THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION

EXAMINATION

131/3C **PHYSICS 3C**

(ACTUAL PRACTICAL C)

(For Both School and Private candidates)

Time: 3:20 Hours **Year: 2023**

Instructions

1. This paper consists of **three (3)** questions**.**
2. Answer **all** questions.
3. Question **one (1)** carries **20** marks, and the other **two (2),** carry **15** marks each.
4. Mathematical tables and non-programmable calculators may be used.
5. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil
6. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet (s).

   The folowing information may be useful:

   Specific heat capacity of Water $C_w = 4.2J/gK$

   Pie, $\pi = 3.14$.

1. You are provided with a half metre rule, metre rule, two retort stands and two pieces of threads.

   Proceed as follows:

   (a) Set up the apparatus as shown in the following figure 1 with the length of threads L= 60cm. The flat side of the ruler with a scale must be horizontal.

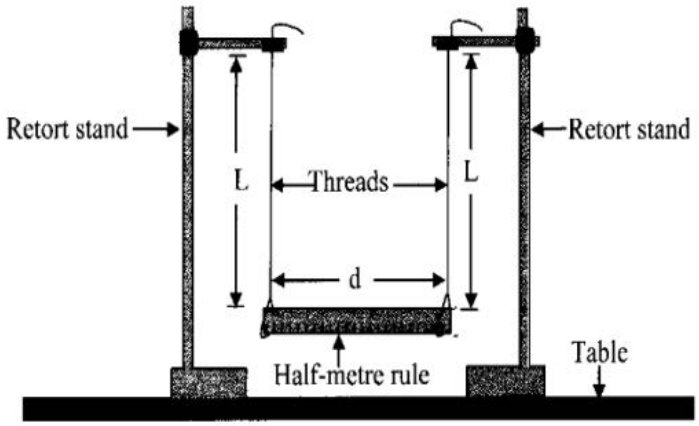

Figure 1

   (b) Set the threads very near to the ends; such that, distance d is 50 cm. Displace the ends of the ruler through a small angle along the horizontal plane so that it swings. Determine the time, t for 20 complete oscillations and the corresponding periodic time, T. Also to record the distance d between the threads.

   (c) Without removing the retort stands, adjust the threads 5cm from each end to make the distance d = 40cm, then repeat the procedure in 1 (b). Continue moving the threads from each end by 5cm to obtain a total of five readings.

Questions

(i) Tabulate the values of $d(s)$, $t(s)$, $T(s)$ and $\frac{1}{d}(m^{-1})$

(ii) Plot a graph of $T(s)$ against $\frac{1}{d}(m^{-1})$

(iii) Use the graph in 1 (ii) and the equation $d = \frac{0.31\pi}{T}\sqrt{\frac{L^3}{g}} + \text{constant}$, determine the value of acceleration due to gravity, g.

2. You are provided with the following apparatus: Copper calorimeter, kerosene lamp/ bunsen burner, a metal foil, thermometer, hot water, stopwatch, stirrer, lid, a container with 250 ml of hot water of about 85^oC and a wooden base. Proceed as follows:

(a) Carefully blacken the outer surface of the calorimeter using soot from a kerosene lamp/Bunsen Burner and set up the given apparatus as required.

(b) Fill to about $\frac{2}{3}$ of the blackened calorimeter with hot water whose initial temperature is 85^0C.

(c) Stir constantly the hot water in the calorimeter then read and record the temperature t of water at one minute intervals until it has fallen to about 75^0C.

(d) Empty the water in the calorimeter and cover the outer surface of the calorimeter with the metal foil provided and repeat the procedures in 2 (b) to (c).

Questions

(i) Draw the set-up of your experiment.

(ii) Tabulate the results obtained in 2 (c) and (d).

(iii) Plot the cooling curves for both the blackened calorimeter with its contents and the calorimeter covered with the metal foil together with its contents in the same axis.

(iv) From each of the curves plotted in 2 (iii), read the time taken by the hot water to cool from 80^{o}C to 75^{o}C.

(v) Compare the results obtained in 2 (iv). Give a reason for your answer.

3. Determine the e.m.f. and internal resistance of a cell using an ammeter, voltmeter, switch, dry cell, rheostat, masking tape and connecting wires. Follow the following procedures:

(a) Connect the circuit using the given apparatuses. Close the switch and adjust the rheostat so that the cell supplies a current of 0.4A. Read the Voltmeter and record the value of voltage, V.

(b) Repeat the procedures in 3 (a) for the values of current, I equal to 0.6A, 0.8A, 1.2A, and 1.6A. Read and record the value of voltage, V in each case.

Questions

(i) Draw a well labelled diagram of the circuit you connected.

(ii) Record your results in a tabular form.

(iii) Plot a graph of V (volts) against I (amperes).

(iv) Formulate the equation governing this experiment.

(v) Determine the internal resistance, r and the e.m.f, E of the cell.