experiments.
- Marks are given mainly for a **clear** record of the observations actually made, for their **suitability, accuracy and for the use made of them**.

Qn 1:34 marks

Qn 2:33 marks

Qn 3:33 marks

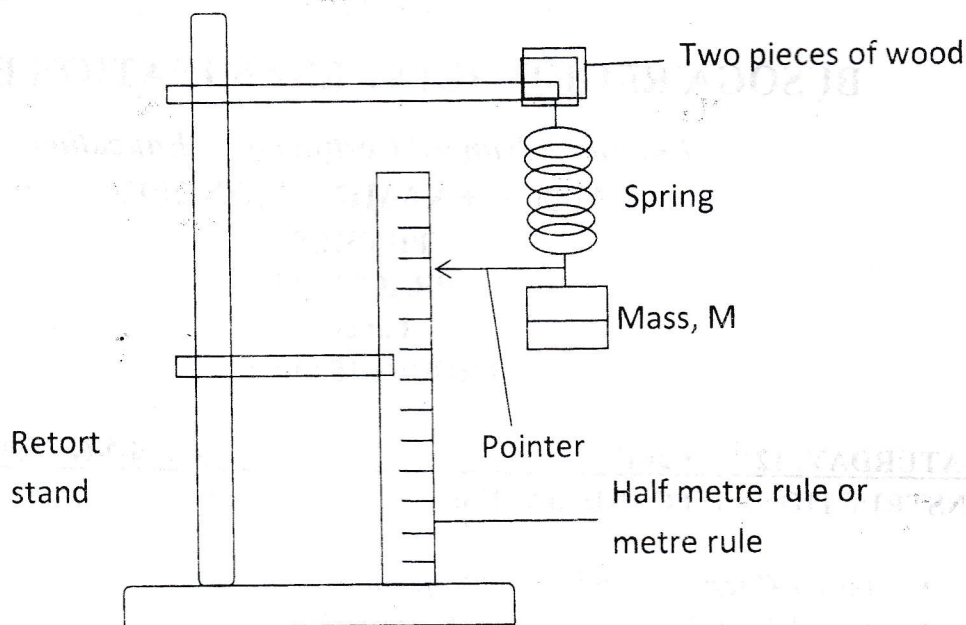
Question 1

In this experiment, you will determine a constant, λ , of the spring provided.

(34 marks)

- (a) Determine the radius, r , of the wire of the spring in meters.
- (b) Determine the radius, R , of the spring in metres.
- (c) Record the number of turns, N , of the spring.
- (d) Clamp the spring provided and the half metre rule as shown in the

figure.



- (e) Read and record the initial position P_1 of the pointer on the half metre rule.
- (f) Suspend a mass $M = 0.200$ kg from the spring.
- (g) Read and record the new position, P_2 of the pointer.
- (h) Find the extension, x , of the spring in metres.
- (i) Pull the mass vertically downwards through a small distance and release it to oscillate vertically.
- (j) Determine the time, t , for 20 oscillations.
- (k) Find the period, T .
- (l) Repeat the procedures (f) to (k) for values of $M = 0.300, 0.400, 0.500, 0.600$ and 0.700 kg
- (m) Tabulate your results in a suitable table including values of T^2 .

(n) Find the value of $S_1 = \left(\frac{M_2 - M_1}{x_2 - x_1} \right)$ where $M_1 = 0.200 \text{ kg}$, $M_2 = 0.700 \text{ kg}$ while x_1 and x_2 are the respective extensions.

(o) Calculate ϕ_1 from $\phi_1 = \left(\frac{4gNR^3}{r^4} \right) S_1$ where $g = 9.8 \text{ ms}^{-2}$.

(p) Plot a graph of T^2 against M .

(q) Find the slope, S_2 , of the graph.

(r) Calculate ϕ_2 from $\phi_2 = \left(\frac{160NR^3}{S_2 r^4} \right)$.

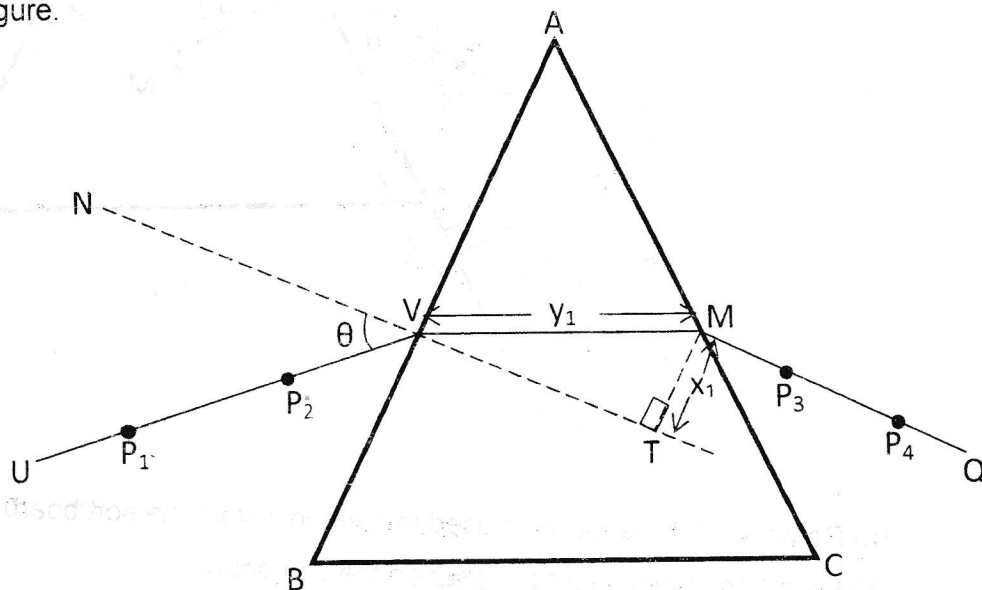
(s) Find the constant λ from $\lambda = \frac{1}{2}(\phi_1 + \phi_2)$

Question 2

In this experiment you will determine the refractive index n of the material of the prism provided by two methods

METHOD 1

- Fix a plain sheet of paper on the soft board
- Place the glass prism on the paper and trace its outline ABC as shown in the figure.

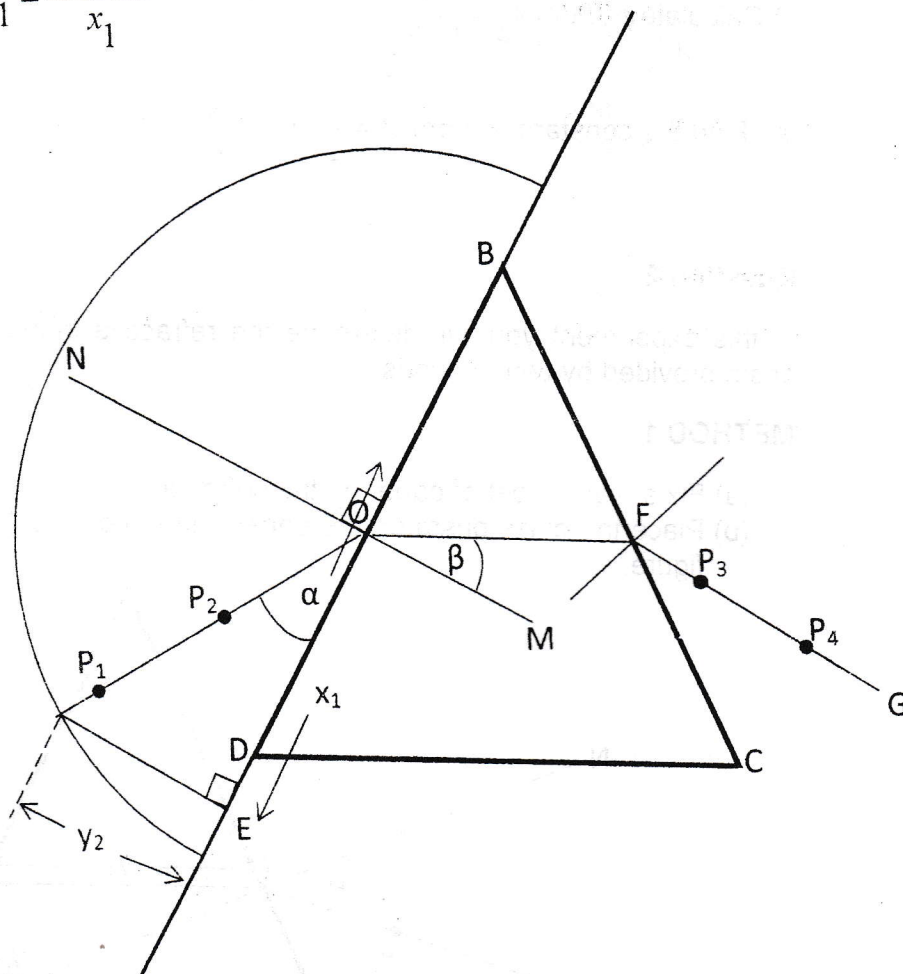


- Draw a normal to side AB through point V.
- Draw line UV making an angle $\theta = 30^\circ$ with the normal.
- Stick pins P_1 and P_2 vertically on line UV.
- Place the prism back on its outline.

- (g) Looking from side AC stick pins P_3 and P_4 such that they appear to be in line with the images of pins P_1 and P_2 .
- (h) Remove the glass prism and the pins.
- (i) Draw a line QM through points P_3 and P_4 to meet line AC at M. Join V to M.
- (j) Measure and record distance $MT = x_1$ and $VM = y_1$.
- (k) Calculate the value of n_1 from the formula

$$n_1 = \frac{y_1 \sin \theta}{x_1}$$

METHOD II



- (a) Remove all the apparatus used in method 1 from the soft board.
- (b) Fix a fresh plain sheet of paper on the soft board.
- (c) Place the glass prism on the plain sheet of paper and trace its outline BCD.
- (d) Draw a normal NM at O about a quarter of DB.
- (e) Prolong line BD such that $AO = HO = 8.0$ cm.
- (f) Draw a semi circle of radius 5.0 cm about centre O
- (g) Draw a radius OQ such that $\alpha = 30^\circ$ as shown in the figure above.

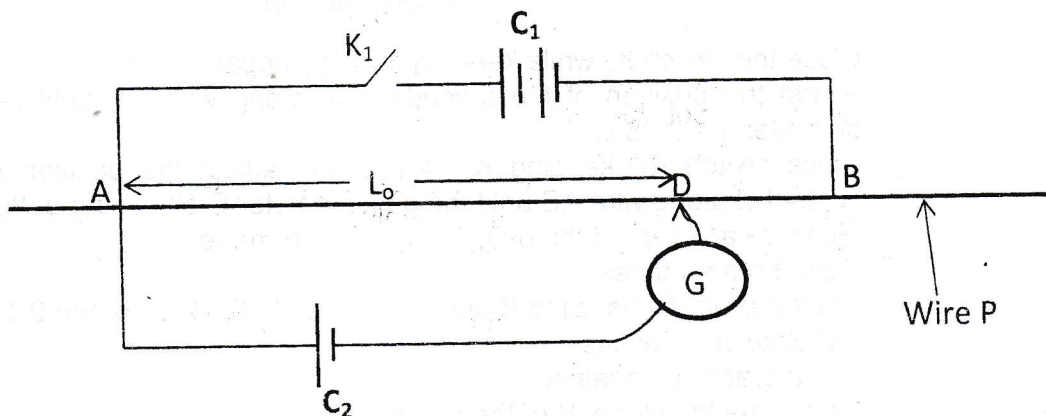
- (h) Replace the glass prism on its outline.
- (i) Stick pins P_1 and P_2 along OQ.
- (j) While looking through the glass prism from side BC, stick pins at P_3 and P_4 such that they appear to be in line with the images of pins P_1 and P_2 .
- (k) Remove the glass prism and the pins.
- (l) Join G to F and F to O.
- (m) Measure and record angle β .
- (n) Draw a line EQ normal to AB through Q.
- (o) Measure and record distances x_2 and y_2 .
- (p) Repeat procedures (g) to (o) for $\alpha = 35^\circ, 40^\circ, 50^\circ, 55^\circ$ and 60° .
- (q) Tabulate your results including values of $\sin \alpha$ and $\frac{y_2 \sin \beta}{x_2}$.
- (r) Plot a graph of $\frac{y_2 \sin \beta}{x_2}$ against $\sin \alpha$.
- (s) Determine the slope, S of the graph.
- (t) Calculate the value of n_2 from the expression $n_2 = \frac{1}{S}$.
- (u) Calculate the refractive index of the material of the glass prism from the expression $n = \frac{n_1 + n_2}{2}$

Question 3

In this experiment, you will determine the potential difference per unit length, δ , of wire P using two methods.

METHOD I

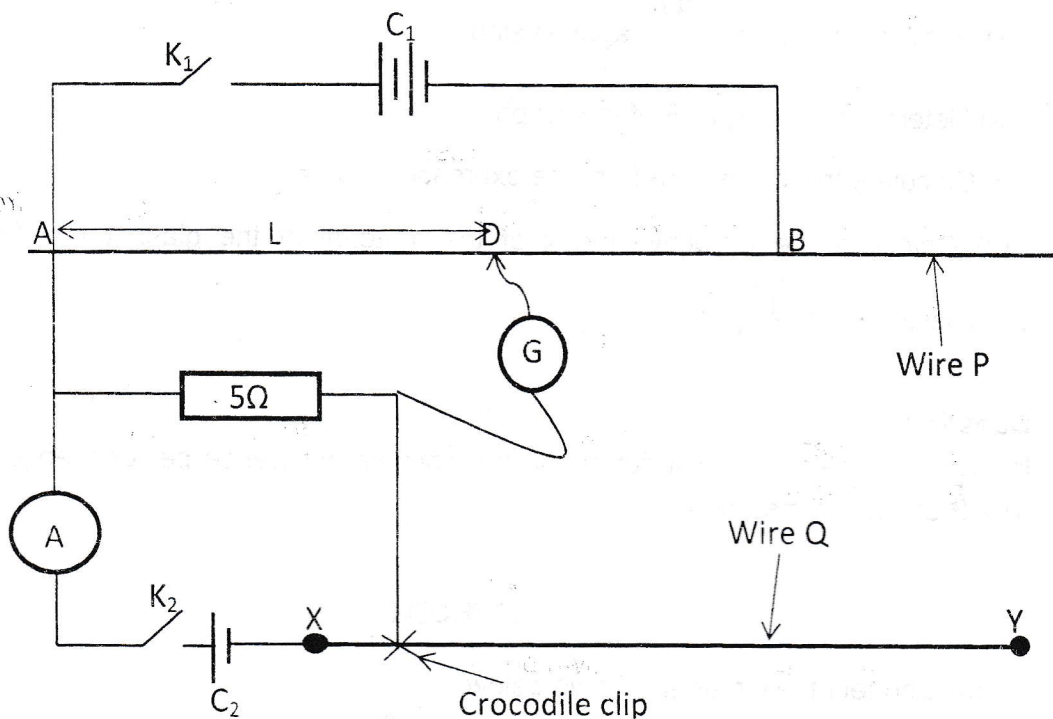
- (a) Connect the circuit as shown below



- (b) Close the switch, K_1 .
- (c) Adjust the position of the sliding contact D until the galvanometer shows no deflection.
- (d) Measure and record the balance length L_0 in metres.
- (e) Open the switch K_1 .
- (f) Calculate δ from $\delta = \frac{1.5}{L_0}$.
- (g) Disconnect the cell C_2 from the circuit

METHOD II

- (a) Connect the circuit as shown below such that $AB = 1.000 \text{ m}$



- (b) Close the switch K_2 while keeping switch K_1 open.
- (c) Adjust the position of the crocodile clip along wire XY until reading on the ammeter, $I = 0.08 \text{ A}$.
- (d) Close switch K_1 , keeping K_2 closed and adjust the position of the sliding contact D along wire AB until the galvanometer G shows no deflection.
- (e) Measure and record the balance length L in metres
- (f) Open both switches.
- (g) Repeat procedures (b) to (f) for $I = 0.10, 0.12, 0.14, 0.16$ and 0.18 A .
- (h) Tabulate your results.
- (i) Plot a graph of I against L .
- (j) Determine the slope, S of the graph.
- (k) Calculate the value of δ from the equation

$$\delta = 5S$$

END