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

131/3A **PHYSICS 3A**
(PRACTICAL A)
(For Both School and Private Candidates)

Time 3:20 Hours **Year: 2020**

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)** carry 15 marks each.
4. Mathematical tables and non-programmable calculators may be used.
5. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. The following information may be useful:

   Pi, $\pi = 3.14$

1. You are required to determine the acceleration due to gravity, g using a simple pendulum.

Proceed as follows:

(a) Attach a piece of thread of 100 cm long to the pendulum bob and set up the apparatus as shown in Figure 1. Note that d is a distance from the bob to the reference line.

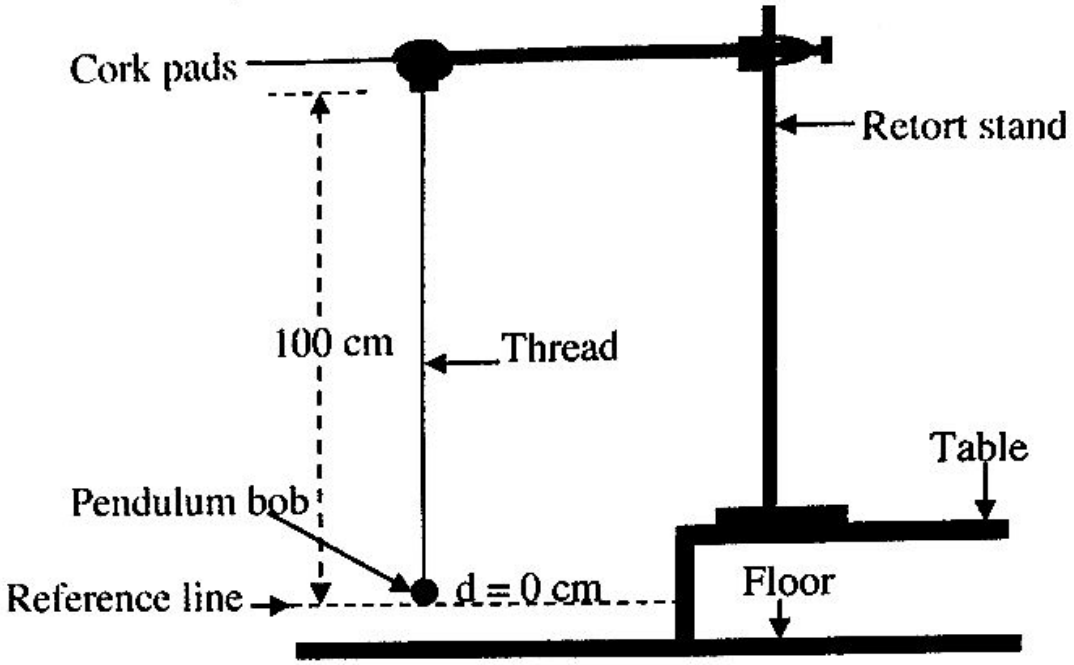


Figure 1

(b) Set the pendulum bob to oscillate through a small angle and determine the time, t for 20 complete oscillations and its periodic time, T.

(c) Repeat the procedure in 1 (b) while reducing the length of the thread by increasing the value of d by 10 cm, 20 cm, 30 cm, 40 cm, 50 cm, 60 cm, and 70 cm.

Questions

(i) Tabulate your results including the values of the length of the thread and T^2.

(ii) Plot a graph of d against T^2.

(iii) Compute the acceleration due to gravity g, from the equation $S = \frac{-g}{(2\pi)^2}$ where S is the slope of the graph plotted in 1 (ii).

(iv) What does the value of d-intercept represent?

2. You are provided with a beaker, liquid L, a thermometer, a stirrer and a wooden slab.

Proceeds as follows:

(a) Weigh the empty beaker provided and record its value.

(b) Set up the apparatus as shown in Figure 2.

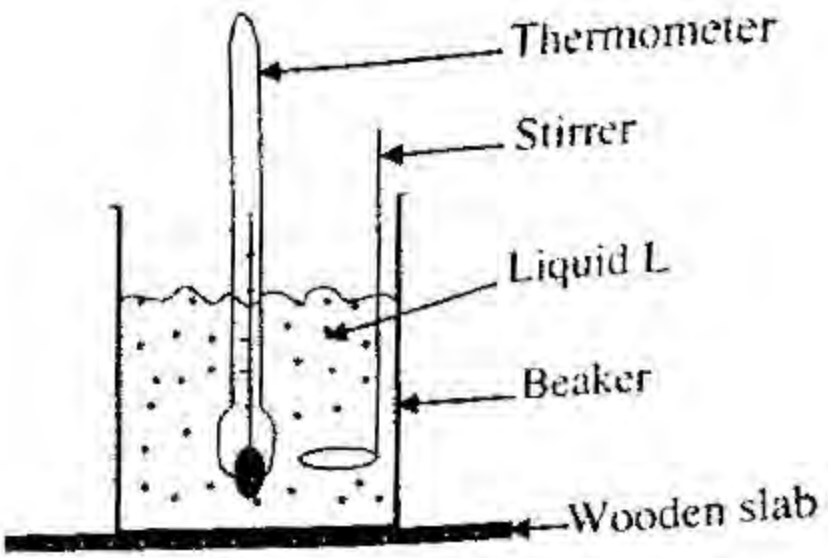


Figure 2

(c) Pour 150 ml of liquid L which is heated to about 90°C in a beaker. While stirring gently, record the temperature of liquid L after every two minutes from 80°C until it falls to 50°C.

(d) Weigh the beaker with its contents and determine the mass of liquid L.

(e) Repeat the procedures in 2 (c) and (d) for 100 ml of liquid L.

Questions

(i) Tabulate the results of your experiment.

(ii) Plot cooling curves for both experiments on the same axes.

(iii) Use the graph plotted in 2 (ii) to record the value of time taken for both volumes to fall from 80°C to 60°C as t_1 and t_2 respectively, hence compute the value of t_1/t_2.

(iv) Determine the ratio of mass of 150 ml to mass of 100 ml.

(v) Compare the values obtained in 2 (iii) and (iv) and give the comments.

(vi) What is the aim of performing this experiment?

3. You are provided with a dry cell E, ammeter A, resistance box B, switch K and several pieces of connecting wires.

Proceed as follows:

(a) Connect a dry cell E, switch K, an ammeter A and the resistance box B in series.

(b) Using the resistance box, set the resistance R equal to 1 Ω, close the switch K and record the current I (A) passing through the circuit

(c) Repeat the procedures in 3 (b) for the values of R equal to 2 Ω, 4 Ω, 5 Ω and 6 Ω.

Questions

(i) Record the results in a tabular form including the values of 1/I (A^{-1}).

(ii) Draw a well labelled diagram of your circuit you connected.

(iii) Plot a graph of R against 1/I.

(iv) Use the graph to compute the value of E.m.f. Of the cell.

(v) What is the physical meaning of R-intercept?

(vi) What is the aim of doing this experiment?