231/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY/AUGUST 2014
TIME: $\mathbf{2}^{1 ⁄ 2} 2$ HOURS

## KURIA WEST SUB-COUNTY JOINT EXAMINATION - 2014

## Kenya Certificate of Secondary Education <br> PHYSICS <br> PAPER 3 <br> (PRACTICAL) <br> TIME: $\mathbf{2}^{1 ⁄ 2} 2$ HOURS

## Instructions to candidates:

1. Write your name and index number in spaces provided above.
2. Sign and write the date of examination in spaces provided above.
3. Answer all the questions in spaces provided in the question paper.
4. You are NOT allowed to spend the first 15 minutes of $21 / 2$ hours allowed for this paper reading the whole paper carefully before commencing the work.
5. Marks are given for clear record of the observations actually made, their suitability, accuracy and the use made of them.
6. Candidates are advised to record their observations as soon as they are made.
7. Non-programmable silent electronic calculators and KNEC Mathematical table may be used.

FOR EXAMINER'S USE ONLY

| Question 1 | a | c | f(i) | f(ii) | f(iii) |  | Total | 20 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Maximum Score | 1 | 8 | 5 | 3 | 3 |  |  |  |
| Candidate's Score |  |  |  |  |  |  |  |  |


| Question 2 | $\mathrm{c}(\mathrm{i})$ | $\mathrm{c}(\mathrm{i})$ | $\mathrm{c}($ ii $)$ | $\mathrm{c}($ iii | $\mathrm{c}($ (iv $)$ | Part II b(i) | $\mathrm{b}(\mathrm{ii})$ | Total | 20 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Maximum Score | 1 | 2 | 5 | 2 | 1 | 2 | 2 |  |  |
| Candidate's Score |  |  |  |  |  |  |  |  |  |

1. You are provided with the following.

- A millammeter.
- A voltmeter.
- A wire mounted on a mm scale.
- A switch.
- A long wire with a crocodife clip at one and (crocodile clip to be used as a slider or jockey).
- A new dry cell (size D) and a cell holder.
- A micrometer scyew gauge (may be shared).
- 5 connecting ifires, two with crocodile clips at the end.


## Proceed as $\boldsymbol{6}$ ollows:

(a) Measure the diameter, d of the mounted at three different points. $Q^{2}$
Average diameter $\mathrm{d}=$ $\qquad$ mm
(b) Set up the apparatus as shown in the circuit diagram in the figure below.

(c) Close the switch and tap the mounted wire with the crocodile clip as shown in the circuit. Ensure that both meters show positive deflection. Open the switch.
(d) Tap the wire at $\mathrm{L}=20 \mathrm{~cm}$. Close the switch read and record in the time provided the milliammeter and voltmeter reading.
(e) Repeat the procedure in (c) for other values of L, shown in the table below and complete the table.

| L(cm) | L(m) | V (Volts) | I <br> MA | Amps | $R=V / I$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 20 |  |  |  |  |  |
| 30 |  |  |  |  |  |
| 40 |  |  |  |  |  |
| 50 |  |  |  |  |  |
| 60 |  |  |  |  |  |
| 80 |  |  |  |  |  |

(f) (i) Plot the graph of R (Y-axis) against $\mathrm{L}(\mathrm{m})$.
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(ii) Determine the slope of the graph.
(iii) Given that $R=P L / A$ were A is the crosss-sectional area of the wire and P is a constant for the material of the wire, deterpine the value of the constant $P$.
2. You are $\ddagger$ rovided with the following:

- A nirarble with a piece of thread attached.
- CTMwo wooden blocks.
${ }^{\circ}$ Clamp, boss and retort stand.
- Meter rule.
- $1 / 2$ metre rule attached to a wooden block.
- Cello tape ( 2 pieces of about 10 cm long)
- Stop watch.


## Proceed as follows:

(a) Fix the thread between the two wooden blocks and fasten the clamp.
(b) Adjust the thread so that the length $L$ shown in figure 1 is 50.0 cm .

Fix the metre rule horizontally to the bench using the cello tape provided.
(c) Adjust the clamp so that the marble is next to the end of the metre rule as shown.

## Fig. 1


(i) Displace the marble by a horizontal distance $\mathrm{X}=20 \mathrm{~cm}$ and measure the corresponding vertical.
Displacement $\mathrm{h}=$ $\qquad$ cm
(ii) Repeat the experiment to find h for each of the following values in the table. (Complete the table).

| $\chi(\mathrm{cm})$ | $\mathrm{h}(\mathrm{cm})$ | $\chi^{2}\left(\mathrm{~cm}^{2}\right)$ | $\chi^{2} / \mathrm{h}(\mathrm{cm})$ |
| :--- | :--- | :--- | :--- |
| 20 |  | 200 |  |
| 25 |  | 625 |  |
| 30 |  | 900 |  |
| 35 |  | 1225 |  |
| 40 |  | 1600 |  |
| 45 |  | 2025 |  |

(iii) Plot the graph of $\frac{\chi^{2}}{h}$ (y-axis againstys. Draw the best through the points.( 5 mks )

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## $\cdots \cdots T^{-14}$









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(iv) Determine the slope of the graph.

From the graph, find the value of $\frac{\chi^{2}}{h}$ when $\mathrm{h}=0$.
(b) Raise the clamp slightly without changing the length $L$ so that the marble is free to swing. Determine the period, T , for one complete oscillation by timing ten oscillations.

Time for 10 oscillation $=$

Period T =
(c) Calculate the value of P from he following equation.
$T=2 \pi \sqrt{(P / g)}$ where $\mathrm{g}=9.8 \mathrm{~ms}^{2}$
2. (b) You are provided with the following apparatus:

- Candle
- Lens
- Lens holder
- Metre rule
- Cross wire
- Screen
- Vernier calipêrs

Proceed as fóllows:
(i) Actrange the apparatus as shown in the figure 2 below.

## Fig. 2


(ii) Place the cross-wire before the lens so that $\mathrm{U}=28 \mathrm{~cm}$. The lit candle should be placed close to the cross-wire.
(iii) Adjust the position of the screen until a sharp image is cast on the screen.
(iv) Measure and record the value of image distance, V , in the table.
(v) Repeat the same procedure for the other values in the table.

Table 2

| $\mathrm{U}(\mathrm{cm})$ | $\mathrm{V}(\mathrm{cm})$ | $M=\frac{V}{U}$ |
| :--- | :--- | :--- |
| 30 |  |  |
| 36 |  |  |

(vi) Given that the focal length $f$ of the lens satisfies the equation $f=\frac{V}{1+M}$ determine average value of the focal length, $f$.

