THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCILOF TANZANIA
DIPLOMA IN SECONDARY EDUCATION EXAMINATION

731/2A

PHYSICS 2A
ACTUAL PRACTICAL A

Time: 3: 00 Hours **Friday, 18th May 2018 a.m.**

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question one **carries 20** marks and the rest **carry 15** marks each.
4. Mathematical tables and non-programmable calculators may be used.
5. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

Use the following:

$\pi = 3.14$

1. The aim of this experiment is to determine the acceleration due to gravity (g) at your center.

Proceed as follows:

(i) Set the apparatus as shown in figure 1.

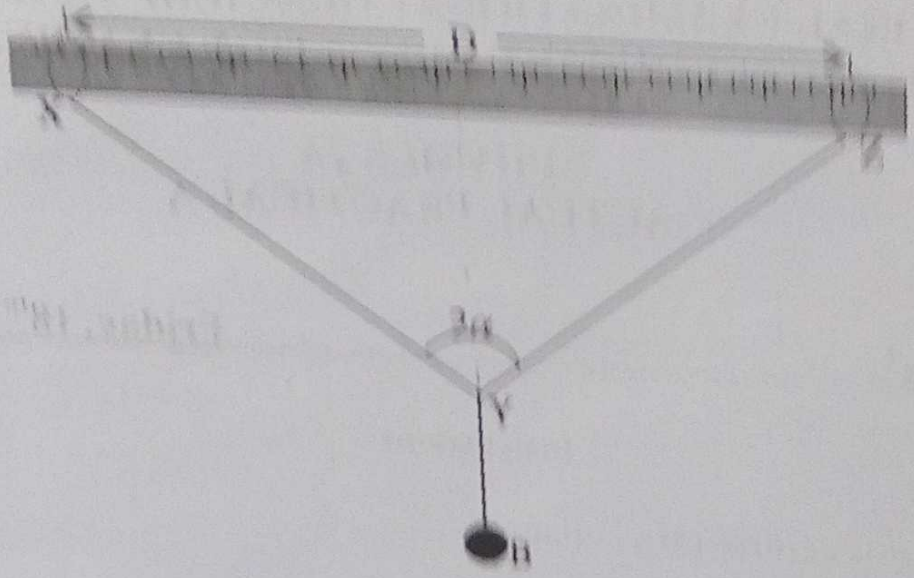

Figure 1

(ii) Clamp the meter rule horizontally with its graduate face vertical towards you.

(iii) Slip the wire loops on the meter rule and position them at 40cm and 60cm marks.

(iv) Tie one end of the given thread to one loop X and the other end to the second wire loop Z, such that each of the lengths XY and YZ are equal to 50cm.

(v) Use the second thread to suspend the simple pendulum YB of length 20cm from the midpoint of the thread XYZ.

(vi) Measure the distance D between the wire loops and the angle $XYZ = 2\alpha$ then determine the time for 20 oscillations and the period T when the pendulum swings in a plane perpendicular to the plane XYZ.

(vii) Repeat the procedures in 1(vi) for the wire loops at 35cm and 65cm, 30cm and 70cm, 25cm and 75cm, 20cm and 80cm and 15cm and 85cm marks. Each time determine and measure D, 2α and T.

Questions

(a) Tabulate your readings comprising the position of the meter rule P, distance D, time for 20 oscillations t, period T, T^2 angle 2α, α, $\tan\alpha$ and $\frac{D}{\tan\alpha}$.

(b) Plot the graph of T^2 against $\frac{D}{\tan\alpha}$.

(c) Find the slope and T^2-intercept.

(d) Given the equation; $T = 2\pi\sqrt{\frac{D + 2YB\tan\alpha}{2g\tan\alpha}}$, determine the acceleration due to gravity, (g).

2. The aim of this experiment is to compare the time in cooling through fixed temperature range for a blackened calorimeter and the same calorimeter covered with metal foil.

Proceed as follows:

(i) Set the apparatus as shown in Figure 2.

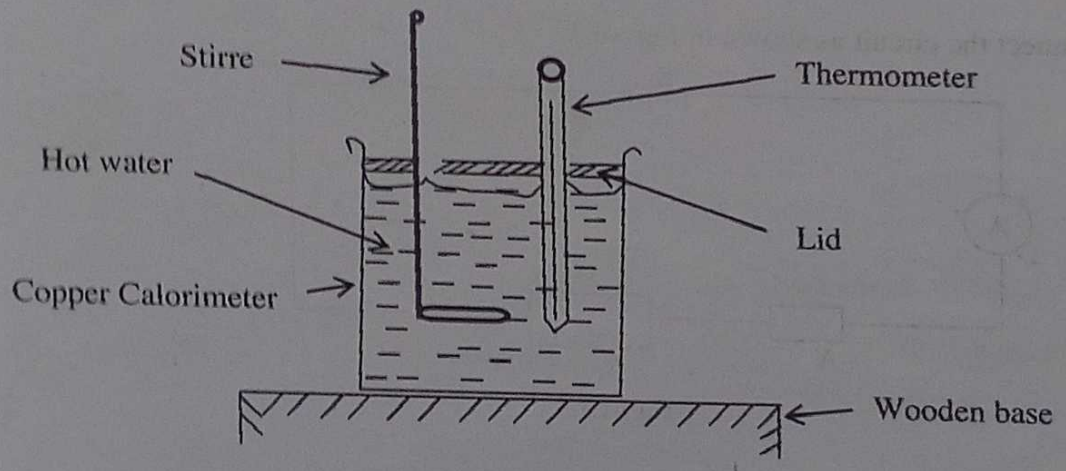

Figure 2

(ii) To about $\frac{2}{3}$ of the blackened calorimeter, fill hot water whose initial temperature is 85^oC.

(iii) Stir the hot water in the calorimeter constantly, read and record the temperature t of water at one minute intervals. Continue reading and recording the temperature until it has fallen to about 75^oC then tabulate the results.

(iv) Empty the water in the calorimeter into the measuring cylinder and record its volume as V_0.

(v) Cover the outer surface of the calorimeter with the metal foil provided and pour this amount V_0 of hot water whose initial temperature is 85^oC into the calorimeter with the metal foil.

(vi) Repeat the procedures in 2(iii).

Questions

(a) Tabulate your result.

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

(c) From each of the curves plotted in 2(b), read the time taken to cool from 80°C to 75°C.

(d) Comment on the results observed in 2(c).

3. The aim of this experiment is to determine the value of unknown resistance of the resistor *N*.

Proceed as follows:

(i) Connect the circuit as shown in Figure 3.

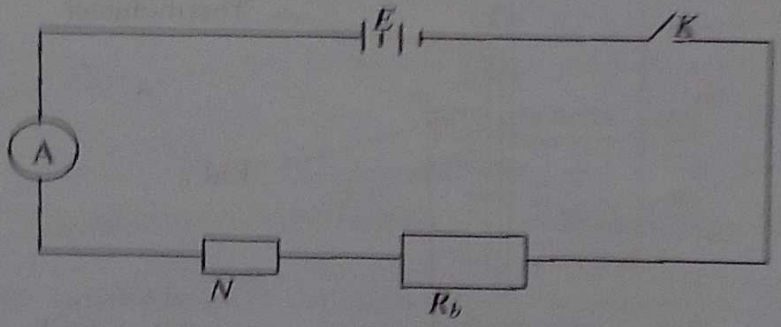

Figure 3

(ii) Set the resistance $R_b = 10\Omega$, close the switch, read and record the value of the current *I* in the ammeter.

(iii) Repeat the procedures in 3(ii) for the values of R_b equal to 8Ω, 6Ω, 4Ω and 2Ω. Each time read and record the value of current *I*.

Questions

(a) Tabulate your results.

(b) Plot the graph of R_b against $\frac{1}{I}$, and find its slope.

(c) From the graph, determine the value of the unknown resistance of a resistor *N*.

(d) State at least three precautions to be taken in carrying out this experiment.