THE ELITES JET

232/3 PHYSICS (Practical) Paper 3

PRE-MOCK

March 2025 – Time: 2 ½ hours

Name ……………………………………………… Adm No.………………………… Class………………

School……………………………………………… Date………………………,,……Sign………………

Instructions to candidates

- **a)** Write your name and admission number in the spaces provided above.
- **b)** Write your class, the date of examination and sign in the spaces provided above.
- **c)** Answer **all** the questions in spaces provided in the question paper.
- **d)** You are supposed to spend the first 15 minutes of 2½ hours allowed for this paper reading the whole paper carefully before commencing the work.
- **e)** Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use.
- **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.
- **h)** **This paper consists of 11 printed pages.**
- **i)** **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- **j)** **Candidates should answer the questions in English.**

For Examiner's Use Only

Question 1	b	d	e	f	g	I	j	k	l
Maximum Score	1	2	5	2	2	2	1	3	2
Candidate's Score									

Question 2	a	b	e	f	g	j	k	l	n
Maximum Score	2	2	3	2	2	2	1	4	2
Candidate's Score									

QUESTION 1

You are provided with the following:

- A voltmeter
- A capacitor
- A switch
- A stop watch
- Five connecting wires
- Two cells and a cell holder

Proceed as follows:

PART A

(a) Connect the circuit as shown in **Figure 1**.

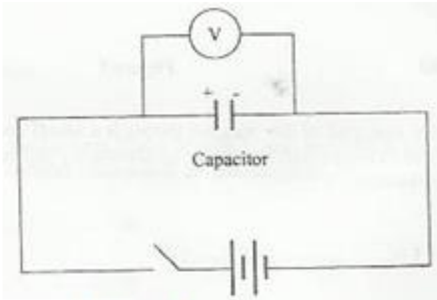

Figure 1

Make sure that the terminals of the capacitor and those of the battery are correctly connected, (*positive to positive and negative to negative)*.

(b) Close the switch, read and record the maximum voltage V_o, across the capacitor.

V_o =..............................volts (1 mark)

(c) While the voltmeter shows the maximum voltage V_o, open the switch and start the stop watch simultaneously. Stop the stopwatch when the voltage has dropped from V_o to 2.5 V. Read and record in **Table 1** the time taken. (2 marks)

(d) Reset the stopwatch and close the switch. Repeat the procedure in (c) to measure and record the time taken for the voltage to drop from V_o, to each of the other values shown in **Table 1**.

Table 1

Voltage (v)	**2.5**	**2.25**	**2.0**	**1.75**	**1.50**	**1.25**
Time , t (s)						

(e) On the grid provided, plot a graph of voltage V (y axis) against time t (5 marks)

(f) **(I)** Use the graph to determine the time t at which V = $\frac{V_0}{2}$ (1 mark)

T = …………. seconds

(II) Determine the resistance R of the voltmeter given that T = 0.693CR where C is the capacitance of the capacitor. (1 mark)

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You are provided with the following:

- A triangular glass prism
- A metre rule
- A 50 g mass
- some hot water
- some cold water
- Some thread
- A thermometer
- One stand, one boss and one clamp
- A beaker

PART B

Proceed as follows:

(g) Using a piece of thread suspend the metre rule from the clamp on the stand and adjust the position of the thread until the metre rule balances horizontally. Note this position, O of the thread. ***(This position of the thread must be maintained throughout the experiment)***

(h) Using another piece of thread suspend the glass prism from the meter rule at a point 35 cm from O. Suspend the 50 g mass on the opposite side of O using another piece of thread. Adjust the position of the thread attached to the 50 g mass until the metre rule balances once more. **See Figure 2**.

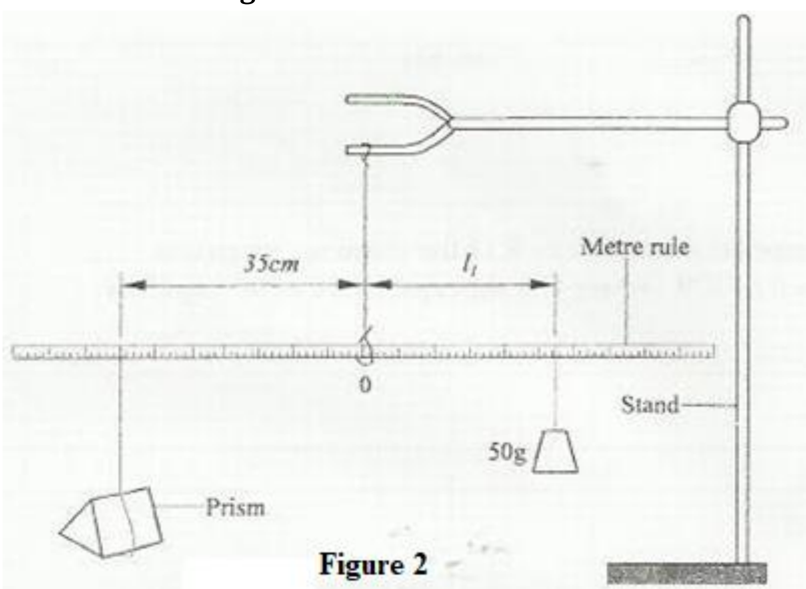

Figure 2

I. Determine the distance l_l between O and the point of support of the 50g mass. (1 mark)

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II Use the principle of moments to determine the weight W_1 of the prism in air. *(Take $g = 10N\ kg^{-1}$)* (1 mark)

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(i) Put cold water into the beaker (approximately three quarter (¾) full. With the glass prism at 35 cm from O, determine the distance l_2 of the 50g mass at which the rule balances when the prism is fully submerged in the cold water. (See **Figure 3**).

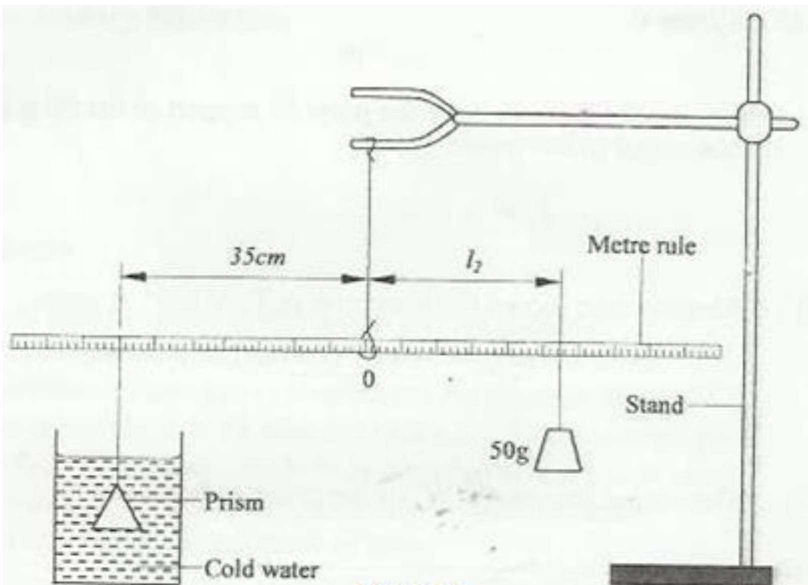

Figure 3

I l_2 = ……………………………….. (1 mark)

II. Determine the weight W_2 of the prism in the cold water**.** (1 mark)

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(j) Measure and record the temperature T_1 of the cold water system is balanced.

T_1 = …………………… (1 mark)

(k) Now pour out the cold water and replace it with hot water. Balance the metre rule with the prism fully submerged in hot water. ***Ensure that the prism is still supported at 35cm from O.***

(i) Determine the distance l_3 of the point of support of the 50g mass when the prism is submerged in hot water.

l_3 = ………………………… (1 mark)

(ii) Measure and record the temperature T_2 of the hot water.

T_2 = ……………… (1 mark)

(iii) Determine the weight W_3 of the prism in hot water. (1 mark)

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(l) Determine the constant K for the water given that:

$$\mathbf{K} = \frac{(W_1 - W_2)(W_1 - W_3)}{(W_1 - W_3)\ (T_2 - T_1)}$$ (2 marks)

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QUESTION 2

You are provided with the following:

- A 100 ml beaker
- A 600 ml beaker
- 2 thermometers range -10^0C to 110^0C;
- A measuring cylinder; (to be shared)
- Some plasticine;
- Vernier callipers: (to be shared)
- A meter rule or half meter rule
- Some boiling water;
- Some cold water;(at room temperature)
- A stopwatch
- Astirrer.

PART A

Proceed as follows:

(a) Using the vernier callipers, measure the internal diameter d_1 and the external diameter d_2 of the 100 ml beaker.

d_1.. cm (1 mark)

d_2..cm

Determine the thickness X of the glass wall of the beaker, given that $X = d_2 - d_1$

X = ... cm (1 mark)

(b) Using the measuring cylinder provided, pour 75 ml of cold into the small beaker. Measure the height h, of the water in the small beaker

h = ... (1 mark)

Determine the area A of the glass walls in contact with water, given that $A = \pi d_1 h$

A =............................... cm^2 (1 mark)

(c) Use the plasticine provided to make a circular disc of about the same area as the bottom surface of the smaller beaker and about 1 cm thick. Place this disc at the bottom of the large beaker and place the small beaker on it. Now pour boiling water into the large beaker until the levels of the water in the two beakers are same. See **Figure 4**.

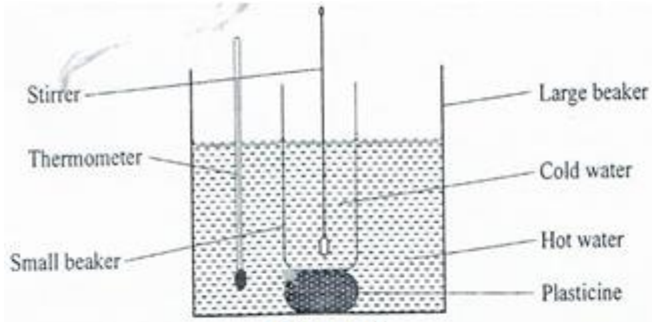

Figure 4

(d) Place a thermometer in the hot water and stir gently until the temperature drops to 75^0. Now start the stopwatch and measure the temperature T_1 of the hot water at intervals of 20 seconds. Record the values in **Table 2**.
(***Stir the water in the two beakers before taking the readings***)
Pour out the contents of the two beakers.

(e) Measure another 75 ml of cold water and put it into the small beaker. Place the small beaker inside the large beaker on the plasticine disc as before. Again pour boiling water into the large beaker until the levels of the water in the two beakers are the same. Place one thermometer in the cold water and the other in hot water. Stir gently until the temperature of the hot water drops to 75^0C. Start the top watch and immediately read and record in **Table 2** the temperature T_2 of the cold water (***You may now remove the thermometer in the hot water***).

Read other values of T_2 at intervals of 20s and record in **Table 2**.

Table 2

Time t (seconds)	0	20	40
Temperature T_1 (^{0}C)			
Temperature T_2 (^{0}C)			

(3 marks)

(f) Determine the average T_2 and t (2 marks)

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(g) **(i)** Determine the ratio of average value of T_2 to average value of t, S.

(1 mark)

S =

(ii) Determine the constant k, given that k $=\frac{315\ SX}{A\ (T_1 - T_2)}$ where T_1 and T_2 are the temperatures of the hot and cold water at t = 60s, and X and A are in m and m^2 respectively. (1 mark)

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PART B

You are provided with the following:

- A lens and a lens holder
- A screen with cross wires
- A candle
- A metre rule
- A white screen
- A 100ml glass beaker with some water

Proceed as follows:

(h) Place the 100 ml beaker on a meter rule and pour 80cm^3 of water into it. Arrange a candle (source of light) and a screen on either side of the beaker (**see Figure 5)**

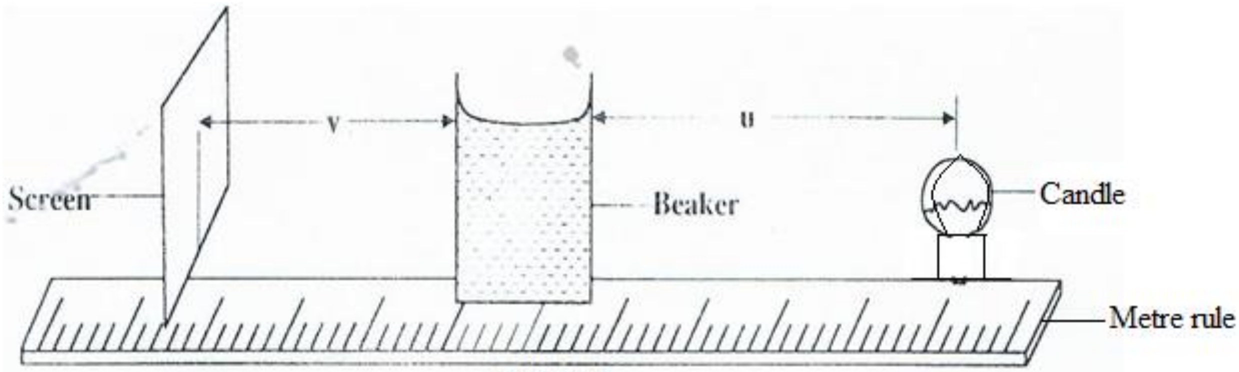

Figure 5

(i) Adjust the position of the candle on the metre rule so that its centre is a distance u =20 cm from the beaker. Adjust the position of the screen until a well-focused image of the flame is formed on the screen. Measure and record in **Table 3** the image distance V between the screen and the beaker.

(j) Repeat part **(i)** for other values of u shown in **Table 3** and complete the table. (2 marks)

Table 3

Distance u (cm)	20	25
Distance V (cm)		
$y = \frac{uv}{u+v}$		

(k) Determine **m,** the mean value of y using the values in **Table 3**.

m =.. (1 mark)

(l) **(i)** With the metre rule outside the beaker, measure the height h of the water meniscus above the bench.

h = ... (1 mark)

(ii) Determine the value of P given that $P = \frac{5}{\sqrt{h}}$ (2 marks)

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(iii) Hence determine the value of f given that $f = \frac{P}{2m} + 1$ to one decimal place. (1 mark)

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(m) Arrange the lit candle, the lens and the screen as shown in **Figure 6**. Adjust the position of the screen until a sharp inverted image of the candle flame is formed on the screen.

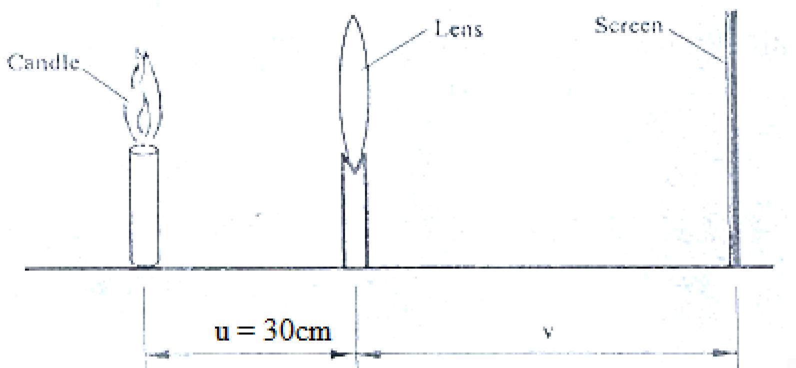

Figure 6

(i) Measure the image distance v

v =.. 1 mark)

(ii) Determine the focal length of the lens using the formula (1 mark)

$$f = \frac{uv}{u+v}$$

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