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# MMS JOINT EXAMINATION - 2014 Renya Certificate of Secondary Education 

## 232/3 <br> PHYSICS

## PAPER 3

JULY / AUGUST 2014

## INSTRUCTIONS TO CANDIDATES

* Write your name and index number in the spaces provided above
* Sign and write the name of your school and date of examination in the spaces provided above
* Answer all the questions in the spaces provided in the question paper
* You are supposed to spend the first 15 minutes of the $21 / 2$ hours allowed for this paper reading the whole paper carefully before commencing your work.
* Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them.
* Candidates are advised to record their observations as soon as they are made
* Non-programmable silent electronic calculators and KNEC mathematical tables may be used
* Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.


## For Examiners Use Only

## Total

| Question 1 | d | e (i) | e (ii) | e (iii) |
| :--- | :--- | :--- | :--- | :--- |
| Maximum Score | 10 | 5 | 3 | 2 |
| Candidate's Score |  |  |  |  |



Total

| Question 2 | h | i | j | k |
| :--- | :--- | :--- | :--- | :--- |
| Maximum Score | 9 | 5 | 3 | 3 |
| Candidate's Score |  |  |  |  |



## Grand Total

1. You are provided with the following:

- a galvanometer
- a cell and a cell holder
- a switch
- a straight wire of length 1.0 m mountéd on a millimeter scale
- Source of heat
- a jockey
- a fixed resistor $\mathrm{P}=200 \Omega$
- component A attached to thermometer - a boss, a clamp and a stand
- a tripod stand and a wire gauze
- connecting wires
- a beaker and some water


## Proceed as follows:

(a) Set up the appafitus as shown in figure 1. Do not light the burner at this point.

Figure 1


The thermometer and component A are mounted so that they do not touch the sides or the bottom of the beaker. The scale of the thermometer should face the candidate.
(b) Close the switch and use the jockey to touch one extreme end of the mounted wire. The galvanometer should deflect to one side. Now use the jockey to touch the other extreme end of the wire. The galvanometer must deflect in the opposite direction.
If the galvanometer does not deflect or the deflections are in one direction only, then the circuit should be checked.
Now locate the position on the wire where the galvanometer shows no deflection (zero deflection). This is the balance point before heating the water. Record the value of this temperature, and the corresponding value of T in the blank space in table 1 . Record also the values of $\mathrm{l}_{1}$ and $\mathrm{l}_{2}$.
(c) Heat the water and locate the balance point when the temperature $=30^{\circ} \mathrm{C}$. (It is advisable to start locating the balance point just before the temperature reaches $\mathbf{3 0}^{\circ} \mathrm{C}$ ).
Record the values of $1_{1}$ and $1_{2}$ (see figure 1 ) in the table 1 . If the temperature of the water before heating, is $30^{\circ} \mathrm{C}$ or more, heat the water to $40^{\circ} \mathrm{C}$ and proceed.
(d) Repeat the procedure in (c) for the other values of temperature shown in table 1. Complete the table. (The resistance of component A is $\mathrm{R}_{\mathrm{A}}$ ).

| $\left({ }^{0} \mathrm{C}\right)$ |  | $30 \times e^{2}{ }^{2} 4$ |  | 50 | 60 |  | 70 | 80 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{T}=(273+\theta)$ |  | $22^{25}$ |  |  |  |  |  |  |
| $\log _{10} T$ | + |  |  |  |  |  |  |  |
| $l_{1}(\mathrm{~cm})$ | $4{ }^{4} 4^{80}$ |  |  |  |  |  |  |  |
| $l_{2}(\mathrm{~cm})$ | जs |  |  |  |  |  |  |  |
| $\mathrm{R}_{\mathrm{A}}=200 \times \frac{l_{1}}{l_{2}} j \geqslant \delta^{j \gamma^{x}}$ |  |  |  |  |  |  |  |  |
| $\log _{10} R_{A} e^{\text {e }} \mathrm{e}^{\text {c }}$ |  |  |  |  |  |  |  |  |

Table 1
(10mks)
(e) (i) $Q^{\partial^{2}}$ On the grid provided plot a graph of $\log _{10} R_{A}(y$-axis $)$ against $\log _{10} T$. [You may use the (4)
(ii) Given that $\log _{10} R_{A}=n \log _{10} T+K$, use the graph to determine the value of n . (3 marks)
(iii) Determine the temperature T at which the resistance $\mathrm{R}_{\mathrm{A}}$ is equal to $200 \Omega$. (2 marks)
2. You are provided with the following:
two lenses marked A and B mounted at the ends of a lube
the tube mounted on a stand
a light source, O , with connecting wires
three dry cells and cell holder
a retort stand and a clamp
a metre rule
a white screen
a switch.

## Proceed as follows:

(a) Set up the apparatus as shown in figure 2.


Adjust the light source so as to be on the principal axis of the lens system.
(b) The distance between O and A is $\mathrm{L}_{5}^{2} 1$. Set $\mathrm{U}_{1}=6 \mathrm{~cm}$.
(c) Switch on the light source and addust the screen, (by moving the screen away or towards the lens system) so as to obtain a focuísed image.
(d) Measure and record the aed distance D , between O and the screen.
(e) Without moving O and the screen move the lens system along the principal axis until another sharp image is obtained on the screen.
(f) Measure and record the new distance $\mathrm{U}_{2}$ between O and A .
(g) Determine fhe displacement, d , through which the lens system has moved and record the value in table $2 x$

| 象 | D (cm) | $\mathrm{U}_{2}(\mathrm{~cm})$ | d (cm) | (D + d) (cm) | $\frac{d}{D+d}$ | (D - d) (cm) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 6 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |
| 12 |  |  |  |  |  |  |
| 14 |  |  |  |  |  |  |
| 16 |  |  |  |  |  |  |

Table 2
(h) Repeat steps $b$ to $g$ for other values of $\mathrm{U}_{1}$ as indicated in the table. Complete the table.
(i) On the grid provided plot a graph of $\frac{d}{D+d}(y-$ axis $)$ against $D-d$. (5 marks)
(j) Determine the slope of the graph.
(k) Determine the value of D when $\frac{d}{D+d}=0$


