***P510/3  
PRACTICAL***

***PHYSICS***

*Paper 3*

*MAY-JUNE-2023*

*3 ¼ hours*

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**ACEITEKA JOINT MOCK EXAMINATIONS 2023**

**UGANDA ADVANCED CERTIFICATE OF EDUCATION**

**PHYSICS**

**PRACTICAL**

**PAPER 3**

**TIME: 3 HOURS 15 MINUTES**

INSTRUCTIONS TO CANDIDATES:

Answer question 1 and ONE other question.

Candidates will not be allowed to use the apparatus or write for the first fifteen minutes.

Graph papers are provided.

Non – programmable silent electronic calculators may be used.

Candidates are expected to record on their scripts all their observations 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 that they have taken and any particular features 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.

**Question 1**

Inthis *experiment, you will determine a constant,* ***W****, of the spring provided.*

***(34 marks)***

1. Determine the radius, r, of the material of the wire of the spring in metres.
2. Determine the radius, R, of the spring in metres.
3. Record the number of turns, N, of the spring.
4. Clamp the spring provided and the half metre rules as shown in figure 1.



1. Read and record the initial P1 position of the pointer on the half metre

rule.

1. Suspend a mass M = 0.200 kg from the spring.
2. Read and record the new position, P2 of the pointer.
3. Find the extension, *x,* of the spring in metres.
4. Pull the mass vertically downwards through a small distance and release it

to oscillate vertically.

1. Determine the time, t, for 20 oscillations.
2. Find the period, T.
3. Repeat procedures (f) to (k) for values of M = 0.300, 0.400, 0.500, 0.600,

and 0.700 kg.

1. Tabulate your results in a suitable table, including values of T2.
2. Find the value of S1 from, , Where M1 = 0.200 kg ,

M2 = 0.300 kg, are the respective extensions.

1. Calculate ∩1 from: ∩1 = , where g = 9.8 ms – 2 .
2. Plot a graph of T2 against M.
3. Find the slope, S2 of the graph.
4. Calculate, ∩2, from ∩2 = .
5. Find the constant, W, from W = (∩1 + ∩2).

**Question 2**

In this *experiment, you will determine the critical angle, Ɣ, for glass in air, using the glass block provided.* ***(33 marks)***

**PART I**

(a) Place a fresh sheet of plain paper provided on the soft board using office pins.

(b) Place the glass block on a white plain sheet of paper with its largest face on the paper.

(c) Trace its outline WXYZ using a pencil, then remove the block from its outline.

(d) Determine and mark the mid-point M, of side WX.

(e) Replace the glass block on its outline and fix an optical pin P vertically at point M.

(f) From the left hand side of the line through M, look through side YZ of the glass block until you see a sharp image of pin P, placed at M.

(g) Fix pins P1 and P2 a distance apart so as to appear to be in line with the image of P as shown in figure 2.



(h) Move your eyes towards the right hand side of the line through M while looking through side YZ until another sharp image of P is seen again.

(i) Fix pins P3 and P4 a distance apart so as to appear to be in line with the image of P.

(j) Remove the all the pins and the glass block.

(k) Draw straight lines QO and SR through pin marks of P2 , P1 and P4 , P3 respectively and produce them backwards to meet at point N.

(l) Measure and record distances, **a,** and **r**, of MN and XY respectively.

(m) Find the value, **n1** from

(n) Calculate the constant **Ɣ1** from the expression;

**PART II**

(a) Measure and record the width, **w**, of the glass block provided.

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

(c) Place a glass block on the white sheet of paper so that it rests on its broad

face and trace its outline ABCD.

(d) Remove the glass block from its outline.

(e) Draw a normal MN to cut AB and DC at R and Q, respectively, such that AR

is 2.0 cm.

(f) Replace the glass block on its outline.

(g) Fix an optical pin vertically at R.

(h) Fix a second pin vertically at E at a distance, = 1.5 cm from Q, as shown

in figure 3.



(i) Measure and record the angle, α.

(j) Repeat the procedures from (f) to (l) for values of, = 2.0, 2.5, 3.0, 3.5 and

4.0 cm.

(k) Tabulate your results including values of and

(l) Plot a graph of against

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

(n) Calculate, **n2** from the expression;

(o) Calculate the constant **Ɣ2** from the expression;

(p)Calculate the critical angle  **,** from the expression

***Write your name on all your tracing papers and hand them together with the rest of the solutions.***

**Question 3**

In this *experiment, you will determine the potential difference per unit length,* ***δ****, of the wire labeled,* ***P****, by two methods*. ***(33 marks)***

**METHOD I**

1. Connect the circuit shown in figure 4.



1. Close switch, K1.
2. Adjust the position of the sliding contact, D until the galvanometer shows

no deflection.

1. Measure and record the balance length, L0, in metres.
2. Open switch, K1.
3. Calculate, δ, from the expression, δ =
4. Disconnect cell C2 from the circuit.

**METHOD II**

1. Connect the circuit shown in figure 5 such that AB = 1.00 m.



1. Close switch, K2, while keeping switch, K1, open.
2. Adjust the position of the crocodile clip along wire XY until the reading on

the ammeter, I = 0.10 A.

1. Close switch K1, keeping K2 closed and adjust the position of the sliding

contact, D along wire AB until the galvanometer, G, shows no deflection.

1. Measure and record the balance length, L, in metres.
2. Open switches K1 and K2.
3. Repeat procedures (b) to (f) for I = 0.12, 0.14, 0.16, 0.18 and 0.20 A.
4. Tabulate your results in a suitable table including values of and
5. Plot a graph of against
6. Determine the slope, **S3** of your graph.
7. Calculate the value of, δ, from; the equation; δ = 5 **S3**

**= END =**