THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION, 1989

031/2

PHYSICS PAPER 2 - PRACTICAL
(For School and Private Candidates)

TIME: 2¼ Hours.

INSTRUCTIONS

1. Answer any TWO (2) questions.
2. Use the first fifteen (15) minutes to read the paper and select the questions you wish to answer.
3. You are expected to present a clear record of the observations and the precautions taken. Unless otherwise indicated, the theory of the experiment is not required.
4. All calculations must be clearly presented showing the steps in your workings and the answers at each stage.
5. Mathematical tables and graph papers may be provided.
6. Write the number of each question you attempt.
7. Remember to write your Index and Centre Number in the answer book provided.

Whenever necessary assume the following:

$g = 10\ ms^{-2}$

$\pi = 22/7$

Density of water = $1000\ kg/m^3$

Specific heat capacity of water = 4200 J/kgK

1. You are provided with a tall beaker containing water and a test-tube fitted with a millimetre scale extending over its entire length.

Put sufficient lead shots into the test-tube and then put it into the tall beaker containing water. Add a few more lead shots into the test-tube until it just floats vertically.

Keep the floating test-tube away from the side of the beaker, then, using the millimetre scale fitted into the test-tube, measure and record the height of the test-tube that is submerged in water. Label this height as h_0.

Then drop four (4) of the clips provided into the test-tube, measure and record the new height of the test-tube that is submerged in water and label this new height as h_4.

Repeat this procedure of dropping clips to obtain five more new heights by, each time, adding four (4) more clips to make 8, 12, 16, 20 and 24 clips respectively. Label these new heights as h_8, h_{12}, h_{16}, h_{20} and h_{24} respectively.

Record your results in a tabular form as indicated below:

NUMBER OF CLIPS C	h_x	h_y
0	h_0 =	$h_0 - 0$ =
4	h_4 =	$h_4 - h_0$ =
8	h_8 =	$h_8 - h_0$ =
12	h_{12} =	$h_{12} - h_0$ =
16	h_{16} =	$h_{16} - h_0$ =
20	h_{20} =	$h_{20} - h_0$ =
24	h_{24} =	$h_{24} - h_0$ =

(a) Plot a graph of C against h_y (first column against third column).

(b) Determine the slope, S, of your graph.

(c) Measure and record the external diameter, D, of the test-tube used in your experiment.

(d) Find the value of $\frac{4Sm}{D^2}$ where m is the average mass in grammes of a clip.

2. In this experiment you are required to determine the thermal capacity of liquid W. Two large containers, each nearly full of the same liquid W, are provided. The container labelled K contains liquid W at room temperature and the container labelled P contains hot (heated) liquid W. The third container, also provided and labelled L, contains cold water.

PROCEDURE:

(a) (i) Using the measuring cylinder provided, take 200 cc. of liquid W from the container labelled K, pour it into an empty beaker provided and measure its temperature.

(ii) Take 250cc. of the cold water provided in the container labelled L and measure its temperature.

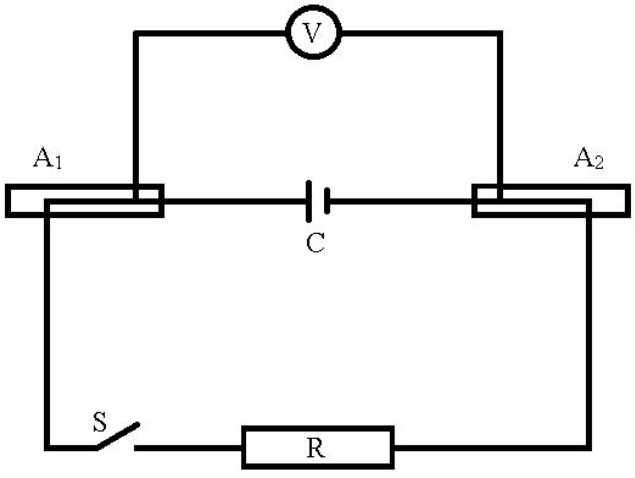
(iii) Then pour the cold water (in (ii)) into the beaker that already contains 200cc of liquid W (in (i)).

(iv) Using the wooden stirrer provided, stir up the mixture (in (iii)) thoroughly and then quickly measure and record the temperature of the mixture.

(b) Repeat the procedure given above (in (a) (i) - (iv)) BUT this time take 200cc of liquid W from the container labelled P instead of the container labelled K.

Using your results obtained from procedures (a) (i) - (iv) and (b) above, determine the thermal capacity of 200 cc of liquid W.

3. You are provided with dry cells, C, a resistance box, R, a Voltmetre, V, a switch, S and two terminal blocks A_1 and A_2 arranged as shown in the circuit diagram below.



PROCEDURE:

(i) Using a resistance of R = 1Ω in the resistance box, close the switch and record the reading, V, as indicated by the Voltmetre.

3. Contd…..

(ii) Repeat the procedure above (in (i)) for the values of R = 2Ω, 4Ω, 5Ω and 10Ω.

(iii) Record your readings in a tabular form as indicated below.

R = Ω	V	$\frac{1}{V}$	$\frac{1}{R}$
1			
2			
4			
5			
10			

(a) Plot a graph of $\frac{1}{V}$ against $\frac{1}{R}$

(b) From your graph

(i) Find the gradient, G, of your graph

(ii) Read and record, N, which is the value of $\frac{1}{V}$ when $\frac{1}{R} = 0$, then calculate $\frac{1}{N}$.

(iii) Read and record, M, which is the value of $\frac{1}{R}$ when $\frac{1}{V} = 0$, then calculate $\frac{1}{M}$.

(c) Show how $\frac{N}{M}$ is related to G

(d) What is the magnitude of the current supplied by the dry cells (C)?