NAME…………………………………………………………INDEX………………………

SCHOOL……………………CANDIDATE SIGN………............. DATE……………

232/3

**PHYSICS**

**Paper 3**

JUNE - 2019
**Time: 21/2 Hours**

**2019**

***Kenya Certificate of Secondary Education (K.C.S.E)***

**INSTRUCTIONS;**

a Answer all the questions in the spaces provided

b Write your name and index number in the spaces provided above

c Sign and write the date of the examination in the spaces provided above

d You are supposed to spend 15minutes if 21/2 hours allowed for this paper reading the whole paper carefully before commencing your work

e Marks will be given for clear record of observations actually made,their suitability, accuracy and the use made of them.

f Candidates are advised to record their observations as soon as they are made

g Non- Programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

**FOR EXAMINER’S USE ONLY**

**For Examiner’s Use Only.**

Question I

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PART A | A(iii) | A(iv) | A(v) | B(viii) | B(ix) | B(x) | B(xi) | TOTAL |
| Maximum Score | 6 | 4 | 2 | 4 | 1 | 1 | 2 |  |
| Candidates Score |  |  |  |  |  |  |  |  |

Question II

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PART B | e(i) | e(iii) | f | g | h | TOTAL |
| Maximum Score | 1 | 8 | 5 | 3 | 3 |  |
| Candidates Score |  |  |  |  |  |  |

 GRAND TOTAL

1. **PART A**

You are provided with the following

 A nichrome wire 1m long mounted on a scale

* + A dry cell
	+ 1 ammeter ( 0 – 1A)
	+ A switch
	+ A bulb
	+ A voltmeter ( 0-5v or 0 – 3v)
	+ A one cell holder
	+ At least 6 connecting wires, one with a jockey

**Proceed as follows**

a) (i) Set up the circuit as shown in fig 1 below



jockey

Fig 1

1. With the jockey / crocodile clip at B (L=100cm) note the voltmeter reading V and ammeter reading, I and record on the table I below.
2. Repeat the procedure in (ii) above for L=80cm, 60cm, 40cm, 20cm and 0cm and record in the table below (6 marks)

**Table I**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| L(cm) | 100 | 80 | 60 | 40 | 20 | 0 |
| V(volts) |  |  |  |  |  |  |
| I (A) |  |  |  |  |  |  |

(iv) Plot the graph of V(y-axis) against I on the grid provided. (4 marks)



v) Calculate the slope of your graph when current is 0.15A. (2marks)

**PART B**

 (b) You are provided with the following apparatus

 - a glass block

 - a plane mirror

 - 4 optical pins

 - a soft board

 - A cellotape ( about 15cm long)

 - 2 white – plain sheets of paper

 - a ruler or half metre rule

 - a protractor

 - 4 office pins

**Proceed as follows:-**

1. Using the cello tape provided fix the plane mirror to the glass block along side as shown in the figure below. The reflecting surface to face the glass block.

Length



Plane mirror

Breadth

Glass block

1. With the use of the office pins, secure firmly a white plain paper on the board and place the block together with attached mirror.
2. Draw the outline of the glass block together with the mirror
3. Remove the block and the mirror and draw a normal at B somewhere a quarter- way the length of the outline you drew in (iii) above.
4. Draw four(4) different rays AB incident at B and extended to C. The incident rays should make angles 10°, 20°, 30°,and 40°.
5. Replace the glass block together with the attached mirror so as exactly fit the outline in(iii)
6. Place two object pins P1 and P2 along the 10° line. Locate the images of pinsP1 and P2 as they appear by non-parallax (the images of the pins appear to be in a straight line when viewed through the glass block).

Place pins P3 and P4 so that the images of pins P1 and P2 are not seen.

1. Remove the glass block together with the attached mirror from the outline and produce the lines joining P1 to P2 and P3 to P4 so that the they intersect at C. Measure and record the distance x in the table 2 below. (4 marks)

NB. It may be necessary for you to draw another outline so as to avoid congestion of (construction) lines.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Angle i ° | 10 | 20 | 30 | 40 |
| Distance x(cm) |  |  |  |  |

Table 2

1. Now measure the breadth b of the glass block.

b=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1mark)

1. Calculate the average Ax of the values of x in table 3 above

Ax \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1mark)

1. Determine the refractive index of the glass block using the formula.

Refractive index n of glass (2 marks)

1. You are provided with the following apparatus
* A metre rule
* Two stands
* A pendulum bob
* Some plasticine
* Stop watch
* Two pieces of strings (long and short one)

 **Proceed as follows:**

1. Attach one end of the length of string to the metre rule at 10cm mark. Mark by use of a sliding loop of string round the meter rule.
2. Fix the string at this point with the small bob of plasticine.
3. Tie the string in a second loop at 90cm mark so that the string is stretched tight between the two marks.
4. Fix this loop with a small plasticine. Attach the pendulum bob to the centre of the string so that the centre of gravity is 15cm below the point of suspension.
5. If the attachments of the pendulum bob to the pieces does not produce a V-shape. Squeeze the string at the knot between the thumb and the fore finger.

A

B

2θ

L1

L2

15cm

1. Measure the angle 2θ (1mark)
2. Pull the pendulum bob towards you through a small distance, release it; measure the time (t) of the motion by timing 10 oscillations.
3. Remove the plasticine at B and slide the loop towards A by 4cm and repeat (ii) above for other distances AB as shown in the table below.

 Table (3) (8marks)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Length from A to B (cm) | 80 | 76 | 72 | 68 | 64 | 60 |
| Time for 10 oscillations (s) |  |  |  |  |  |  |
| Period time T (s) |  |  |  |  |  |  |
| T2(s2) |  |  |  |  |  |  |
| 2θ |  |  |  |  |  |  |
| θ |  |  |  |  |  |  |
| Cosθ |  |  |  |  |  |  |

1. Plot a graph of T2 against Cosθ (5 marks)



1. Find the slope “s” of the graph. (3 marks)
2. Given that find k. (3 marks)