

KENYENYA DISTRICT JOINT EVALUATION TESTS (KDJET)

Kenya Certificate of Secondary Education

232/3

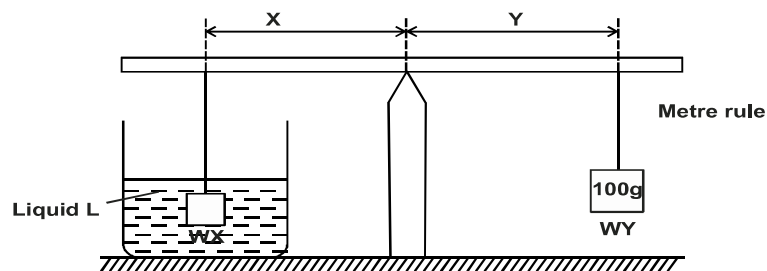
PHYSICS**Paper 3****July/August 2015**

I. You are provided with

- Liquid L in a 500ml beaker.
- Two identical cylindrical 100g masses (2with hooks)
- Two pieces of thread (about 15cm long)
- A metre rule
- A knife edge
- A vernier callipers.

Procedure

- a) Determine the volume of one of the masses using the apparatus provided, its diameter ___ cm
 Height cm
 Volume =m³ (4 marks)
- b) i) Determine the centre of Gravity, 'G' of the metre rule and record it G = cm (1 mark)
- ii) I. Arrange the apparatus as shown in the diagram I, such that X = 5cm from the pivot with the 100g mass completely immersed in liquid L hang the other 100g mass from the metre rule and adjust its position until the system is in equilibrium as shown in the diagram below.



Repeat the procedure above for the following values of X and fill the table.

NB: During each experiment ensure that the position of the pivot does not change.

X (cm)	5	10	15	20	25	30
Y (cm)						

II. Plot a graph of Y against X. (5 marks)

III. Determine the slope, S, of the graph. (2 marks)

IV. The slope S is given by the equation.

$$S = \frac{W_X}{W_Y}$$

Where W_X is the apparent weight of the mass in a liquid L, and W_Y is the actual weight. Calculate the value of W_X and the upthrust, U. W_X N (1 mark)

U N (1 mark)

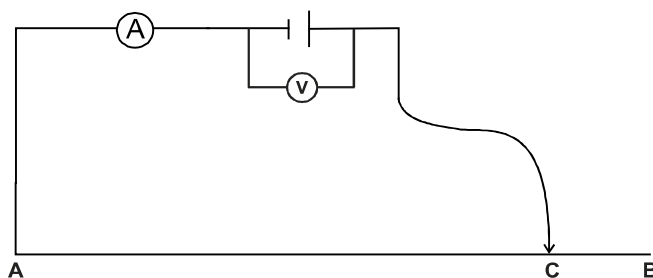
V. If mass of the liquid = $\frac{U}{g}$. hence determine the density ρ of the liquid L. (3 marks)**Question TWO**Part A

You are provided with the following

- One cell and a cell holder.
- One ammeter (0 → 1A)
- One voltmeter (0 → 3.0V)
- 9 connecting wires
- Four crocodile clips
- One metre long nichrome wire mounted on a scale.

Procedure

- a) i) Connect the apparatus as shown in the circuit diagram.



AB is the nichrome wire mounted on 100cm scale.

NB: leave the crocodile clip next to the cell unconnected. This clip should be disconnected when no readings are being taken.

- ii) Adjust the length AC of the wire to 80cm using the crocodile clip at C.
 iii) Connect the crocodile clip next to the cell and record the voltmeter and ammeter reading.
 iv) Repeat the procedure for other lengths AC as shown on the table of value below.

Length AC (cm)	80	70	60	50	40	30
p.d (V)						
Current (A)						

- b) i) Using the grid provided plot graph of p.d. across the cell against the current. (5 marks)
 ii) I. Calculate the slope of the graph. (3 marks)
 II. What is the significance of the slope in I above. (1 mark)
 iii) I. Determine the intercept of the graph on p.d. axis. (1 mark)
 II. What is the significance of intercept value in(iii)(I) above. (1 mark)

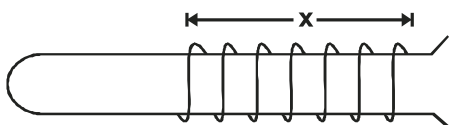
Part B

You are provided with the following

- Copper wire of length 30cm
- Test-tube of diameter 1.5cm (ordinary)
- Metre - rule

Procedure

By using the wire provided make 20 closely packed turns around the said ordinary test-tube as shown.



- a) Measure the length X = cm (1 mark)
 b) Use the result 'X' to determine the thickness (d) of the wire. (1 mark)
 c) Given that the volume of the wire $V = \frac{1}{4}\pi d^2 L$, determine the volume (V) of the wire if L = 50cm. (3 marks)

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1. a)

$$\begin{aligned}
 V &= \pi r^2 h \\
 &= 3.142 \times \left(\frac{2.5}{2}\right)^2 \times 2.3 \\
 &= 11.29 \text{ cm}^3 \\
 &= 1.129 \times 10^{-5} \text{ m}^3
 \end{aligned}$$

b) i) G = 50.0 ± 0.5 cm

ii)

I.

X(cm)	5.0	10.0	15.0	20.0	25.0	30.0
Y(cm)	4.0 ✓	9.0 ✓	13.1 ✓	17.5 ✓	22.5 ✓	26.5 ✓

Each ✓½ mark allow ± 0.1

II. Refer graph.

$$\begin{aligned}
 \text{III. } S &= \frac{\Delta y}{\Delta x} \\
 &= \frac{26.5 - 13.1}{30.0 - 15.0} \\
 &= \frac{13.4}{15} \\
 &= 0.89
 \end{aligned}$$

$$\begin{aligned}
 \text{IV. } W_x &= SW_x \\
 &= 0.89 \times 1 \\
 &= 0.89 \text{ N} \\
 U &= W_y - W_x \\
 &= 1.0 - 0.89 \\
 &= 0.11 \text{ N}
 \end{aligned}$$

Upthrust (U) = weight of liquid displaced
 Mass of liquid

$$\begin{aligned}
 L &= \frac{U}{g} = \frac{0.11}{10} \\
 &= 0.011 \text{ kg} \\
 e &= \frac{m}{v} = \frac{0.011}{1.129 \times 10^{-5}} \\
 &= \frac{1.1 \times 10^{-2}}{1.129 \times 10^{-5}} \\
 &= 9.74 \times 10^2 \text{ kg m}^{-3}
 \end{aligned}$$

Question 2**PART A**

Length AC (cm)	80	70	60	50	40	30
P.d. (V)	2.7	2.65	2.6	2.55	2.5	2.45
Current (A)	0.1	0.125	0.155	0.175	0.2	0.25

NB: Each correct value of v and A award $\frac{1}{2}$ mark

b) i) Graph of p.d. (v) against current (A) - refer the graph.

ii) I. Slope

$$= \frac{\Delta V}{\Delta I}$$

$$= \frac{2.4 - 2.8}{(0.08 - 0.24)} = \frac{0.4}{0.16}$$

$$= -2.5\Omega$$

II. Slope is the internal resistance of the cell.

iii) I. Intercept = 3.0 ± 0.2

II. Intercept is the emf of the cell.

PART B

a) $x = 1.6\text{cm}$

b) Thickness = $\frac{1.6}{20}$
 $= 0.08\text{cm}$

c) $v = \frac{1}{4} \times 3.142 \times (0.08)^2 \times 50$
 $= 0.25136\text{cm}^3$