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

131/3C

PHYSICS 3C
ACTUAL PRACTICAL C

(For Both School and Private Candidates)

Time: 3:20 Hours **Wednesday, 18th May 2016 a.m.**

Instructions

1. This paper consists of **three** (3) questions.
2. Answer **all** questions.
3. Question **Number 1** carries 20 marks and the other **two** (**2**), 15 marks each.
4. Calculations should be clearly shown.
5. Mathematical tables and non-programmable calculators may be used.
6. Cellular phones are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet(s).
8. Use the following:

   $\pi = 3.14$

1. The aim of this experiment is to determine Young's modulus from a period of vibration of a loaded metre rule.

Proceed as follows:

(a) Using micrometer screw gauge, measure the width, b and thickness, d of a metre rule.

(b) Clamp firmly the loaded beam to the edge of the bench by G-clamp with l = 80cm projected from it as shown in Figure 1.

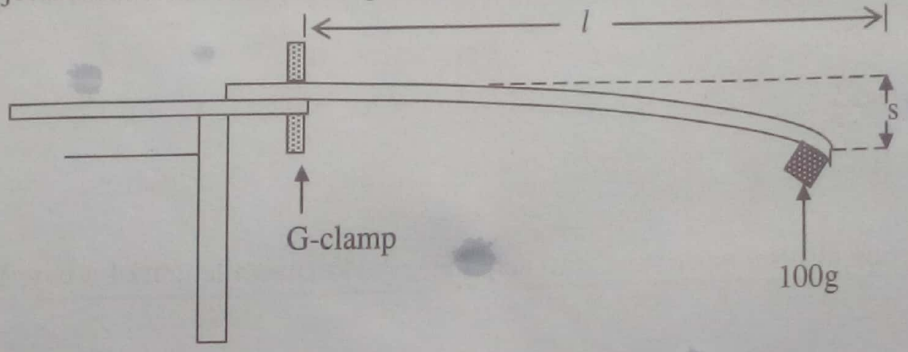

Figure 1

(c) Cause a beam to vibrate and obtain periodic time by timing 10 vibrations.

(d) Repeat the procedure by reducing the length l by 8cm to obtain another four readings.

(e) Record your results in a tabular form including the values of T^2 and l^3. Make sure that the values of l are in metre.

(f) Plot a graph of T^2 against l^3.

(g) From your graph determine;
(i) The value of the slope.
(ii) The young's modulus given that

$$\frac{1}{b}\left(\frac{l}{d}\right)^3 = 0.625\rho\left(\frac{T}{\pi}\right)^2$$ where ρ is the Young's modulus of the material.

2. The aim of this experiment is to determine the loss of heat constant of liquid L.

Proceed as follows:

(a) Using 250mls beaker, heat the liquid L to about 80^0C and then pour it into a calorimeter. Make sure the calorimeter is about $\frac{2}{3}$ full.

(b) Quickly put the calorimeter with liquid L, on a wooden block provided.

(c) While stirring, start a stopwatch/clock and record the temperature of liquid at an interval of two minutes until you reach a temperature of 50^0C.

(d) Record the room temperature, θ_R.

(e) Tabulate your results including the values of θ - θ_R and $\log(\theta-\theta_R)$.

(f) Plot a graph of $\log(\theta-\theta_R)$ against time, t.

(g) Deduce the equation governing this experiment.

(h) Determine the slope of the graph.

(i) What is the physical meaning of the slope?

3. The aim of this experiment is to determine the unknown length of a wire R wound in a piece of wood and the resistivity of a material of wire.

Proceed as follows:

(a) Connect the unknown length of the wire and free wire W to the left terminal and next connect the free wire W with a crocodile clip C to other terminal of the right hand gap as shown in Figure 2.

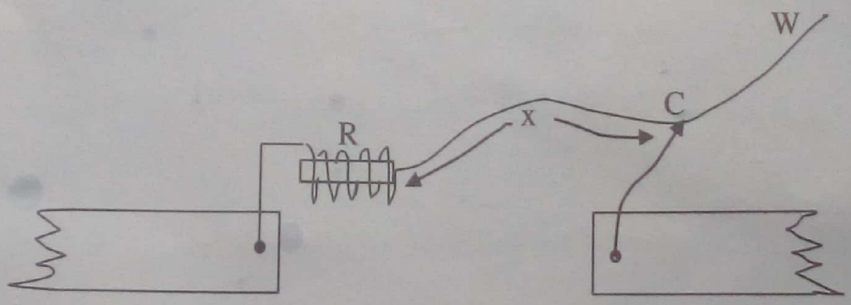

Figure 2

Connect the 2Ω resistor in the left hand gap and hence complete the Wheatstone bridge circuit in the usual way.

(b) Draw the circuit diagram of the set up outlined in 3 (a).

(c) Measure a length x of the wire W equal to 15cm and clip the crocodile clip C at the end of this length. Find the balance length, l as measured from the end with the 2Ω resistor. Calculate the equivalent resistance R_e in the right gap. Increase x by 15cm each time and obtain other four corresponding value of l and R_e. Tabulate your results.

(d) Plot a graph of x against R_e.

(e) From the graph deduce:
(i) The value of unknown length of the wire R wound in a piece of wood.

(ii) The length per unit ohm of the wire.

(f) Measure the diameter of the wire, W; hence find the resistivity of the material of the wire.