THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION

EXAMINATION

131/3B **PHYSICS 3B**

(ACTUAL PRACTICAL B)

(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 $C_w = 4.2 J / gK$

Pie, $\pi = 3.14$.

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1. You are required to examine the oscillations of a simple pendulum using the given apparatus by following the procedures:

   (a) Suspend a pendulum bob from the length L equals to 0.90 m and displace it through a small angle so that it swings parallel to the edge of the bench.

   (b) Determine the time, t for 20 oscillations and the corresponding periodic time, T.

   (c) Repeat the procedures in 1 (a) and (b) above for the values of $L = 0.70\ m, 0.50\ m, 0.30\ m,$ and $0.10\ m.$

   Questions

   (i) Record your readings in a table including the values of log L and log T.

   (ii) Plot a graph of $\log_{10} L$ against $\log_{10} L$

   (iii) Use the graph in 1 (ii) to resolve the values of constants n and k from the equation $L^n = KL^{-1}$

2. You are provided with hot water, metal foil, wooden block, thermometer, stopwatch, marker pen, rubber bands, copper calorimeter with its lids, stirrer and kerosene lamp/Bunsen burner. Follow the following procedures to perform an experiment:

   (a) Cover the outer surface of the calorimeter with the meter foil provided and use the rubber bands to hold the metal foil tightly on the calorimeter.

   (b) Use a marker pen; indicate a mark of about two-thirds inside the calorimeter.

   (c) Fill the calorimeter with hot water of about 90^{o}C to the mark indicated in 2 (b).

   (d) Cover the calorimeter with its lid when the stirrer and thermometer are

inserted.

(e) While stirring, start the stopwatch when the temperature of the liquid in the calorimeter is about 80^0C. Read and record the temperature of the liquid after every 2 minutes until it reaches 60^0C.

(f) Empty the calorimeter, remove the metal foil and carefully blacken the outer surface of the calorimeter using the soot from a kerosene lamp/ Bunsen burner provided. Repeat the procedures in 2 (c) up to (e).

Questions

(i) Tabulate your results.

(ii) Using the same axis, plot the cooling curves for the blackened calorimeter with its content and for the calorimeter with metal foil together with its content.

(iii) From each of the curves, read and record the time taken for hot water to cool from 80^0C to 60^oC.

(iv) What is the implication of the results in 2 (iii).

(v) What is the aim of doing this experiment?

3. Determine the e.m.f. of the given dry cell E using ammeter A, resistance box R, switch K, masking tape and pieces of connecting wires. In order to achieve the task, the follow the instructions below:

(a) Carefully set up the circuit as required using the given apparatuses.

(b) Start with R = 2Ω, close the switch and record the current I from the ammeter.

(c) Repeat the procedure in 3 (b) for the values of R = 4 Ω, 6 Ω, 8 Ω and 10 Ω.

Questions

(i) Draw a well labelled circuit diagram of your connections.

(ii) Tabulate the obtained data including the value of $\frac{1}{I}$

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

(iv) Use the graph in 3 (iii), determine the e.m.f. of the dry cell E.