

**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, $\pi = 3.14$

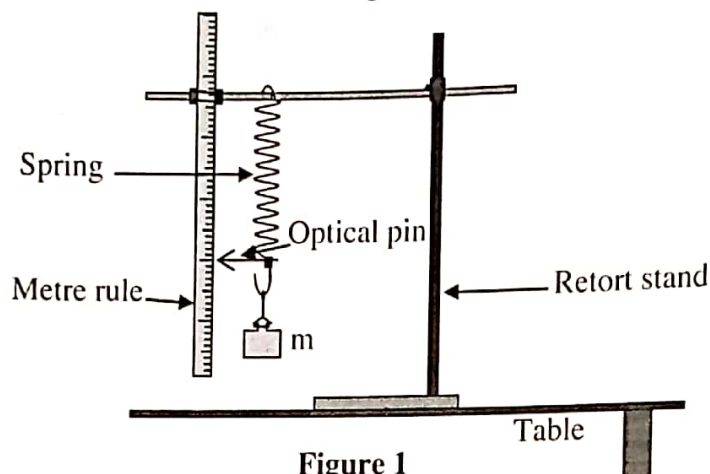
Acceleration due to gravity, $g = 10 \text{ m/s}^2$.



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_0 .



- (b) Hang the 50 g mass on the spring and record the reading on the metre rule as y . Find the extension, $e = y - y_0$.
- (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.

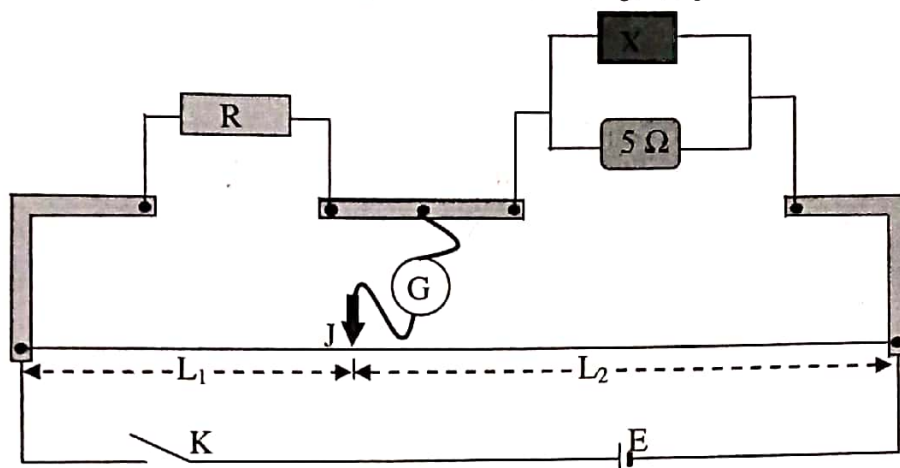


Figure 2

- (b) Set $R = 1 \Omega$, 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 $R = 2 \Omega, 3 \Omega, 4 \Omega$ and 5Ω 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)