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

131/3B

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

Time: 3:20 Hours **Tuesday, 16th May 2017 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, $c_w = 4.2\ Jg^{-1}K^{-1}$

   Specific heat capacity of copper, $c_c = 0.39\ Jg^{-1}K^{-1}$.

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1. In this experiment you are required to investigate the gravitational field intensity.

Proceed as follows:

(a) Set up the apparatus as shown in Figure 1 such that a 150g slotted mass, m, hangs vertically from the lower end of the spring by using hanger. Measure the distance, h between the floor and the lower end of the spring.

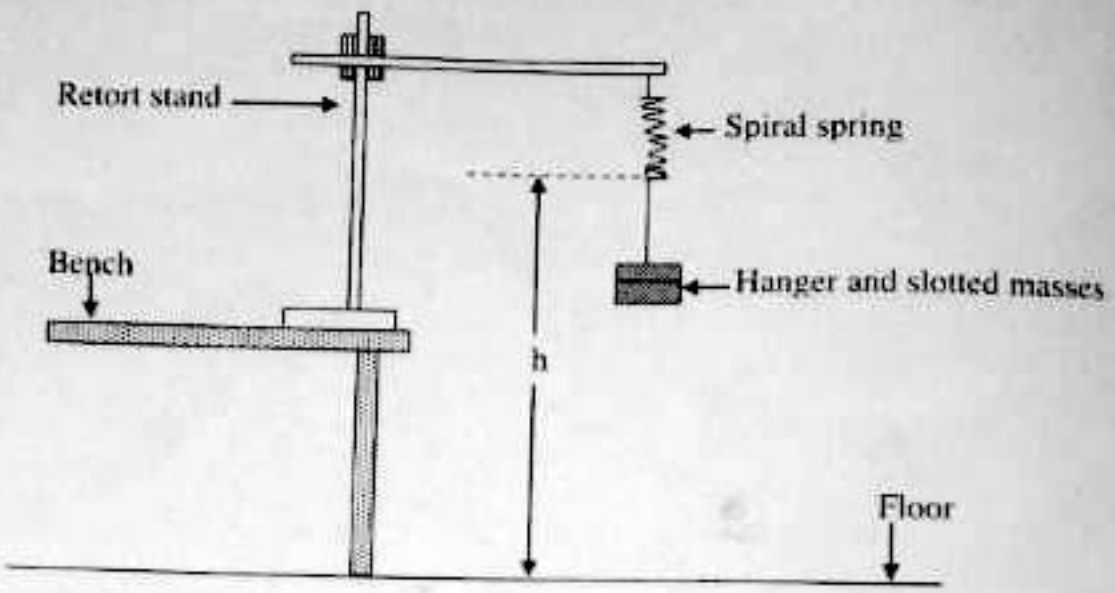


Figure 1

(b) Pull the slotted mass with hanger downwards through a short distance and then release it to perform simple harmonic motion.

(c) Measure the time, t, taken for 20 complete oscillations and hence determine the corresponding period T and the value of T^2.

(d) Repeat the procedures (a) – (c) above by using mass, m = 200g, 250g, 300g and 350g.

(e) Record the value of h, m, t, T and T^2 in a tabular form.

(f) Plot a graph of h against T^2.

(g) From your graph determine:

(i) The slope of the graph.

(ii) Using the relation $T^2 = \dfrac{H-h}{a \times 2.533 \times 10^{-2}}$, calculate the value of 'a'.

(iii) What does 'a' represent?

(h) State any three sources of error in this experiment.

2. The aim of this experiment is to determine the specific latent heat of fusion, L of wax provided.

Proceeds as follows:

(a) Weigh the test tube while it is empty and then when it is with some amount of piece of wax. Record the mass of wax as m.

(b) Weigh the insulated calorimeter when it is empty and record its mass as m_c.

(c) Fill the calorimeter with cold water to about half of it and record the mass of water as m_w.

(d) Boil some water in the beaker to the boiling point.

(e) Heat the test tube with wax in the boiling water until the wax is completed melted and is about 95°C.

(f) Transfer the test tube into the calorimeter through the hole of the cover as it is in Figure 2.

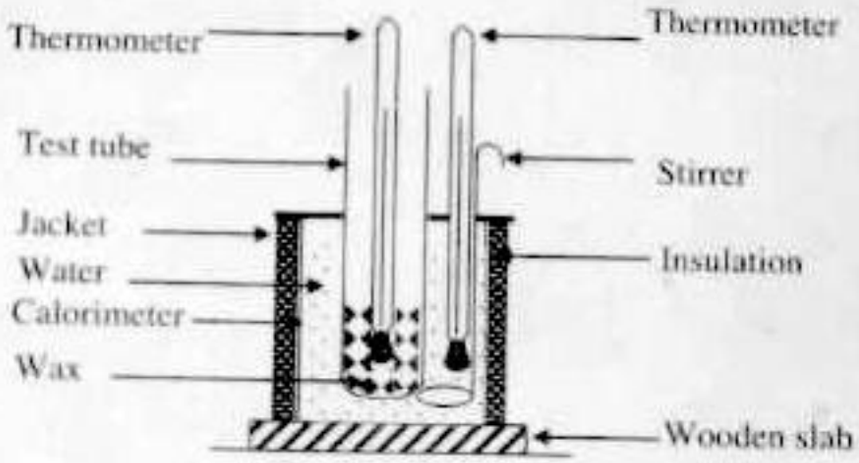


Figure 2

(g) While stirring the water in the calorimeter, record the temperature of the water after every one minute and simultaneously record the temperature of wax. Continue recoding the temperature and time until wax cools to about 38°C. Tabulate your results.

(h) Using the same axes, plot a cooling curve for wax and heating curve for water.

(i) Determine the time interval over which the wax solidifies. With the same time intervals use water graph to determine the temperature rise $d\theta$ of the water.

(j) Using the equation;

$mL = (m_c c_c + m_w c_w) d\theta$, determine the value of L.

3. The aim of the experiment is to determine the resistance of each wire, S provided.

Proceed as follows:

(a) Connect two identical wires S of 33cm long in parallel on the right hand gap of the metre bridge. Also connect the resistance R to left hand gap of the metre bridge. Hence complete the Wheatstone bridge circuit.

(b) If E is the e.m.f of a cell, G is the galvanometer, K is the switch and J is a jockey in usual manner, draw the circuit diagram of the set outlined in 3 (a).

(c) Starting with R = 10Ω, obtain the balance length, l_1 from left hand side of a metre bridge.

(d) Repeat the procedure in 3 (c) for value of R equals to 8Ω, 6Ω, 4Ω, 2Ω and 1Ω.

(e) Determine the value of x given that $x = \frac{l_1}{100 - l_1}$, hence tabulate your results.

(f) Plot a graph of R against x.

(g) Determine the gradient G of the graph.

(h) What is the physical meaning of G obtained in 3 (g).

(i) Determine the resistance of each wire S.