THE UNITED REPULIC 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, 20th May 2015 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:

   $\pi = 3.14$

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1. The aim of the experiment is to determine the radius of gyration, K of the circular sheet of hard-board provided and acceleration due to gravity, g.

Proceeds as follows:

(a) Set up- the apparatus as shown in Figure 1, where G is the centre of gravity of the hard board. Suspend the hard board from the hole nearest G and record the distance l between the point of suspension and G.

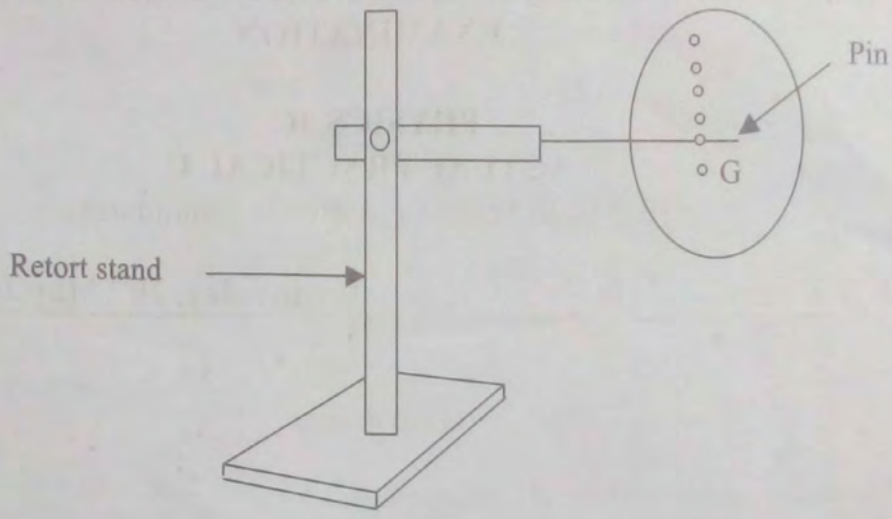

Figure 1

(b) Using the stopwatch or stop clock provided obtain the time, t for 10 complete oscillations of the hard board and hence calculate the periodic time, T.

(c) Repeat the procedure in 1 (b) with four (4) other values of l and obtain the corresponding values of T. Tabulate your results.

(d) Plot a graph of l^2 against $T^2 l$, with both axes starting at the origin.

(e) Given that $T^2 l = \frac{4\pi^2}{g}\left(K^2 + l^2\right)$, determine the;

(i) Radius of gyration, K.

(ii) Acceleration, g due to gravity.

2. In this experiment you are required to compare the time taken for cooling through a fixed temperature range for a blackened calorimeter and the same calorimeter covered with metal foil.

Proceed as follows:

(a) You are provided with a container labelled HOT WATER and blackened calorimeter. Nearly fill the blackened calorimeter with hot water whose initial temperature should be about 80^0C and put this calorimeter on a wooden slab placed on the bench.

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(b) Stir the hot water in the blackened calorimeter constantly and record the temperature θ of the water at one minute interval. Continue recording the temperature θ until it has fallen to about 60^0C.

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

(d) Cover the outer surface of the calorimeter (not blackened) with a metal foil provided by using rubber bands. Use the same volume V_0, of hot water at about 80^0C as in 2 (c) to fill the calorimeter covered with the metal foil. Then repeat the procedures outlined in 2 (b).

(e) Using the same axes, draw the cooling carves for the blackened calorimeter with its contents and calorimeter with metal foil together with its contents.

(f) From each carve, estimate the time taken to cool from 80^0C to 60^0C. Comment on your results.

3. The aim of this experiment is to determine the e.m.f of the given cell.

(a) Carefully set up the circuit illustrated in Figure 2 where R = 5Ω; E is a series connection of any two dry cell and K is a key. Make sure that the connections are tight enough.

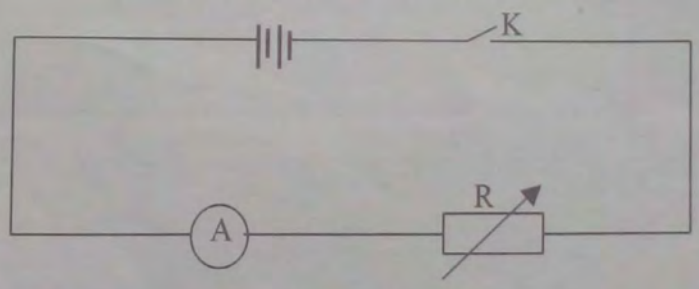

Figure 2

(b) With the key closed, note and record the reading I of the ammeter.

(c) Repeat the procedure in 3 (b) for the values of R equal to 10Ω, 15Ω, 20Ω, 25Ω and 30Ω. Record your results as shown in Table 1

Table 1

R(Ω)	5	10	15	20	25	30
I(A)						
$\frac{1}{I}$ (A^{-1})						

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(d) Plot a graph of R against $\frac{1}{I}$ and determine:

(i) Slope.

(ii) E.m.f.

(iii) The value of R for which $\frac{1}{I}$ equals to zero and state what the value represents.

(e) State any two sources of error.

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