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

031/2A

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

Time: 2:30 Hours **Thursday, 14th November 2019 a.m.**

Instructions

1. This paper consists of **two** (**2**) questions. Answer **all** the questions.
2. Each question carries 25 marks.
3. Non-programmable calculators may be used.
4. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

The following information may be useful:
Pie, $\pi = 3.14$
Acceleration due to gravity, $g = 10\ m/s^2$.

1. The aim of this experiment is to determine the density of a liquid L by means of a spiral spring.

Proceed as follows:

(a) Assemble the apparatuses as shown in Figure 1 with zero mark of the meter rule at upper most end. Record the reading of the position of a pointer on the scale as y_o.

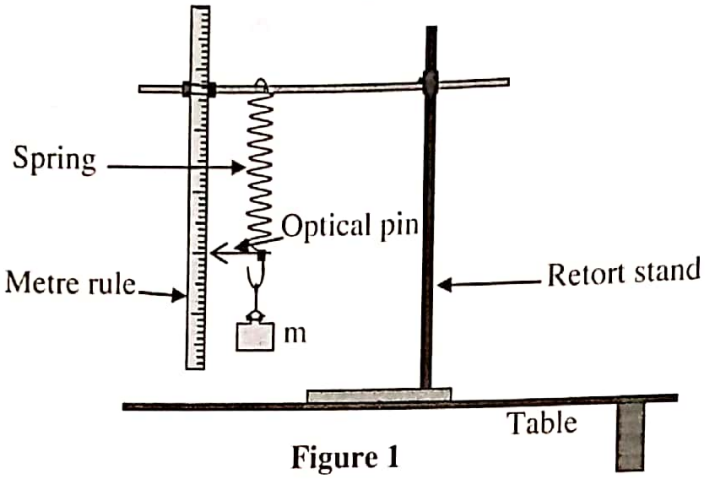

Figure 1

(b) Hang the 50 g mass on the spring and record the reading on the metre rule as y. Find the extension, $e = y - y_o$.

(c) Without removing the 50 g mass, repeat the procedure in 1 (b) for m = 100 g, 150 g, 200 g and 250 g mass to obtain a total of five readings. Remember to calculate the extension, e in each observation.

(d) Measure and record the mass of empty piece of bottle labelled Q.

(e) Replace the masses with a piece of bottle labelled Q filled with 100 cm^3 of liquid L. Record the resulting extension as e_1.

Questions

(i) Prepare a table of results including the values of m, y and e.

(ii) Plot a graph of mass m (g) against extension e (cm).

(iii) Find the gradient G of the graph.

(iv) What will be the extension produced by a mass of 1.0 kg?

(v) Use the information from the graph you have drawn to determine the density of liquid L in its SI units.

(25 marks)

2. You are required to determine the value of unknown resistance X using metre bridge.

Proceed as follows:

(a) Connect the circuit as shown in Figure 2, where R is a resistance box, E is a dry cell, K is a key, G is a centre-zero galvanometer, J is a jockey and X is unknown resistance.

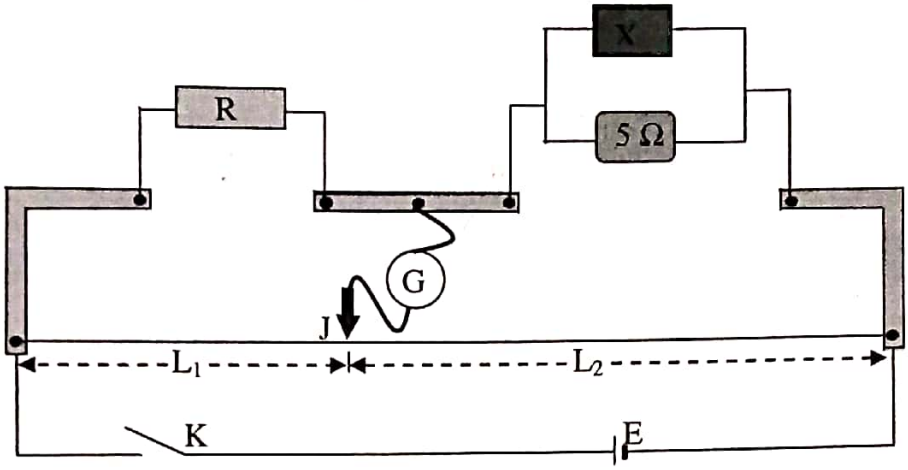

Figure 2

(b) Set R = 1 Ω, close the key K, slide the jockey over the metre bridge wire until the galvanometer reads zero. Read and record length L_1. Also read and record the corresponding length L_2.

(c) Repeat the procedures in 2 (b) for R= 2 Ω, 3 Ω, 4 Ω and 5 Ω and record the value for L_1 and its corresponding value of L_2 in each case.

Questions

(i) Tabulate your results including the values of $\frac{L_1}{L_2}$.

(ii) Plot a graph of R against $\frac{L_1}{L_2}$.

(iii) Deduce the slope, S of the graph.

(iv) Find the value of unknown resistance X. Show clearly how you arrived to your answer.

(25 marks)