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

031/2A

PHYSICS 2A
ACTUAL PRACTICAL A
(For Both School and Private Candidates)

Time: 2:30 Hours ***Wednesday, 12th October 2011 a.m.***

Instructions

1. This paper consists of **two (2)** questions. Answer **all** the questions.
2. Whenever calculations are involved show your work clearly.
3. Marks for questions are indicated at the end of each question.
4. Calculators and cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. Use $\pi = 3.14$.

1. The aim of this experiment is to determine the mass of a given dry cell size "AA". Proceed as follows:
   (a) Locate and note the centre of gravity C of the metre rule by balancing it on the knife edge.
   (b) Suspend the 50g mass at length 'a' cm on one side of the metre rule and the 20g mass together with the dry cell at length 'b' cm on the other side of the metre rule. Fix the 50g mass at length 30cm from the fulcrum and adjust the position of 20g mass together with the dry cell until the meter rule balances horizontally. Read and record the values of a and b as a_o and b_o respectively.
   (c) Draw the diagram for this experiment.
   (d) By fixing a = 5cm from fulcrum C, find its corresponding length b.
   (e) Repeat the procedure in (d) above for a = 10cm, 15cm, 20cm and 25cm. Tabulate your results.
   (f) Draw a graph of 'a' against 'b' and calculate its slope G.
   (g) Calculate X from the equation $50 = \frac{b_0}{a_0}(20 + X)$.
   (h) Comment on the value of $\frac{b_0}{a_0}$.
   (i) State the principle governing this experiment.

(25 marks)

2. You are provided with an ammeter, A, resistance box, R, dry cell, D, a key, K and connecting wires. Proceed as follows:
   (a) Connect the circuit in series.
   (b) Put $R = 1\,\Omega$ and quickly read the value of current I on the ammeter.
   (c) Repeat procedure (b) above for $R = 2\,\Omega, 3\,\Omega, 4\,\Omega$ and $5\,\Omega$. Record your results in a tabular form.
   (d) Draw the circuit diagram for this experiment.
   (e) Plot the graph of R against $\frac{1}{I}$.
   (f) Determine the slope of the graph.
   (g) If the graph obeys the equation $R = \frac{E}{I} - r$, then
      (i) suggest how E and r may be evaluated from your graph.
      (ii) compute E.
      (iii) compute r.
   (h) State one source of error and suggest one way of minimizing it.
   (i) Suggest the aim of this experiment.

(25 marks)