**Term 1 – 2023 OPENER EXAM**

**PHYSICS (232/3)**

**FORM FOUR (4)**

**Time:** $2\frac{1}{2} hours$

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

**School**: ……………………………………………………….. **Class**: …………………..

**Signature**: …………………………………………………….. **Date**: …………………...

**INSTRUCTIONS:**

* Answer all the questions in this paper
* 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 starting your work.
* Marks are given for clear record of the observations made, their suitability and accuracy and the use made of them.
* Candidates are advised to record observations as soon as they are made
* Mathematical table and electronic calculators may be used.
* **The earth’s gravitational pull,** $g=10Nkg^{-1}$

 **For Examiner’s use only:**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **TOTAL MARKS**  | **CANDIDATE’S SCORE** |
| 1 | **20** |  |
| 2 | **20** |  |
| GRAND TOTAL | **40** |  |

***This paper consists of 7 printed pages. Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.***

**QUESTION 1**

**You are provided with the following apparatus:**

• A cell holder

• A volt-meter (0-3V)

• An ammeter (0-1A)

• A switch

• Amounted resistance wire labelled AB

1. Set up the apparatus as shown in the circuit below, figure 1

**Figure 1**

1. While the switch is open, record the voltmeter reading, V0

$V\_{0}=$ ........................... (1mark)

1. Put on the switch. While the crocodile clip is at A (i.e. L = 100 cm) take the volt-meter reading (V) and the ammeter reading (I). Record V and I in the table 1 below.

**Table 1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Length,** $L$ **(cm)** | **100** | **80** | **60**  | **40** | **20** | **0** |
| Voltage (V) |  |  |  |  |  |  |
| Current, I (A) |  |  |  |  |  |  |

 (8marks)

1. Repeat the procedure in (c) above for the lengths shown and complete the table 1 above.
2. Plot a graph of voltage (Y-axis) against current (X-axis) (5marks)



1. Determine the slope of the graph (3marks)
2. The voltage and current are related by the equation: $V=V\_{0}-b.I.$ Determine the value of b (2marks)
3. What physical quantity does the slope of the graph represent? (1mark)

**QUESTION TWO**

You are provided with the following:

* a metre rule
* 3 optical pins
* 2 small wooden blocks
* a stop watch
* a stand, a boss and clamp
* a piece of sello-tape

**Proceed as follows**:

1. Using the two wooden blocks, clamp two optical pins about 4 cm apart in the stand so that they project out of the blocks in a horizontal plane.
2. Using a piece of sellotape, attach the third optical pin across the metre rule at a distance x = 10 cm from the 50 cm mark. Now suspend the metre rule on the two clamped pins so that it can swing freely in a vertical plan with the third pin as the axis. (See **figure 2**)



**Figure 2**

1. Displace the lower end of the metre rule slightly and let it oscillate as shown in the **figure 2**. Measure and record in table 2 the time t (s) for 20 oscillations.
2. Repeat the procedure in (b) and (c) for the values of x shown in table 2.
3. For each value of x shown in the table, determine the period T(s), and complete the table. (The period T is the time for one complete oscillation).



 **(9 marks)**

1. On the grid provided, plot a graph of T2. X (y-axis) against X2 (5marks)



1. From the graph, determine:
2. the slope S of the graph. (3marks)
3. The value of constant r given that: $rS=39.5$ (3marks)

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