

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

131/3B

**PHYSICS 3B
ACTUAL PRACTICAL B
(For Both School and Private Candidates)**

Time: 3:20 Hours

Friday, 16th May 2014 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 the experiment is to determine the acceleration due to gravity at your school.

Proceed as follows:

- (a) Using a G-clamp fix metres rule horizontally on the bench such that its projection from the fixed point is 80cm.
- (b) By means of the string, suspend the pendulum bob from the hole at the free end of the fixed metre rule.
- (c) Starting with length of thread equals to 80cm, displace the bob through a small angle and release it so that its plane of swing is perpendicular to the rule.
- (d) Record the time t in seconds for 15 complete oscillations. Hence determine the period T .
- (e) Without altering the length of the fixed metre rule, repeat the procedures in part (c) and (d) above for values of the length of thread 70cm, 60cm, 50cm and 40cm.
- (f) Plot a graph of T^2 against pendulum length, l .
- (g) Given that $T = \left(\frac{39.49}{g} l + \alpha \right)^{\frac{1}{2}}$, obtain the values of g and α .
- (h) What is the significance of the constant α in this experiment?

2. You are provided with a calorimeter with its stirrer, thermometer, source of water, stop watch, 250cc of water and a beaker.

Proceed as follows:

- (a) Read and record the room temperature θ_R .
- (b) Heat some water in the beaker until the temperature reaches about 95°C .
- (c) While water is being heated, put the calorimeter with its stirrer on a wooden base.
- (d) When the temperature of water reaches about 95°C , transfer some of it to the calorimeter till the level reaches about one centimetre from the top.
- (e) When the temperature of water in the calorimeter has dropped to about 85°C , start the stopwatch while stirring.
- (f) Record the temperature θ in $^\circ\text{C}$ after every time interval of 2 minutes. Continue doing this for about 18 minutes.
- (g) Plot a graph of $\log_{10}(\theta - \theta_R)$ against time t in minutes.
- (h) Write down the equation of your graph.
- (i) State two possible sources of error in this experiment.

3. The aim of this experiment is to determine the electrical resistivity of wire Y.

Proceed as follows:

- (a) Set up a slide-wire metre bridge such that wire Y is connected across the right hand gap of the bridge, while a parallel combination of standard resistor of 4Ω and resistor box R is across the left hand gap.
- (b) Connect the zero centred galvanometer at its usual terminal whereas its jockey is placed at 50cm mark on the slide-wire. Complete the metre bridge circuit.
- (c) With $R = 30\Omega$, find the length l of wire Y when the galvanometer read zero and the jockey is still at 50cm mark.
- (d) Repeat the procedures in part 3 (c), find the length l of the wire which balances with the left hand combined resistance for values of $R = 20\Omega, 10\Omega, 5\Omega, 2\Omega$ and 1Ω .
- (e) Tabulate your results.
- (f) Sketch the circuit diagram for your experiment.
- (g) Plot a graph of $\frac{1}{R}$ against $\frac{1}{l}$.
- (h) Derive equation of your graph.
- (i) Measure the diameter of wire Y.
- (j) From the graph, determine the resistivity of wire Y.