**Name…………….…………………………………………Stream…………..Adm………..**

**Candidate’s signature……………………Date…………………..…………….**

**PHYSICS**

**PAPER 3**

**PRACTICAL**

**TIME: 2 ½HOURS**

**SUNRISE ONE TERM 1 EXAMINATION -2023**

**INSTRUCTIONS TO CANDIDATES**

* Write **your name** and **index number** in the spaces provided
* Answer **ALL** the questions in the spaces provided in the question paper.
* You are supposed to spend the first 15 minutes of the 2 1/2 hours allowed for this paper reading the whole paper carefully before commencing your work.
* Marks are given for clear record of observations made, their suitability, accuracy and the use made of them.
* Candidates are advised to record their observations as soon as they are made.
* **Non-programmable** silent electronic calculators and KNEC mathematical table may be used.
* This paper consists of 7 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

**FOR EXAMINER’S USE ONLY**

**QUESTION MAXIMUM SCORE CANDIDATES SCORE**

1. **24**
2. **16**

**TOTAL 40**

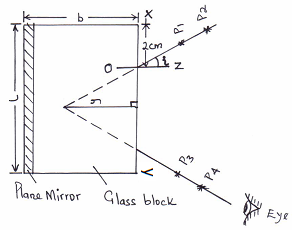
**QUESTION 1 (PART A)**

You are provided with the following apparatus:

* A rectangular glass block.
* Four optical pins.
* A soft board.
* A protractor.
* 30cm ruler.
* 2 white plain papers.
* A plane mirror.
* A vernier calipers (to be shared)

**PROCEDURE**

1. Trace the outline of the glass block on the white paper.
2. Draw a normal ON, 2cm from point X on side XY.
3. Measure an angle (i) 10º from the normal.
4. Place back the glass block on the outline and fix a plane mirror vertically along the length of the glass block on the opposite side of XY using a cello tape as shown in the figure below.



1. Fix two pins P1 and P2 as shown in the figure.
2. By observing image of P1 and P2, locate two pins P3 and P4 such that they appear to be in line with images of P1 and P2.
3. Remove the pins and the block. Join P3P4 and produce the line to meet line P1P2 produced
4. Measure the perpendicular distance y.
5. Repeat the same for angles of 15º, 20º, 25º, 30º, 35º and 40º and record the results in table 2 below.

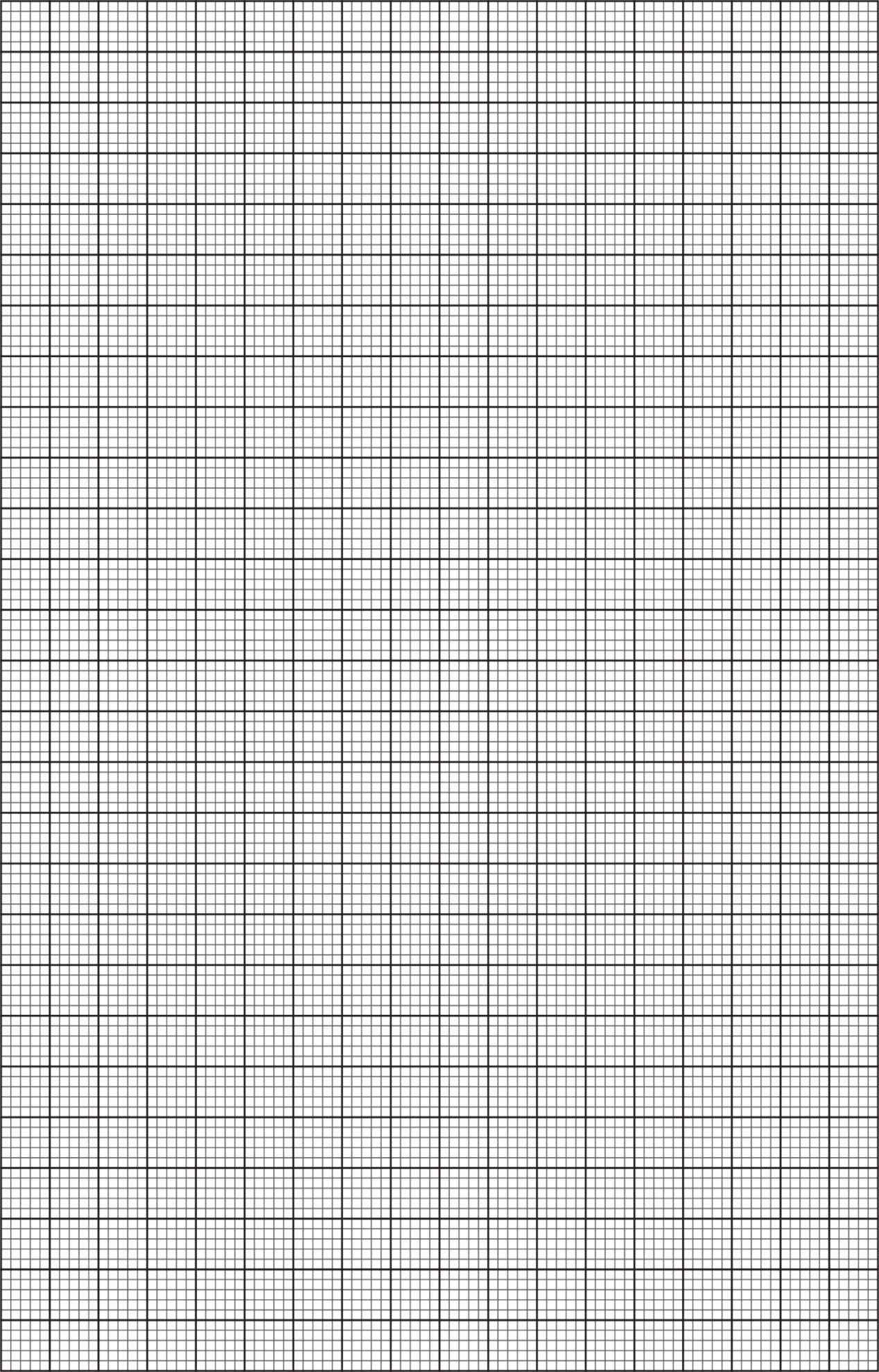
**(NB: The paper work must be submitted together with the question paper).**

**Table 2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Angle i | 10º | 15º | 20º | 25º | 30º | 35º | 40º |
| y(cm) |  |  |  |  |  |  |  |

(6marks)

(j) Plot a graph of y(cm) against angle i. (5marks)



1. Use the graph to determine yo the value of y when i = 0º

yo = ……………… cm (1mark)

ii) Measure and record the breadth (b) of the glass block

b = ……………. Cm (1mark)

1. Determine the value of η given that

 (1marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………....

**PART B**

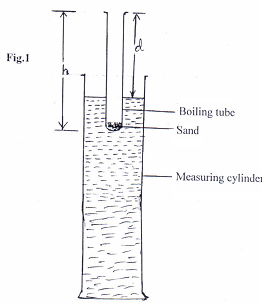
You are provided with the following:-

* A boiling tube.
* Some dry sand.
* A liquid in a measuring cylinder labelled L.
* Half metre rule.
* A vernier calipers (to be shared).
* A weighing machine (to be shared).
* Tissue paper.
* A measuring cylinder.

**Proceed as follows:**

a) Measure the length of the boiling tube.

h = ……………………. cm (1mark)

b) Put a little amount of sand in the boiling tube and place it in the measuring cylinder which is almost filled with liquid L. Add sand, little by little until the tube floats upright as shown in figure below.

Measure the length, d, of the boiling tube which is above the liquid using half metre rule

d = …………… cm (1mark)

c).Determine the length, t, of the boiling tube which is immersed in the liquid using half metre rule

t = ………….. cm (1mark)

1. Remove the boiling tube from the measuring cylinder, wipe it dry (on the outside) and measure its mass, m, including the sand inside.

m = ………….. g (1mark)

1. Measure the external diameter, D, of the boiling tube.

D = ………….. cm (1mark)

1. Determine the external radius, R.

R = …………… cm (1mark)

1. Using the formula m = 12ρπR², determine ρ for the liquid. (1marks)

*………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………...*

**QUESTION 2**

*You are provided with the following:*

**-** An ammeter (**0** – **1 A**)

**-** A voltmeter (**0** – **3 V** or **0** – **5 V**)

**-** A variable resistor

**-** A **10Ω** carbon resistor

**-** A piece of resistance wire

**-** Two new dry cells

**-** A cell holder

**-** A switch

**-** Seven connecting wires

*Proceed as follows:*

a) Take the resistant wire and coil it around the biro pen to make a coil.

b) Set up the apparatus as shown **Figure 5** below such that the **10Ω** carbon resistor and the coil are in parallel connection.

Coil

**Figure 5**

c) Close the switch and the adjust the variable resistor such that the ammeter read a current of I1=**0.08A** and record the corresponding voltmeter reading **V1**

i) **V1 =**………………… (1mark)

ii) Calculate resistance  (1mark)

d) Repeat (c) above for current of I2 = **0.16A** and record the corresponding voltmeter reading **V2**

i) **V2 =**………………… (1mark)

ii) Calculate resistance  (1mark)

e) Find the average value of resistance **R** (1mark)

f) Determine the resistance, **C** of the coil (2marks)

g) Now set up the apparatus as shown in **Figure 6** below such that the voltmeter is connected across the cells, **10Ω** carbon resistor and the coil are in parallel connection.

Coil

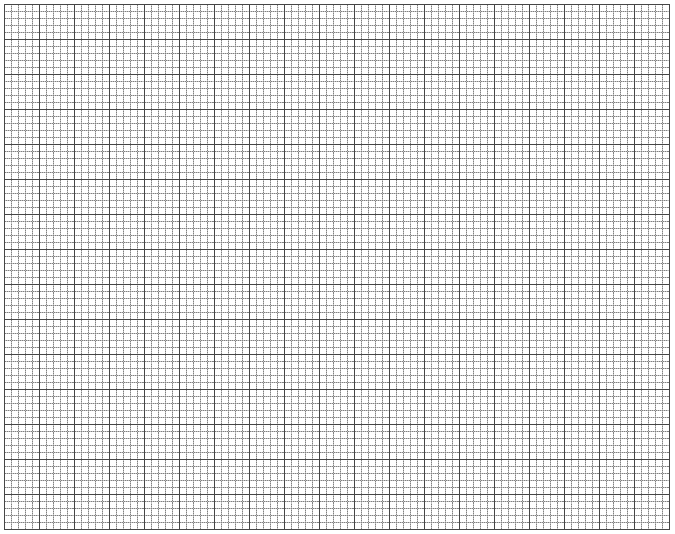
**Figure 6**

h) Close the switch and the adjust the variable resistor such that the ammeter reads a current of **0.04A** and note the corresponding voltmeter reading. Record the value in the **Table 4** below.

i) Repeat (h) above for other values of current and voltage and complete the **Table 4** below

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Current, I (A)** | **0.04** | **0.08** | **0.12** | **0.16** | **0.20** | **0.24** |
| **Voltage, V(V)** |  |  |  |  |  |  |

(4marks) **Table 4**

j) On the grid provided plot a graph of **Voltage, V (V)** against **Current, I (A)** (5marks)

k) Determine the slope of the of the graph (2marks)

l) Given that graph is related to equation  where **E** and **r** are the emf and internal resistance of the cells respectively, use your graph to determine the value of:

**E** =…………………… (1mark)

**r** =……….…………. (1mark)