**Name: ………………………………………………….…Adm No…………………….**

**232/3 Candidate’s Signature: ……………….**

**PAPER 3**

**DECEMBER 2021. Date: ……………………………………**

**THE MURANG’A EXTRA COUNTY SCHOOLS JOINT EXAMINATIONS (MECS)**

**PHYSICS PRACTICAL**

**PAPER 3**

**Instructions to Candidates**

1. *Write your name and admission number in the spaces provided.*
2. *Answer* ***ALL*** *questions in the spaces provided in the question paper.*
3. *You are supposed to spend the first* ***15 minutes*** *of the allowed for this paper reading the whole paper carefully before commencing the work.*
4. *Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them.*
5. *Candidates are advised to record their observation as soon as they are made.*
6. *Non programmable silent electronic calculators may be used.*
7. ***This paper consists of 8 printed pages.***
8. ***Candidates should check the questions to ascertain that all the pages are printed as indicated and that no question are missing.***
9. ***Candidates should answer the questions in English.***

**For Examiner’s Use Only**

**Question 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | d | e | f | g | h | i | j |
| **Maximum Score** | 6 | 5 | 2 | 2 | 2 | 1 | 2 |
| **Candidate’s Score** |  |  |  |  |  |  |  |

**TOTAL**

**Question 2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | b | c | d | e | f | h | i | j |
| **Maximum Score** | 1 | 5 | 5 | 2 | 1 | 3 | 2 | 1 |
| **Candidate’s Score** |  |  |  |  |  |  |  |  |

**TOTAL**

**GRAND**

**TOTAL**

**QUESTION 1 (20 marks)**

1. You are provided with the following;

* A galvanometer
* A dry cell and a cell holder
* A switch
* A wire labelled Y mounted on a piece of wood.
* Eight connecting wires each with a crocodile clip at one end.
* A resistance wire labelled AB mounted on a millimeter scale.
* Six 10 Ohm carbon resistors
* A jockey or crocodile clip
* Micrometer screw gauge (to be shared)

***Proceed as follows:***

1. Set up the circuit as shown in figure below, with X being one of the 10 ohms carbon resistors.

Nichrome wire mounted on a Millimeter scale

Wire Y

B

A

X

G

P

1. Close the switch. Tap the jockey at various points on the wire AB and locate point P at which the galvanometer shows zero deflection, measure and record in table below the length,  where = PB.
2. Repeat the procedure in (b) using X as two 10Ω resistors, three resistors, four resistors, five resistors and six resistors. **X is the effective resistance for the parallel combination i.e.** where **n** is the number of resistors in parallel.
3. Record your readings in table below. (6mks)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of **10Ω**  Carbon resistor | **One** | **Two** | **Three** | **Four** | **Five** | **Six** |  |
| X (Ω) | **10** | **5** | **3.333** | **2.5** | **2** | **1.667** | **Exact or 4sf all correct = 1mk** |
| **(cm)** | **66.5** | **53.3** | **48.2** | **43.5** | **40.2** | **37.4** | **within the range and 1 d.p a must (Each value = mk)**  **Decreasing trend a must** |
| -1) | **0.1** | **0.2** | **0.3** | **0.4** | **0.5** | **0.6** | **All correct = 1mk** |
|  | **1.515** | **1.876** | **2.075** | **2.299** | **2.488** | **2.674** | **4sf or Exact = 1mk** |

**TABLE**

Plot a graph of (y-axis) against . (5mks)

0.3

0

0.2

0.1

0.8

0.6

0.5

0.4



1.0

0.5

3.0

2.5

2.0

1.5

* **Well labelled axes with units = 1 mk**
* **Simple, uniform and accommodative scale = 1mk**
* **Each correctly plotted point = mk for a maximum of 4 points (total 2 mks)**
* **Straight line with positive gradient passing through at least 3 correctly plotted points = 1mk**

0

1. Determine the slope m of the graph. (2mks)

**(Correct substitution = 1mk)**

**(Correct evaluation with units = 1mk)**

Wrong unit = 0mk, no unit = half mark

1. Given that where K = 100cm. Use the graph to determine R. (2mks)

**(Correct substitution = 1mk)**

**(Correct evaluation = 1mk)**

1. Measure the diameter d and the length of wire Y. (2mks)

**=** **m ±0.01** **(Value within the range and 3dp a must = 1mk)**

**d** **= m ± 0.00002(Value within the range and 5dp a must = 1mk)**

1. Determine its cross-sectional area A of the wire Y. (1mk)

**(Correct substitution = mk)**

**A**  m2 **(****Correct evaluation = mk)**

1. Determine the resistivity of the wire Y given that its Resistance, (2mks)

**(Correct substitution = 1mk)**

(**Correct evaluation = mk, rule for units applies)**

**QUESTION 2 (20 marks)**

**PART A**

**You are provided with the following;**

* Meter rule
* Retort stand, clamp and boss
* A spring and with a pointer
* Three masses (a 100 g and two 50g masses)
* Stop watch

**Proceed as follows**

1. Set the apparatus as shown below.

pointer



Metre rule

spring

stand

M

1. Hang the unloaded spring and record the pointer readings

***xo*****(3d.p a must)** *m* (1mk)

1. (i) Load a mass of 150 g and determine the extension of the spring, ***e1****.*

***e1***m (1mk)

(**Correct subtraction =** **mk, correct evaluation =mk)**

1. Displace the 150 g mass slightly downwards and release it to oscillate vertically. Time 20 oscillations and obtain time t1.

**t1** = (1mk)

**(Value within the range and 2dp a must = 1mk, no unit deny a half mark)**

1. Find periodic time T1

**T1**

(**Correct division = mk, correct evaluation with unit=mk)** (1mk)

1. Use the equation to find the value of P1. (2mks)

**(Correct substitution = 1mk)**

**(Correct evaluation to 4sf = 1mk)**

1. (i) Load a mass of 200 g and determine the extension of the spring, ***e2****.*

***e2*** m. **(****Correct subtraction =** **mk, correct evaluation=mk).**  (1mk)

1. Displace the 200 g mass slightly downwards and release it to oscillate vertically. Time 20 oscillations and obtain time t2.

**t2**  (1mk)

**(Value within the range and 2dp a must = 1mk, no unit deny a half mark)**

1. Find periodic time T1

**T2**  (1mk)  **(Value within the range and 2dp a must = 1mk, no unit deny a half mark)**

1. Use the equation to find the value of P2. (2mks)

**(Correct substitution = 1mk)**

**(Correct evaluation to 4sf = 1mk)**

1. Find the average of P

**(Averaging principle = 1mk).** (2mks)

**(Correct evaluation to 4sf = 1mk)**

**PART B**

**Apparatus**

* Lens and a lens holder.
* A candle
* Screen
* A metre rule.

**Procedure**

1. Focus a distant object and estimate the focal length, **f** of the lens

**f mm ± 10 mm**

(1mk)

1. Set up the apparatus as shown below.

P

Candle

screen

lens

s

d

P’

1. Set the distance **s= 60 cm.**
2. Adjust the position of the lens to position **p** where a magnified sharp image is formed on the screen**.** Recordposition P.

**P =** **Student’s value (1d.p a must)** cm. (1mk)

1. Maintaining distance **s,** adjust the lens to position **P’**where a diminished sharp image is formed on the screen. Record position, **P’.**

**P’ =**  **Student’s value (1d.p a must)** cm. (1mk)

1. Find distance **d,** between the originalposition and final position of lens

**d =**  cm (1mk)

(**Correct subtraction = mk, correct evaluation =mk)**

1. Using the formula . Find the value of **q.** (2mks)

**(Correct substitution = 1mk)**

**(Correct evaluation to 4sf = 1mk)**

1. What physical quantity do **q** represent (1mk)

**Focal length of the lens used.**