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

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

**Date: ………………….…………………**

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**PHYSICS**

**PAPER 3**

**(PRACTICAL)**

**2 ½ HOURS**

**SET 5**

**FORM3**

**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.



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

2). You are provided with the following

* A rectangular glass block
* Four optical pins
* A plane mirror mounted on a piece of wood to stand vertically
* Soft board
* Sheet of paper
* Four thumb pins/office pins
* Vernier callipers

 a) Place the plain sheet of paper on the soft board and fix it using the thumb pins. Place the glass block

 on the soft board and trace its outline.

 b) Remove the glass block and draw a normal line at about 2cm from the end of the longer side of the glass block outline.

 c) Draw a line at an angle i = 100 from the normal. Fix two pins P1 and P2 on the line, at least 6cm

 from each other.

p3

P4

p2

p1

 Mirror

a

i

Glass block

 d) Arrange the glass block and the plane mirror as shown below

 (e) Fix pins P3 and P4 such that they appear to be in line with image of P1 and P2.

 Measure the distance a

 (f) Repeat the procedure for other values of i and complete the table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Angle i0 | 10 | 20 | 30 | 40 | 50  | 60 |
| Distance a (cm) |  |  |  |  |  |  |

 (5mks)

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

 (h) Find the slope of the graph (3mk)

(i) Use your graph to determine the maximum value of a (1mk)

(j) Given that a = mi + k where m and k are constants, find the values of m and k. (2mk)

(k) Measure the width of the refracting glass using the vernier calipers

 W = (1mk)

(i) For i = 300 determine the value of x = w/a (2mks)

(m) What physical quantity does x represent (1mk)

NB hand in the sheet of paper with the traces representing the rays of light you used for determining a and i