Name ..... Index Number...../.....

232/3
PHYSICS
(PRACTICAL)
Paper 3
Oct./Nov. 2014
$2\frac{1}{2}$ hours

Candidate's Signature.....

Date.....

THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education
PHYSICS
(PRACTICAL)
Paper 3
$2\frac{1}{2}$ hours

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
*(c) Answer **all** the questions in the spaces provided in the question paper.*
(d) You are supposed to spend the first 15 minutes of the $2\frac{1}{2}$ hours allowed for this paper reading the whole paper carefully before commencing your work.
(e) Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them.
(f) Candidates are advised to record their observations as soon as they are made.
*(g) **Non-programmable** silent electronic calculators and KNEC mathematical tables may be used .*
*(h) **This paper consists of 9 printed pages.***
*(i) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***
*(j) **Candidates should answer the questions in English.***

For Examiner's Use Only

Question 1

	a	b	c	d	e	f	g
Maximum Score	2	1	2	5	4	2	4
Candidate's Score							

Total ☐

Question 2

	d	e	f	g
Maximum Score	6	5	3	6
Candidate's Score				

Total ☐

Grand Total	

QUESTION 1

You are provided with the following:

- a voltmeter
- a milliammeter
- a micrometer screw gauge (to be shared)
- a stopwatch
- a centre zero galvanometer
- a switch
- ten connecting wires (at least five with a crocodile clip on one end)
- a resistance wire mounted on a millimetre scale labelled AB.
- a resistance wire labelled P.
- a resistance wire labelled Q.
- a capacitor labelled C.
- a metre rule or half metre rule.
- two dry cells and a cell holder.
- a carbon resistor labelled R.

Proceed as follows:

PART A

(a) Using the micrometer screw gauge provided, measure the diameter:

(i) D of wire P.

D = _____ (1 mark)

(ii) d of wire Q

d = _____ (1 mark)

(b) Determine C_1 the value of the ratio $\frac{D}{d}$.

C_1 = _____ (1 mark)

(c) (i) Set up the circuit as shown in **Figure 1**. *(Ensure that each of the wires **P** and **Q** is 50cm long)*

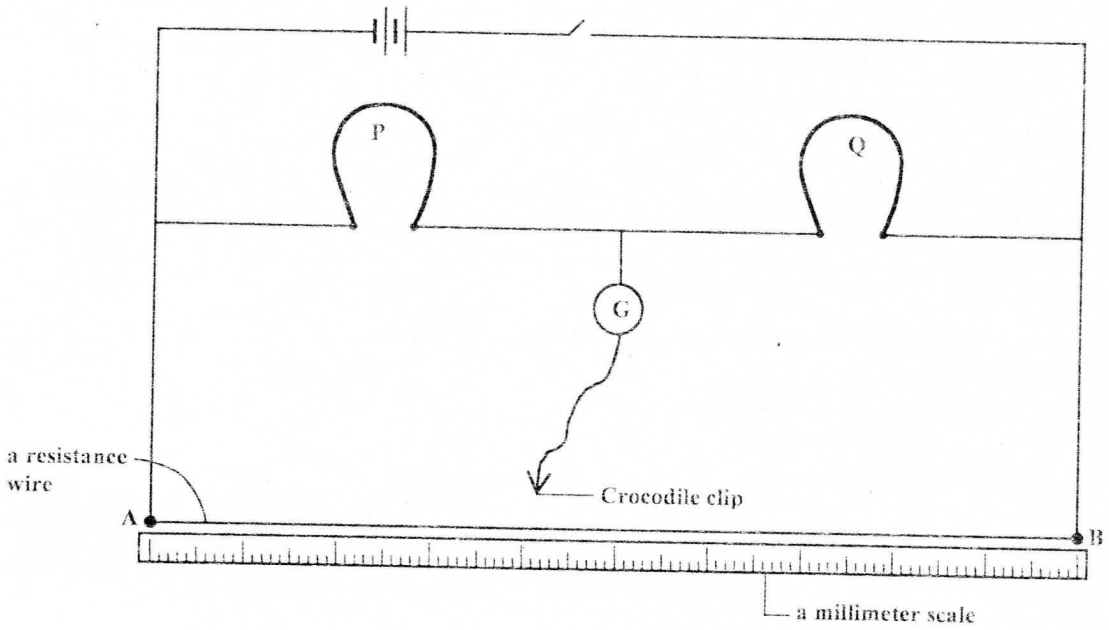

Figure 1

Close the switch. Using the clip at the free end of the wire from the galvanometer, tap wire **AB** near end **A** and observe the deflection in the galvanometer.

(ii) Then tap the wire near end **B** and again observe the deflection in the galvanometer.

(iii) Now tap the wire **AB** at various points between **A** and **B** to obtain a point **K** where there is no deflection in the galvanometer.

(I) Determine the length L_1, the distance from **A** to **K**.

L_1 = _____ (1 mark)

(II) Determine the length L_2, the distance from **B** to **K**.

L_2 = _____ (1 mark)

(d) (i) Given that the resistance $\mathbf{R_Q}$ of Q is 9.0 ohms, determine the resistance $\mathbf{R_P}$ of **P** using the expression:

$$\frac{R_P}{R_Q} = \frac{L_1}{L_2}$$ (2 marks)

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(ii) Determine the value of $\mathbf{C_2}$ given that,

$$C_2 = \sqrt{\frac{R_Q}{R_P}}$$ (2 marks)

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(iii) Compare the value of $\mathbf{C_1}$ (in part (b)) with that of $\mathbf{C_2}$. (1 mark)

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PART B

(e) Set up the circuit shown in **Figure 2.** S and T are crocodile clips.

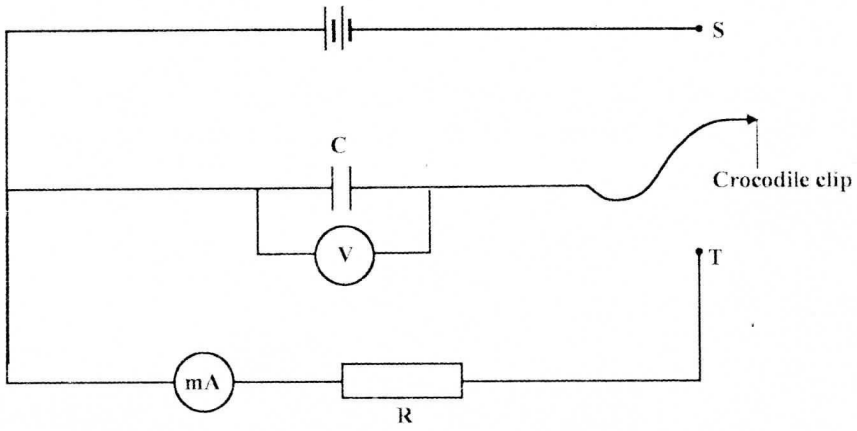

Figure 2

(i) Charge the capacitor **C** by connecting the crocodile clip to **S**. Record the reading of the voltmeter, **V**.

V = _____ (1 mark)

(ii) Calculate the value of the current I_o, given that $I_o = \frac{V}{R}$ (where $R = 4.7 \times 10^3\ \Omega$) (3 marks)

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(f) (i) Discharge the capacitor by disconnecting the crocodile clip from **S** and connecting it to **T**. Observe and record the highest reading of the milliammeter I_1. (This is the current at $t_o = 0$).
(You may have to repeat the process to obtain an accurate value).

I_1 = _____ (1 mark)

(ii) Recharge the capacitor by connecting the crocodile clip to **S**.

(iii) Discharge the capacitor and at the same time start the stop watch to measure the time t_1 taken for the current to decrease to half the value of I_1 i.e $\left(\frac{1}{2}I_1\right)$.

t_1 = _____ (1 mark)

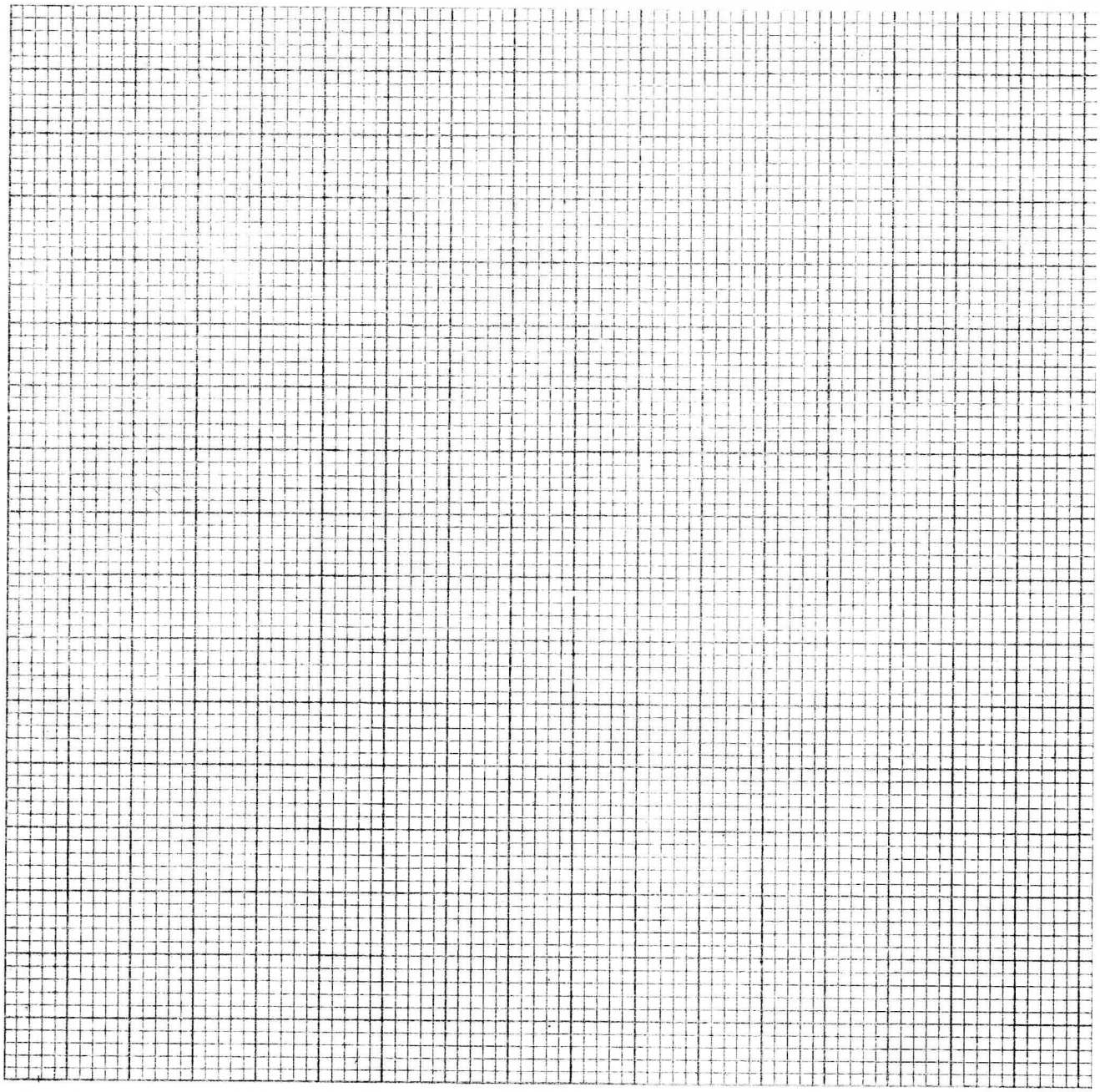
(g) (i) Recharge the capacitor and repeat the procedure in f(iii) to measure the time t_2 taken for the current to decrease to one tenth of the value of I_1 i.e $(\frac{1}{10} I_1)$.

t_2 = _____

(1 mark)

(ii) Use the values of the currents I_1, $\frac{1}{2} I_1$, $\frac{1}{10} I_1$ and their corresponding times to draw a graph of current I (y axis) against time on the grid provided.

(3 marks)



Question 2

You are provided with the following:

- a stand boss and clamp
- two wooden blocks
- a stopwatch
- a half metre rule or metre rule
- a mettallic rod
- a bare copper wire labelled **M** attached to a crocodile clip
- a bare copper wire labelled **N** attached to a crocodile clip.

Proceed as follows:

(a) Clamp wire **M** between the wooden blocks so that the length ***l*** of wire between the wooden blocks and the point of its attachment on the crocodile clip is 5 cm. Clamp the mettallic rod at its mid point using the crocodile clip attached to wire **M**.
(See figure 3)

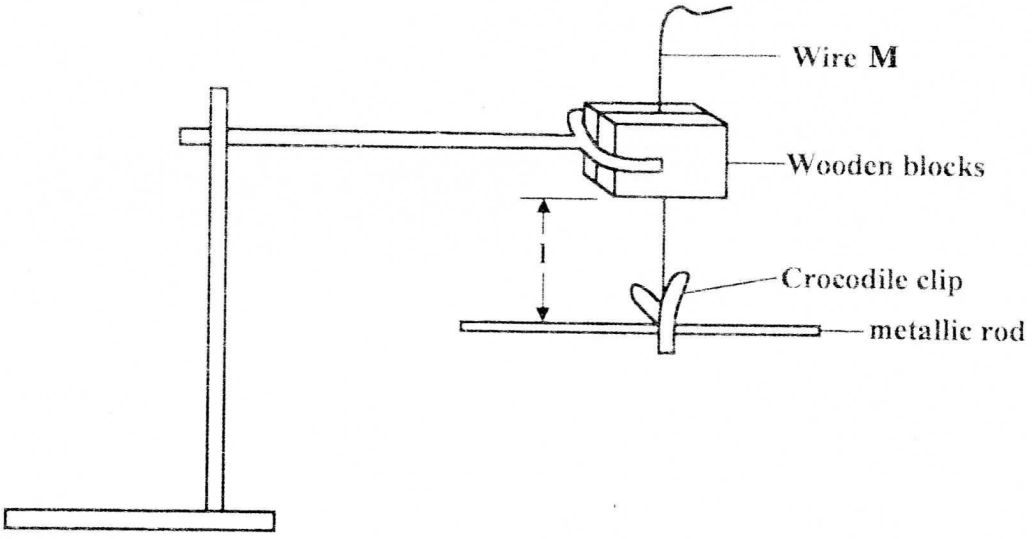


Figure 3

(b) Displace the rod through a small angle in a horizontal plane about its mid point so that when released, it oscillates in the same plane. Record the time t for 10 oscillations and determine the period **T** in **Table 1**.

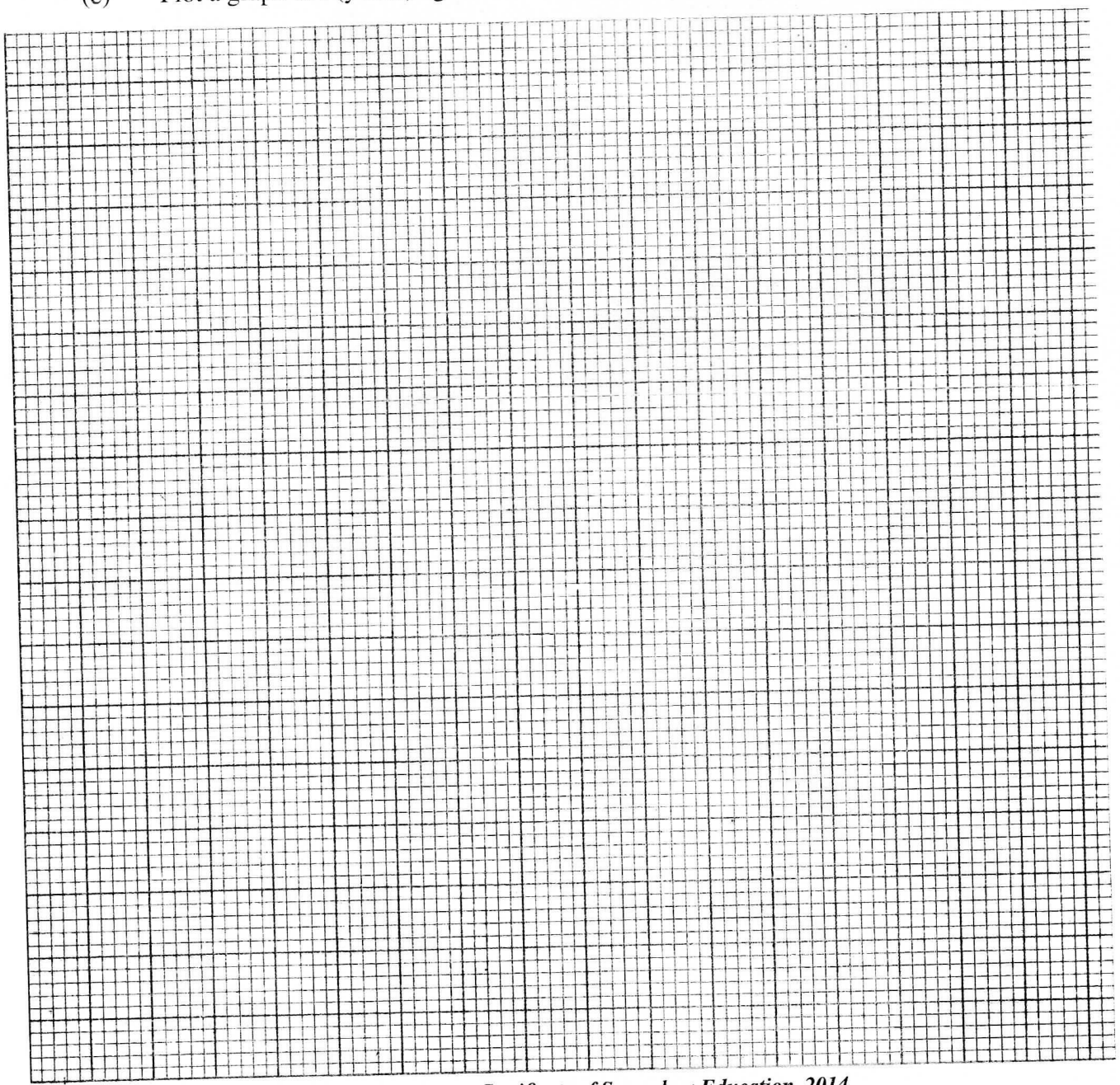
(c) Repeat part (b) for the other lengths of wire **M** shown in **Table 1**.

(d) Complete **Table 1**. (6 marks)

Table 1

l (cm)	5	10	15	20	25	30
t (s)						
T (s)						
T^2 (s^2)						

(e) Plot a graph of l (y axis) against T^2. (5 marks)



(f) Determine the gradient of the graph, S. (3 marks)

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(g) Now replace wire **M** with wire **N** in the set up.

(i) For l = 20 cm, displace the rod through a small angle in a horizontal plane and measure the time $\mathbf{t_N}$ for 10 oscillations.

$\mathbf{t_N}$ = _____ (1 mark)

(ii) Determine the period $\mathbf{T_N}$ = _____ (1 mark)

(iii) Calculate $\mathbf{T_N^2}$ (1 mark)

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(iv) Determine the value of H given that $H = \frac{0.2}{T_N^2}$. (1 mark)

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(v) Calculate the value of $\frac{H}{S}$. (2 marks)

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