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

131/3C

PHYSICS 3C
ALTERNATIVE C PRACTICAL
(For Both School and Private Candidates)

TIME 3 Hours 10 minutes **17 May 2000 A.M.**

Instructions

1. Answer ALL questions.
2. Read each question carefully.
3. All calculations must be clearly presented in the answer booklet provided.
4. Mathematical tables, desk calculators and graph paper may be used.
5. Write your examination number on every page of your answer booklet provided.
6. The following may be used

$g = 9.8\ m/s^2$

$\pi = 3.14$

This paper consists of 3 printed pages

1. Determine the mass of a spring and the acceleration due to gravity by using an oscillating mass attached to a spiral spring. Proceed as follows:

(a) Suspend a spiral spring from a retort stand provided. Attach a mass of 100g at the end of the spring, slightly pull down the mass such that it oscillates up and down. Measure and record the time for 30 oscillations.

(b) Repeat the procedure in (a) above by attaching masses of 200g, 300g, 400g, 500g and 600g respectively each time measuring the time taken to make 30 complete oscillations.

(c) Record your measurements in a table as shown below.

Load m (g)	Time for 30 oscill. t(sec)	Periodic time T (sec)	T^2 (sec^2)
100			
200			
300			
400			
500			
600			

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

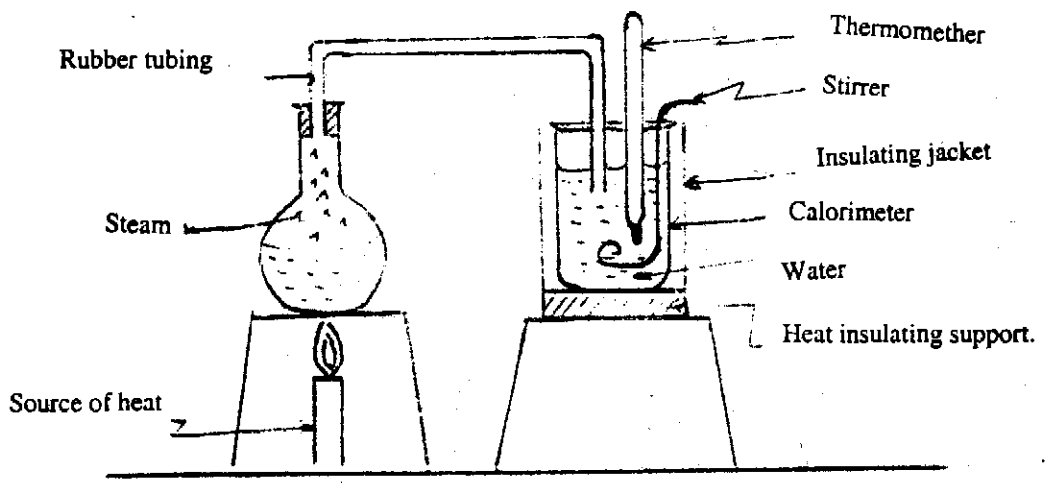
(e) Find the slope and the intercept on the m-axis.

(f) T and m are related to the equation

$T = 2\pi \sqrt{\frac{m + m_o}{kg}}$, where k is the spring constant of magnitude 40 g/cm.

Use the equation and your graph to calculate the value of the acceleration due to gravity and the mass of the spring. 20 marks

2.



(a) Set up the experimental apparatus as shown above.

(b) Record the room temperature.

(c) Pass steam through the rubber tubing immersed in a calorimeter containing water cooled to about 5°C below the room temperature. While stirring take readings of the temperature in the calorimeter and the time at intervals of one-minute until the temperature of water in the calorimeter has reached about 70°C.

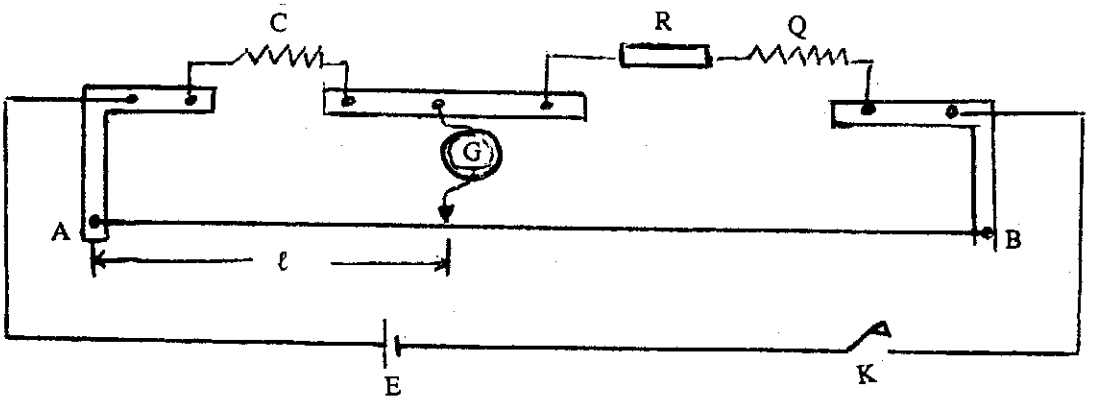
(i) Plot a graph of temperature against corresponding values of time in minutes.

(ii) Find the slope of your graph (a curve) at the room temperature.

(iii) From the slope of this curve at room temperature, deduce the thermal conductivity of the rubber tubing.

15 marks

3. Determine the value of the unknown resistance and resistivity of the material of wire Q. proceed as follows.



(a) Set up the slide-wire metre bridge as illustrated in the figure above, where C is a standard resistor, R is the resistance box and G is the galvanometer.

(b) Connect the resistance box R and the wire Q of 50 cm long across the right hand gap and the standard resistor C at the left hand gap.

(c) When R = 1Ω find the balance point and record that length ℓ in centimeters.

(d) Repeat the procedure in (c) above for values of R equal to 4Ω, 7Ω, 12Ω, 15Ω, and 20Ω each time recording the corresponding balance length ℓ.

(e) Plot a graph of R (ordinate) against $\frac{1}{\ell}$ (abscissa). Using the equation $R\ell = 100C - (C + Q)\ell$ where C and Q are constants and the graph, determine the value of the unknown resistance Q.

(f) Measure the diameter of wire Q, hence find the resistivity of the material of the wire.

15 marks