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

131/3A

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

Time: 3:20 Hours **Monday, 11th 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:

   Specific heat capacity of water, $C_w = 4200 JKg^{-1}K^{-1}$

   Specific heat capacity of copper, $C_c = 390 JKg^{-1}K^{-1}$

1. You are provided with standard masses, unknown mass labelled X, a retort stand with its accessories and two cardboard discs each with three small holes spaced at rectangular intervals near the edge. Disc A has pieces of string threaded through the holes as well as disc B.

Proceed as follows:

(a) Clamp disc B horizontally using two small blocks of wood. Suspend disc A vertically below disc B by using string below the holes as shown in Figure 1. Place a 50g at the centre of disc A and adjust the length strings until l = 100cm.

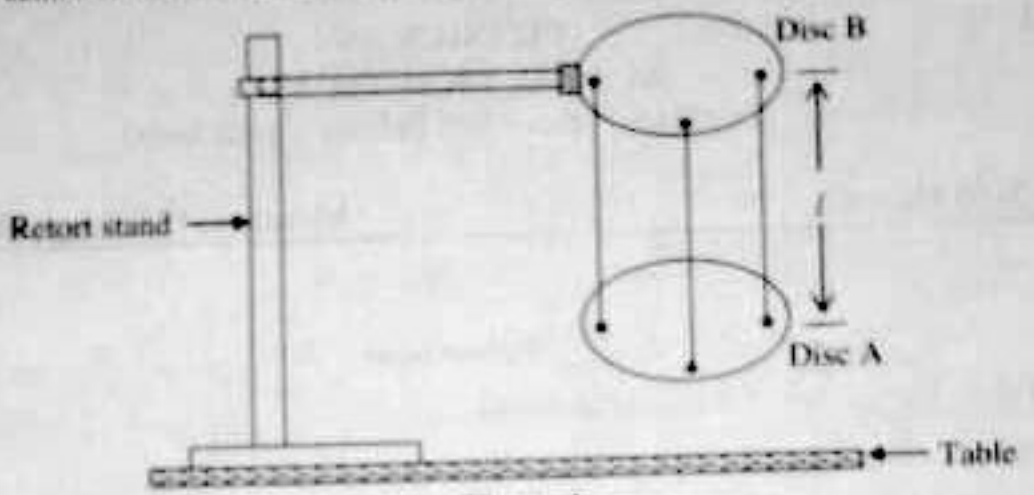

Figure 1

(b) Gently rotate disc A through a small angular displacement and release it so that the disc performs torsional oscillations in horizontal plane as shown in Figure 2. Make and record measurement to determine the period, T for 10 oscillations.

Figure 2

(c) Repeat the procedures in 1 (b) for different values of M = 100g, 150g, 200g, 250g and 300g. Replace the masses by unknown mass, M labelled X and perform further measurements.

(d) Tabulate your results including the values of logT and logM.

(e) Plot a graph of logT against logM.

(f) M and T are related approximately by a simple power law of the form: $T = kM^n$. Use your graph to calculate the numerical values of k and n.

(g) Using the results of your experiment, determine the unknown mass, M of X.

2. The aim of this experiment is to determine the boiling point of the rate of cooling of liqui at 65^0C.

Proceed as follows:

(a) Using one of the beakers provided, take about $200cm^3$ of the warm liquid P and he until it boils. Note and record the boiling temperature θ_b of liquid P.

(b) Quickly transfer the beaker of boiling liquid P and place it on the wooden b provided. Note the temperature and immediately start the stopwatch.

(c) While stirring the liquid with your thermometer and constant fanning with the pie paper provided, note and record the temperature of the liquid P at two minutes inte as it cools at about 45^0C.

(d) Tabulate the values of temperature θ and their corresponding time t.

(e) Plot a graph of temperature against time; hence determine the rate of cooling at 60^0

(f) What do you think liquid P is? Give reason for your answer.

(g) Is the boiling temperature of liquid P the one expected? Give reason for your answ

3. You are provided with a metre bridge, an accumulator, galvanometer, a switch, jock two wires labelled X and Y.

Proceed as follows:

(a) Set up the slide-wire metre bridge as shown in Figure 3.

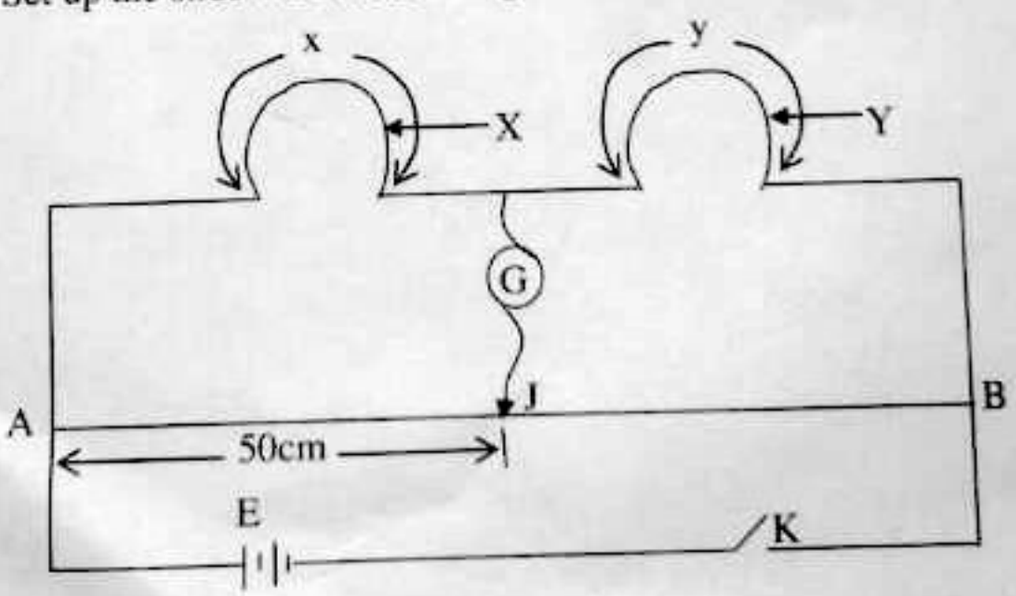

Figure 3

(b) Connect a length y = 10cm of the wire labelled Y to the right hand gap o bridge, to the left hand gap connect a length x of the wire labelled X which balance point at the 50 mark of the bridge. Measure and record the length x.

(c) Repeat the procedures in 3 (b) for values of y = 20cm, 30cm, 40cm, 50cm and 60cm.

(d) Tabulate your results.

(e) Measure and record the diameters dx and dy of the wires X and Y respectively.

(f) Plot a graph of y against x and determine its slope.

(g) Using the relation: $y = \left(\frac{\rho_y}{\rho_x}\right)\left(\frac{dy}{dx}\right)^2 x$, where ρ_y is the resistivity of wire Y which is equal to $49 \times 10^{-8}\Omega m$; Determine the resistivity ρ_x of wire X.

(h) What is the aim of the experiment?