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

 **Class………………………**

**Candidate’s Signature**: .........................

 **Date**: ...................................

**232/3**

**PHYSICS**

**Paper 3**

**PRACTICAL**

**TERM 2, 2019**

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

**MOKASA II EXAMINATION**

**FORM FOUR EXAMINATION**

**PHYSICS**

**Paper 3**

**Instructions to Candidates**

* *Write your name and index number in the spaces provided above.*
* *Sign and write the date of the examination paper.*
* *Answer* ***ALL*** *the questions in the spaces provided in the question paper.*
* *ALL working* ***MUST*** *be clearly shown where necessary.*
* *Mathematical tables and silent electronic calculators may be used.*
* *Candidates should check the paper to ascertain that all the pages are printed as indicated and that no questions are missing.*
* *Take density of water 1g/cm3.*

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

* Rectangular glass block
* Two plain papers
* Four optical pins
* Four paper pins or thumb pins
* Protractor
* Half metre rule

**PART A:**

**PROCEDURE:**

(i)Place the glass block on the plain paper on it’s largest area, trace it’s outline and mark it’s sides A,B,C and D . Mark the point P0 on the centre of side BC as shown in

figure 1 below;

**B**

**C**

**D**

**A**

**Po**

**P3**

**P4**

**P1**

**P­2**

**G**

**Pi**

**E**

**Fig .1**

(ii)Measure the breadth of the glass block.

b =$….……..cm$ (1mk)

(iii)Replace the glass block and fix an object pin at P0 such that the pin lies along the surface of the glass block.

(iv)With your eye on the side AD closer to A ,fix pins P1 and P2 such that they are in line with the image Pi of Po as seen from the side AD through the glass block.

(v)From the same side AD closer to D,fix pins P3 and P4 such that they are in line with the image Piof P0 seen through the glass block.

(vi)Remove the glass block and join P1 and P2 , and P3 and P4 to meet at Pi.

(vii)Join P0 to Pi and measure length P0Pi

P0Pi=…………………………………..cm (1mk)

(viii)Determine the ratio;$ \frac{b}{ b-P\_{0 }P\_{i }} $= n (2mks)

**(Hand in the outline with the question paper.) (2mks)**

**PART B:**

(i)Trace the outline of the glass block again on the second plain paper and label it ABCD as shown in figure 2.

(ii)Construct a normal on the side AB approximately 3cm from A and measure angle of incidence i=300 (secure the plain paper using paper pins).

(iii)Replace the glass block on the outline and fix pins P1 and P2 along the line of 300.

(iv)Viewing from the sides CD through the block, fix pins P3 and P4 such that they appear in line with the images of P1 and P2.

(v)Join P3 and P4  and join x and y.

**P1**

**i0**

**P2**

**B**

**A**

**y**

**r0**

**C**

**X**

**D**

**d**

**e0**

**Fig.2**

**P3**

**P4**

(vi)Extend the line P1 and P2 to obtain lateral displacement as shown in the figure and measure the lateral displacement **d** and angle **r0.**

(vii)Tabulate your results.

(viii)Repeat the procedure in (i) to (vi) for angles of incidence 400, 500,600 and 700.

**(Hand in the plain paper on which you have done your experiment together with the exam paper)** (2mks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  **i0** | 30 | 40 | 50 | 60 | 70 |
|  **r0** |  |  |  |  |  |
| **d(cm)** |  |  |  |  |  |

 (5mks)

(ix)Plot a graph of **d (cm)** against **r0**  (5mks)



(x)From your graph;

* Determine the value **r**0 where the lateral displacement d equals to the breadth **b** of the block.

**r**0 = ……………………………………………………… (1mk)

* Given that k sin **r**0=1, determine the value of k (2mks)

**Question 2:**

**PART A:**

(a)You are provided with the following;

* A voltmeter
* A milliammeter
* A capacitor C
* A switch
* A stop watch
* Five connecting wires
* Two dry cells and a cell holder
* A carbon resistor labeled R (4.7kΩ)
* Set up the circuit as in fig.3 below. S and T are crocodile clips.

**Fig.3**

**S**

**C**

**Crocodile clip**

**T**

**V**

**R**

**mA**

(i)Charge the capacitor C by connecting the crocodile clip to S. Record the reading of the voltmeter,**V**.

**V** = ………………………………………. (1mk)

(ii)Calculate the value of the current **I0**, given that I0=$\frac{V}{R}$ , where R = 4700Ω (2mks)

(b) (i) Discharge the capacitor by disconnecting the crocodile clip from S and connecting it to T. Observe and record the highest reading of the milliameter I1. (this is the current at t0=0 ).

(you may have to repeat the process to obtain an accurate value.)

I1=………………………………………. (1mk)

(ii)Recharge the capacitor by connecting the crocodile clip to S.

(iii)Discharge the capacitor and at the same time,start the stop watch to measure the time t1, taken for the current to decrease to half the value of I1 ie $\frac{1}{2}$I1,;

t1 =…………………………………. (1mk)

(c) (i) Recharge the capacitor and repeat the procedure in (b) (iii) above to measure the time t2 , taken for the current to decrease to $\frac{1}{5}$I1.

 t2=………………………………… (1mk)

(i) Recharge the capacitor and repeat the procedure in (b) (iii) above to measure the time t3 , taken for the current to decrease to $\frac{1}{10}$I1.

 t3=………………………………… (1mk)

**N.B:** Transfer the above values in the following table;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Current (mA )** | I1  | $\frac{1}{2}$I1 | $\frac{1}{5}$I1 | $\frac{1}{10}$I1. |
|  |  |  |  |
| **Time (s)** | **t**0  | t1 | t2 | t3 |
|  |  |  |  |

(ii) Use the values of the currents; I1, $\frac{1}{2}$I1, , $\frac{1}{5}$I1 $ \frac{1}{10}$I1  and their corresponding times as in the **above table** to draw a graph of **current I** (y axis) against **time t** on the grid provided. (3mks)



**PART B:**

2. You are provided with the following;

* A metre rule
* A knife edge
* One 50g mass and a 100g mass
* Some thread
* Some water in a beaker
* Liquid L in a beaker
* Tissue paper

Proceed with the experiment as follows;

(i)Balance the metre rule on the knife edge and record the reading at this point.

Balance point = ……………………………. cm (1mk)

(**For the rest of the experiment; the knife edge must be placed at this position.)**

(ii)Set up the apparatus as shown in figure 4 below;

Use the thread provided to hang the masses such that the positions of the support can be adjusted.

10cm

D

X

100g mass

50g

water

**Fig.4**

The balance point is attained by adjusting the position of the 100g mass.Note that the distance X and D are measured from the knife edge.and the 50g mass is fully submerged in the water.

Record the values of X and D.

X = …………………………………… cm (1mk)

D = …………………………………….cm (1mk)

Apply the principle of moments to determine the weight W1of the 50g mass in water and hence determine the upthrust Uw in water. (2mks)

W1 = ………………………………………………N

Uw = ……………………………………………….N

Remove the 50g mass from the water and dry it using the tissue paper .

(iii) Now balance the metre rule when the 50g mass is fully immersed in the liquid L . Record the value of the distance X.

10cm

D

X

100g mass

50g

liquid L

**Fig.5**

X=………………………………………. cm. (1mk)

Apply the principle of moments to determine to determine W2 of the the 50g mass in the liquid L and hence determine the upthrust UL in the liquid.

W2……………………………………………………………….. (1 Mark)

UL………………………………………………………………… (1 Mark)

(iv) Determine the relative density R.D. of the liquid L, given that;

R.D.=$\frac{U\_{l}}{U\_{w}}$ (1mk)

(v) Find the density of liquid L in kg/m3. (1mk)