

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 $l = 80\text{cm}$ projected from it as shown in Figure 1.

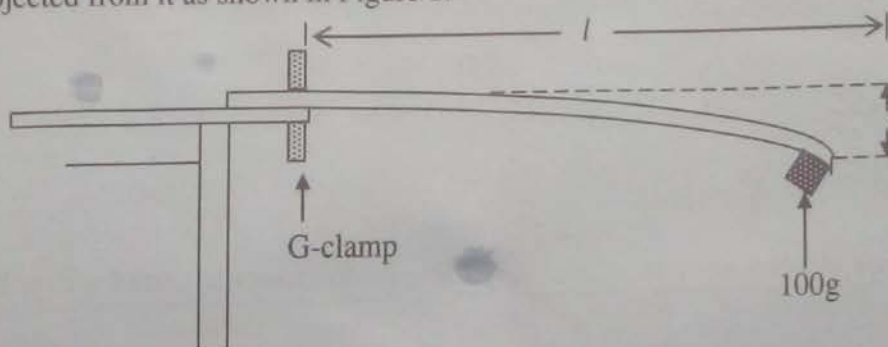


Figure 1

- (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

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

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°C 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°C .
- (d) Record the room temperature, θ_R .
- (e) Tabulate your results including the values of $\theta - \theta_R$ 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.

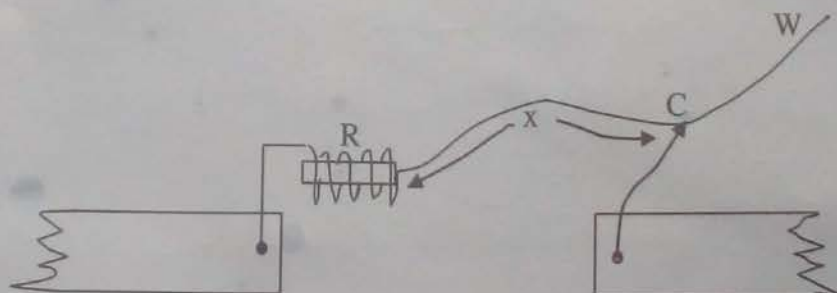


Figure 2

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.