GATUNDU DISTRICT JOINT EXAMINATION JULY/AUGUST 2016

PHYSICS PRACTICAL 232/3

CONFIDENTIAL

QUESTION 1

Each candidate should have the following

- A voltmeter
- An ammeter
- A nichrome resistor wire mounted on wooded bar A-B
- Fixed Resistor of 10 Ohms labelled R
- A conductor X-Y labelled (P) which is 20.0 cm long nichrome wire of SWG 32 and about 0.25 mm in diameter
- 9- pieces connecting wires at least4 with
- 4 crocodile clips
- Two dry cells and cell holders
- A Jockey (J)
- A switch (K)
- A micrometer screw gauge * (to be shared)

Question 2

- Water in a beaker
- Complete retort stand
- Glass marble
- 100ml measuring cylinder
- Boiling tube
- Cotton thread, 50cm
- Meter rule
- Beam balance
- Rubber band (one piece)
- A piece of plasticine

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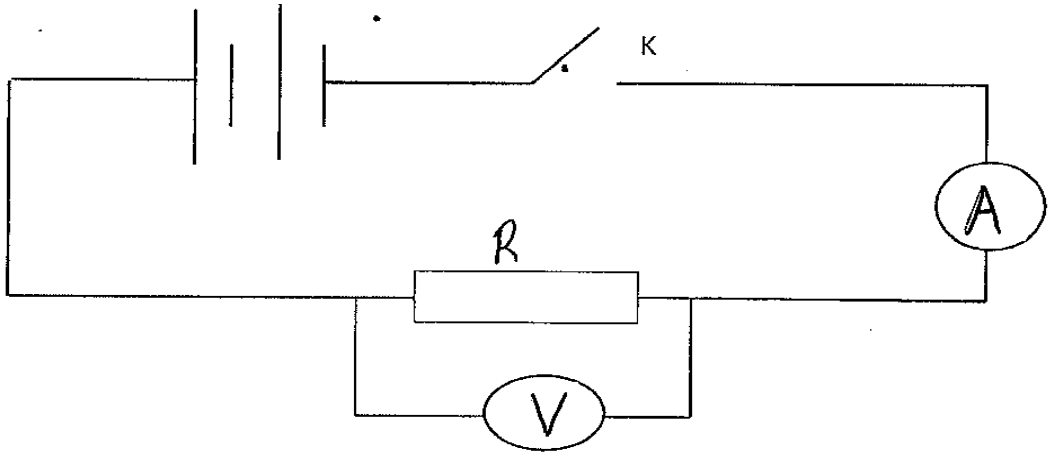
232/3

QUESTION 1

Each candidate is provided with the following

- A voltmeter
- An ammeter
- A nichrome resistor wire mounted on a wooded bar A-B
- A fixed resistor labelled (R)
- A conductor X-Y labelled (P)
- 9- pieces connecting wires
- Two dry cells and cell holders
- Jockey
- A micrometer screw gauge *(to be shared)

(a) Set up the apparatus as shown below in fig 1.0



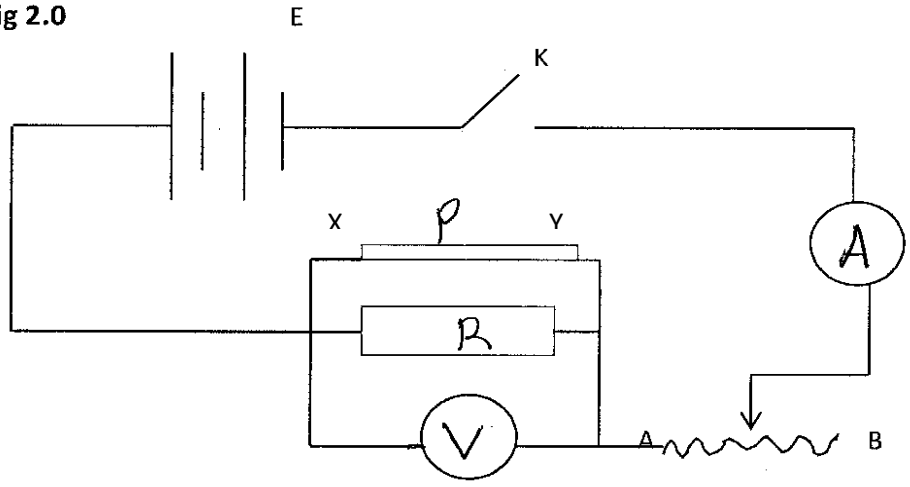
b) Close the switch k and record the ammeter and the corresponding readings

I (A) =.....A (1mk)

Pd (V) =.....V (1mk)

(c)set the apparatus again as shown in fig 2.0 below. With the conductor XY length set at L = 0.2m

fig 2.0



(d) switch on the current and adjust the rheostat ab so that the voltmeter read 0.5v Read the ammeter readings and record in the table below.

Pd (V)	0.1	0.2	0.3	0.4	0.5	0.6
I(A)						

(e)Plot a graph of p.d (V) against I (A) (5mks)

(f) Determine the slope (S)of your graph (2mks)

(g) Given that S = $\frac{10P}{P+10}$ determine the value of P (2mks)

(h) Measure the diameter (d) of the conductor P.

d = ...m (1mk)

(g) Find the cross section area (A) of the conductor P (1mk)

(h) Find the quantity (α) given by

$\alpha = \frac{A \times P}{L}$ (2mks)

Question 2

You are provided with the following:

- Water in a beaker
- Complete retort stand
- Marble
- 100ml measuring cylinder
- Boiling tube
- Cotton thread, 50cm
- Meter rule
- *Beam balance (to be shared)
- Rubber band (one piece)

Proceed as follows

a)i) measure the mass of the marble using the electronic beam balance and record the value as m_0

m_0 =.....g (1/2 mk)

(ii) Now half fill the boiling tube with water and using the meter rule, measure the height, h_1 of the water column.

h_1 = ...cm (1/2mk)

b) i) carefully drop the marble into the water in the tube and measure, h_2, of the water column.

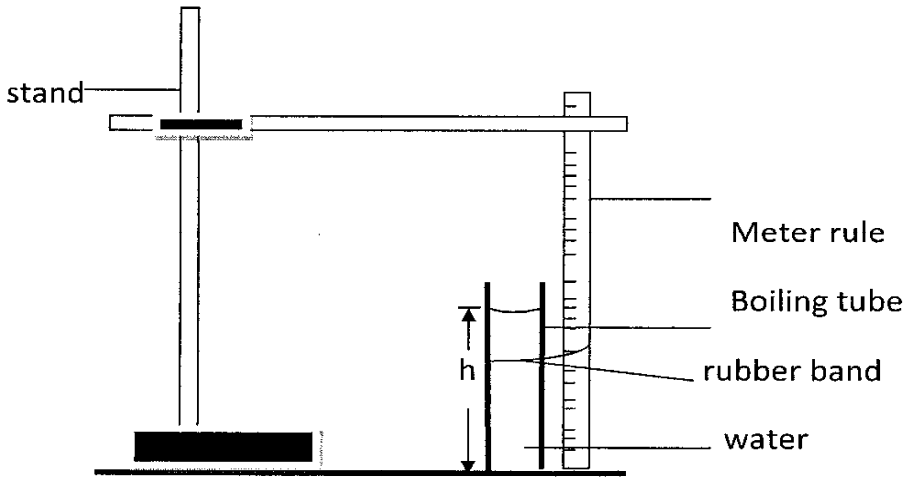
h_2 =.....cm (1/2mk)

(ii) Record the mass m, of the boiling tube.

m = ...g (1/2mk)

c) Fill a measuring cylinder with water up to 100ml mark: clamp the boiling tube vertically with its base resting on a flat surface as shown in figure 2.0

figure 2.0



The meter rule should be clamped beside the boiling tube.

d) Pour 10ml (cm^3) of the water from the measuring cylinder into the boiling tube. Measure the height h, of the water column and record in the table below.

Keep adding water in small amounts of $10cm^3$ into the boiling tube until you obtain six sets of reading as given in the table below to complete the table:

TABLE 2.0

V (cm^3)	Height (h)(cm)
10	
20	
35	
45	
50	
65	

e) On the grid provided, plot a graph of volume V(cm^3) of water (y-axis) against height h (cm) of the water column. (5 marks)

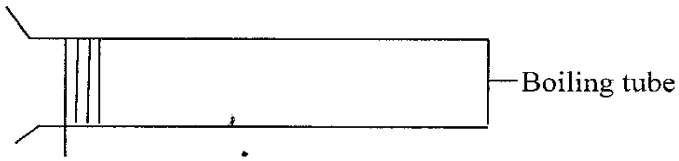
f) From the graph determine the slope s (3mks)

g) Measure the length (H) of the boiling tube,

H=.....cm (1mk)

h) Wind the cotton thread ten times round the boiling tube, pushing the windings very close together, the turns should touch one another but not overlap as shown in figure 3.0.

figure 3.0.



Unwind the thread and measure the length, L, of the thread

L =.....cm (1mk)

I)i) calculate the volume v, of the glass material which the boiling tube is made of.

Given that $v = H\left[\frac{2L^2}{2500} - s\right]$

(ii) Calculate the density, ū, of the glass material of the boiling tube (1mk)

(iii) using the graph determine the volume of the marble (V_0)

$V_0 = s(h_2 - h_1)$ (2mks)

(iv) Hence calculate the density d_0, of the marble (1mk)

Marking guide

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QUESTION 1

(b) I (A) = 0.20A +/ - 0.02 ..... (1mk)
Pd (V) = 2.00V +/ - 0.02.....(1mk)

(d)

Pd (V)	0.1	0.2	0.3	0.4	0.5	0.6
I(A)+/- 0.02	0.14	0.18	0.24	0.29	0.33	0.38

(e) Axes and Units....1mk
Scale.....1mk
Plotting.....2,mk
Line with +ve slope,passing thro at least 4 points...1

(f)
Interval..1mk
Correct eva 1mk... s= **2.0 Ohms**

(g) $s = \frac{10P}{P+10}$ p = **2.5 Ohms** (2mks)

(h) d = ...**0.25 mm** +/- 0.02mm .....m (1mk)

(i) $A = \pi r^2$
$= 4.911 \times 10^{-8}\ m^2$ .....(1mk)

(j) $\alpha = \frac{4.911 \times 10^{-8}\ m^2}{0.2} \times 2.5$

$= \mathbf{6.138 \times 10^{-7}\ \Omega m.}$ 2mks

QUESTION 2

a)i) m_0 = 5.0 ($\pm$ 0.2)g

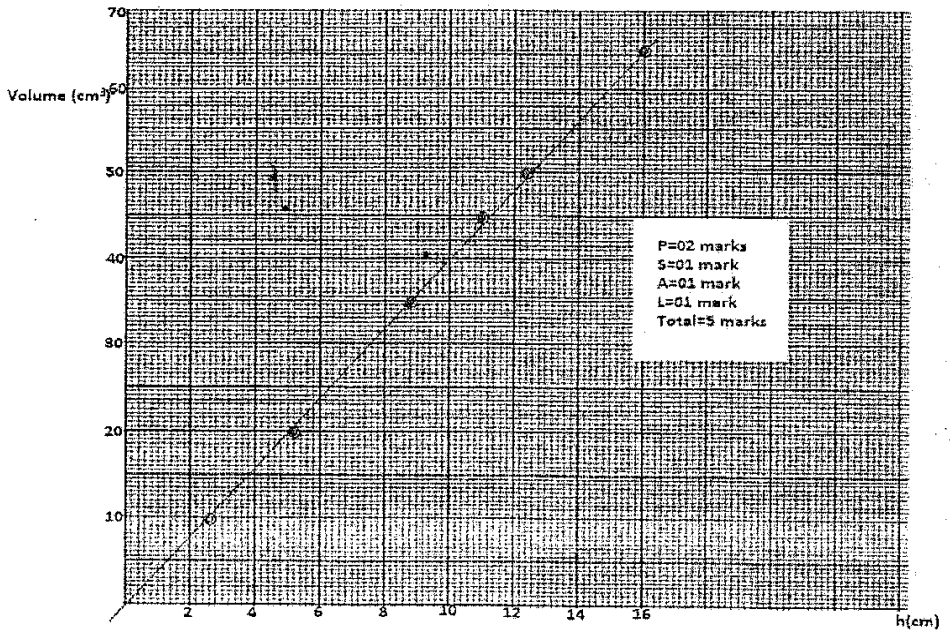
a)ii) h_1 = 7.5cm ($\pm$0.5)cm

b(i) h_2 = value of h_1+ 0.5 ($\pm$0.1)cm

b(ii) Mass of the boiling tube, m = 29.5 ($\pm$ 0.5)

V (cm^3)	Height (h)($\pm$ 0.2) cm
10	2.8
20	5.2
35	8.8
45	11.2
50	12.4
65	16.0

At least 1 decimal place Max=3mks



Accuracy = 4.17 ($\pm$ 0.1) (1mk)

g) H= 15.0 ($\pm$0.1) cm

h)L = 78.5cm($\pm$ 0.2)cm (1mk)

I)i) V=correct evaluation (1mk)

(ii)P=m/v (1mk)

(iii)$V_0 = s\ (h_2 - h_1)$

correct evaluation (1mk)

accuracy v_0 = 1.95 ($\pm$ 0.1) cm^3 (1mk)

(iv) $d_0 = M_0/V_0$ (award for the correct substitution of the values and final computation) (1mk)