P510/3

PRACTICAL

PHYSICS

Paper 3

August, 2019

3¼ hours

JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS – AUGUST, 2019

PHYSICS PRACTICAL

(PRINCIPAL SUBJECT)

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer Question 1 and one other question.

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

Graph papers are provided.

Mathematical tables and non – programmable silent electronic calculators may be used.

Write on one side of the paper only.

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 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.

**1.** **In this experiment, you will determine the density,  of the material of the marbles provided**.

**PART I**

a) Press the two wooden blocks firmly against one of the marbles ensuring that they are parallel as shown in Figure 1(i).

*d*

*wooden block* *wooden block*

*marble*

**Fig. 1(i)**

b) Measure and record the separation, *d* of the wooden blocks.

c) Calculate *V* from the expression:



**PART II**

a) Balance the metre rule horizontally on a knife edge.

b) Read and record the position, G of the knife edge from the zero end of the metre rule.

*Sellotape* *Thread* *metre rule*

*y*

G

*Thread* *x* *z*

*50g*

*Thread*

*Retort stand*

*Marbles in a polythene bag*

**Fig. 1(ii)**

c) Suspend the metre rule from a retort stand using a piece of thread.

d) Suspend the 50g mass from a piece of thread firmly attached to the zero end of the metre rule using Sellotape as shown in the Figure 1(ii).

e) Place the four marbles inside the polythene bag and tie a piece of thread round the neck of the bag.

f) Suspend the polythene bag containing the marbles at a distance, *x* =4.0 cm from the zero-end of the metre rule.

g) Adjust the metre rule so that it balances horizontally.

h) Measure and record the distances, *y* and *z* from the zero-end and point G respectively to the point of suspension of the metre rule.

*i*) Repeat procedures (f) to (h) for values of *x* =8.0, 12.0, 16.0, 20.0 and 24.0 cm.

j) Tabulate your results including values of  and  .

k) Plot a graph of  against.

*l*) Find the slope, *S* of the graph.

m) Read and record the intercept, *C* on the  axis.

n) Calculate,  from the expression:



**2.** **In this experiment, you will determine the constant, of the material of the glass block provided.**

**METHOD I**

N

P1

B

A

O

*r*

G*b*

*i a*

E

D

C

M

P2

P3

H

**Fig. 2(i)**

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

b) Place the glass block on the paper with its broadest face uppermost and trace its outline ABCD.

c) Remove the glass block and draw a perpendicular line NM to side DC at M such that DM = 2.0 cm.

d) Mark a point E along the side DC such that OM=ME.

e) Replace the glass block on its outline and fix a small pin, P1 vertically and close to side AB at point O along NM as shown in the Figure 2(i).

f) Fix the second small pin, P2 vertically and close to side DC at point E.

g) While looking through the side DC of the glass block, fix an optical pin, P3 such that it appears to be in line with pin P2 and the image of pin P1.

h) Remove the glass block and the pins.

*i*) Draw a line HE through the positions of P3 and P2 and join E to O.

j) Produce line HE to meet NM at G.

k) Measure and record distances *a* and *b*, and the angles *i* and *r*.

*l*) Calculate *K1* from the expression: 

m) Calculate *K2* from the expression: 

n) Obtain from the expression: 

o) Remove the tracing paper from the soft board.

**METHOD II**

*x*

B

P1

A

N E

*y*

O

P2

D

C

*i*

P3

R

M

**Fig. 2(ii)**

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

b) Place the glass block on the paper with its broadest face uppermost and trace its outline ABCD.

c) Remove the glass block and draw a perpendicular line NM to side DC at O such that DO = 1.0 cm.

d) Mark a point E along the side AB at a distance *x* = 1.0 cm from point N.

e) Replace the glass block onto its outline and fix a small pin, P1 vertically and close to side AB at point E as shown in the Figure 2(ii).

f) Fix the second small pin, P2 vertically and close to side DC at point O.

g) While looking through the side DC of the glass block, fix an optical pin, P3 such that it appears to be in line with pin P2 and the image of pin P1.

h) Remove the glass block and the pins.

*i*) Draw a line RO through the positions of P3 and P2 and join O to E.

j) Measure and record the angle *i* and the distance *y*.

k) Repeat procedures (d) to (j) for values of *x* =2.0, 3.0, 4.0, 5.0 and 6.0 cm.

*l*) Tabulate your results including values of  and .

m) Plot a graph of  against .

n) Find the slope, *S* of the graph.

o) Calculate, from the expression:



p) Calculate from the expression:



q) Comment on the constant, you have obtained.

**HAND IN THE TRACING PAPERS YOU HAVE USED.**

**3.** **In this experiment, you will determine the electrical resistance per metre, *k* of the material of the bare wire labelled *W* provided.**

**METHOD I**

K

A

*Wire W*

*x*

*crocodile clip crocodile clip*

**Fig. 3(i)**

a) Connect the circuit shown in Figure 3(i) with the length *x* of wire *W* equal to 0.200 m.

b) Close switch K.

c) Read and record the ammeter reading, *I1*.

d) Open the switch K.

e) Repeat procedures (a) and (b) for *x* = 0.500 m.

f) Read and record the ammeter reading, *I2*.

g) Open the switch K.

h) Calculate *k1* from the expression:



where 

**METHOD II**

*Wire W*

*crocodile clip*

*R1*=2Ω

*d R2*=2Ω

G

*y2*

*y1*

A C B

K

**Fig. 3(ii)**

a) Connect the circuit in Figure 3(ii).

b) Adjust the length, *d* of the wire *W* to 0.100 m.

c) Close switch K.

d) Move the sliding contact along the wire AB of the metre bridge to a point C where the galvanometer G shows zero deflection.

e) Measure and record the balance lengths *y1* and *y2*, in metres.

f) Open the switch K.

g) Repeat procedures (b) to (f) for values of *d* = 0.200, 0.300, 0.400, 0.500, and 0.600 m.

h) Tabulate your results, including values of  and .

*i*) Plot a graph of against 

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

k) Calculate *k2* from the expression: 

*l*) Calculate the resistance per metre, *k* of the material of the bare wire *W* from the expression:

