**NAME: ………………………………………………………. Index No:..…...………………………….**

**SCHOOL: …………………………………………………… Candidate’s signature: ….……………..**

**Date: ………………….…………………**

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**PHYSICS**

**PAPER 3**

**2 ½ HOURS**

**INSTRUCTIONS TO CANDIDATES**

* Write your name and index number in the spaces provided above.
* This paper consists of **two** questions, Question **1** and question **2**.
* Answer **ALL** the questions in the spaces provided in the question paper.
* You are not allowed to start working with the apparatus for the first ¼ hours of the 2 ½ hours allowed for this paper. This time is to enable you read the question paper and make sure you have all the apparatus you may need.
* Marks are given for a clear record of the observations actually made, for their suitability and accuracy and the use made of them.
* Candidates are advised to record their observations as soon as they are made.
* Mathematical tables and electronic calculators **may be** used in calculations.

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum Score** | **Candidate’s Score** |
| **1** | 20 |  |
| **2** | 20 |  |
| **Total** | **40** |  |

***This paper consists of 6 printed pages.***

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

**PART A**

1. You are provided with the following apparatus.
* Two dry cells.
* Nichrome wire 100cm on a mm scale.
* An ammeter.
* Cell holder.
* Voltmeter.
* Connecting wires with crocodile clips.
* Switch.

Proceed as follows;

1. Connect the circuit as shown in the diagram.

![](data:application/x-msmetafile;base64...)

1. Connect the ends A and C where AC is the length L of the Nichrome wire across the terminals as shown. Close the switch and measure both current I and potential difference (P.d) across the wire AC when L = 100cm.

Current I = ………………………………… (1 mark)

P.d, V = …………………………………… (1 mark)

1. Measure the E.m.f of the cells, E.

E = ………………………………………… (1 mark)

1. Reduce the length L (AC) to the lengths shown in the table below. In each case record the current, I, and the corresponding P.d.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Length L (cm) | 100 | 70 | 60 | 50 | 40 | 20 |
| I (A) |  |  |  |  |  |  |
| P.d (V) |  |  |  |  |  |  |
| E – V (v) |  |  |  |  |  |  |

(7 marks)

1. Plot a graph of E – V against I(A) on x-axis in the grid provided. (5 marks)

![](data:application/x-msmetafile;base64...)

1. Determine the slope of the graph. (3 marks)
2. Given that E = V + Ir, determine the internal resistance, r, of each cell. (2 marks)

**PART B**

1. You are provided with the following;
* Salt solution in a 500ml beaker.
* Two identical cylindrical 100g masses.
* Two pieces of thread.
* A metre rule.
* A knife edge (wedge).
* A vernier caliper. (To be shared).
1. i) Determine the volume V of one of the masses using the apparatus provided.

Record V.

V = ………………….. (1 mark)

ii) Explain how you determined the volume V. (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………

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1. i) Determine the centre of gravity of the metre rule and record it as the balance point G.

G = …………………………. (1 mark)

ii) Arrange the apparatus as shown in the diagram below such that X = 5cm from the pivot. With the 100g mass completely immersed in the salt solution, hung the other 100g mass from the metre rule and adjust its position until the system is in equilibrium as shown.

![](data:application/x-msmetafile;base64...)

Repeat the procedure above with the following values of X and fill in the table. NB: During each experiment ensure that the position of the pivot does not change.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X (cm) | 5 | 10 | 15 | 20 | 25 | 30 |
| Y (cm) |  |  |  |  |  |  |

(4 marks)

1. Plot a graph of Y against X in the grid. (5 marks)

![](data:application/x-msmetafile;base64...)

1. Determine the slope ‘S’ of the graph. (2 marks)
2. Given that S = , where F is the apparent weight of the mass in the salt solution and W is the actual weight of the mass, calculate the value of F and the upthrust U.

F = ………………………….. (1 mark)

U = …………………………. (1 mark)

1. Hence determine the density of the liquid L. (3 marks)