**TERM 2 - 2023**

**PHYSICS – PRACTICAL (232/3)**

**FORM FOUR (4)**

**Time - 2**$\frac{1}{2}$ **Hours**

**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.

 **For Examiner’s use only:**

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

**This paper consists of 8 printed pages**

**QUESTION ONE**

You are provided with the following apparatus:

* An ammeter (0-1 A)
* Voltmeter (0-3 V)
* Two dry cells
* Cell-holder
* Variable resistor (0-100 Ω)
* Connecting wires
* Switch

**Proceed as follows:**

1. Connect the apparatus as shown in figure 1 below:



**Figure 1**

1. With the switch open, measure and record the voltmeter reading, V0

V0 = .......................... (1 mark)

1. Now, remove the voltmeter and connect it across the variable resistor (as shown in figure 2).



**Figure 2**

1. Adjust the variable resistor until you obtain a reading of 1.0 V on the voltmeter. Record the corresponding ammeter reading. Continue to adjust the variable resistor to obtain the voltmeter readings shown in table 1, each time recording the corresponding current value.

**Table 1:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Voltage, V | 1.0 | 1.5 | 2.0 | 2.5 |
| Current, A |  |  |  |  |
| $$R=\frac{V}{I} \left(Ω\right)$$ |  |  |  |  |
| $$\frac{1}{I} (A^{-1})$$ |  |  |  |  |

1. complete the table 1 above: (6 marks)
2. Plot a graph of resistance, R against $\frac{1}{I}$ (5 marks)



1. Determine the slope of your graph (3 marks)
2. Given that: $\frac{V}{I}=\frac{P}{I}-K,$ where P and K are constants. From the graph determine the values of P and K.
3. P ($2$ marks)
4. K (2 marks)
5. State the significance of K (1 mark)

**QUESTION TWO**

**PART A**

You are provided with the following apparatus:

* Complete retort stand
* Cork
* Optical pin (for suspending the cardboard)
* Stop-watch
* Half-metre rule
* Knife-edge
* Rectangular Cardboard (40cm by 5 cm by 0.5cm)

**PROCEED AS FOLLOWS:**

1. Using the knife-edge, determine the centre of gravity of the cardboard. Mark it as G.
2. From G, cut holes 1, 2, 3, 4, 5 and 6 at intervals of 3 cm. measure and record the distance, L of each of the holes from G.
3. Now set-up the apparatus as shown in figure 3, below:



**Figure 3**

1. Displace the strip through a small angle, θ and release it to oscillate. Determine time, t for 10 oscillations and fill in your results in table 2 below: (8 marks)

**Table 2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **hole** | 1 | 2 | 3 | 4 | 5 | 6 |
| **Distance, L** **(cm)** |  |  |  |  |  |  |
| **Time, t for 10 oscillations (s)** |  |  |  |  |  |  |
| **Periodic time, T (s)** |  |  |  |  |  |  |
| **T2 (s2)** |  |  |  |  |  |  |
| **T2L (ms2)** |  |  |  |  |  |  |
| **L2(m2)** |  |  |  |  |  |  |

1. Determine Z, given that: $Z=\frac{A}{B}$ , where A, is the average value of T2L and B is the average value of T2 (2 marks)

**PART B**

You are provided with the following apparatus:

* A thermometer (range: -100c- 1100c)
* A 250 ml beaker
* Measuring cylinder
* Retort stand, clamp and boss
* Stop watch
* Source of boiling water or Bunsen burner
* Some tissue paper

**Proceed as follows:**

1. Record the temperature reading, T0 of the thermometer provided

T0 = ................................. (1 mark)

1. State the significance of the temperature, T0 above. (1 mark)
2. Now pour 200ml of hot (boiling) water from the source into the beaker and immediately insert the thermometer as shown in figure 1 below. Ensure it is at a temperature above 850C.



**Figure 4**

1. Start the stop watch when the temperature falls to 800c. Record the temperature of the water as it cools down after every two minutes for about ten minutes. Record your results in the table below: (5 marks)

**Table 3:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Time, t (minutes)** | 0 | 2 | 4 | 6 | 8 | 10 |
| **Temperature, T (0C)** |  |  |  |  |  |  |

1. Given that the specific heat capacity of water is 4J/g0C. determine the heat lost when the water cools from 800c to the temperature in (a) above. (assume: 1ml = 1g) (3 marks)

**THIS IS THE LAST PRINTED PAGE**