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

031/2B **PHYSICS 2B**

ACTUAL PRACTICAL B

(For Both School and Private Candidates)

CS17REP

Time: 2:30 Hours **Tuesday, 14th November 2017 a.m.**

Instructions

1. This paper consists of **two** (2) questions. Answer **all** the questions.
2. Calculations should be clearly shown.
3. Marks for questions are indicated at the end of each question.
4. Calculators, cellular phones and any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. The following information may be useful:

   $\pi = 3.14$

1. The aim of the experiment in Figure 1 is to determine the effective mass of the spring and its spring constant K.

(a) Suspend the spiral spring to the retort stand.

(b) Load the lower end of the spring with a mass of M = 200g and then pull the mass slightly vertically downwards through a short distance from an equilibrium position and release it so that the system executes vertical oscillations of small amplitudes.

(c) Use a stop watch to record the time t (sec) for 20 vertical oscillations and then determine the periodic time T (sec), hence determine $T^2(sec^2)$.

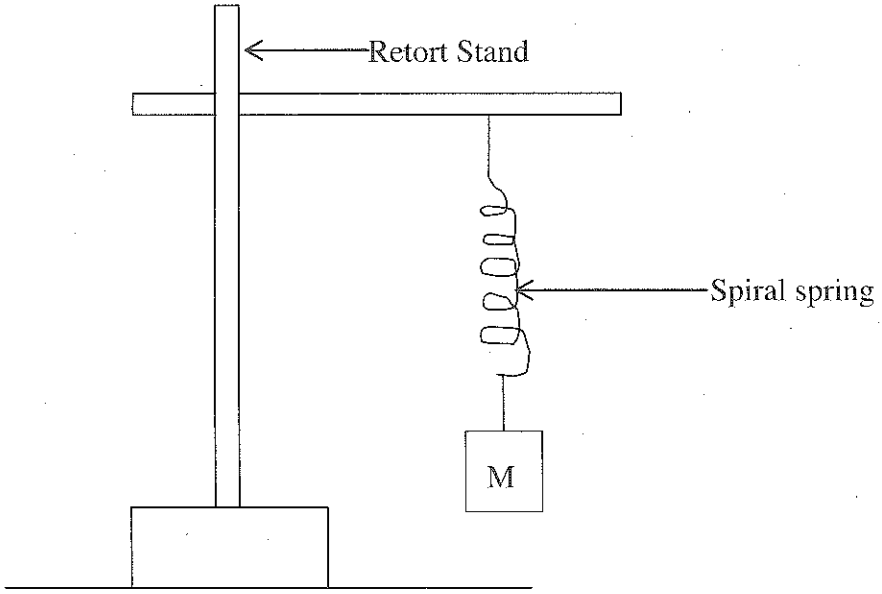

Figure 1

(d) Repeat this procedure for the other four (4) masses in steps of 50 grams.

(e) Tabulate your results.

(f) It is found that the period T of oscillations and the spring constant K are related by the equation, $\frac{T^2}{4\pi^2} = \frac{M+S}{K}$, where S is the effective mass of the spring.

(i) Plot a graph of T^2 against M.

(ii) Calculate the slope of the graph.

(iii) Using the given equation and the graph, determine the value of S and K.

(25 marks)

2. The aim of the experiment in Figure 2 is to determine the critical angle A of the given glass block.

(a) Fix a sheet of paper on a soft board using drawing pins.

(b) Place the glass block provided on the sheet of paper with its largest face upper most and trace its outline EFGH.

(c) Remove the block and on its outline, draw a perpendicular BI.

(d) Draw a ray AB such that angle $\beta = 35^o$.

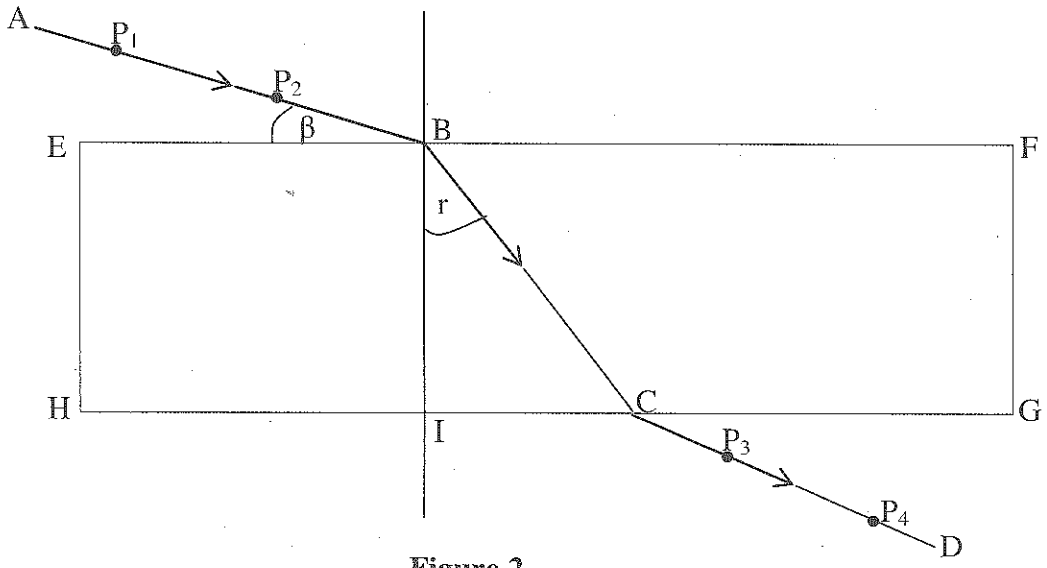

Figure 2

(e) Replace the glass block.

(f) Stick two pins P_1 and P_2 along AB and looking through the glass block from the opposite face HG, stick two other pins P_3 and P_4 in line with P_1 and P_2. Remove the glass block.

(g) Draw a straight line DC through P_4 and P_3 and join up C to B.

(h) Measure the angle of refraction r and then calculate the value of $\cos\beta$ and sinr.

(i) Repeat the procedure (d) to (h) for values of $\beta = 45^o, 55^o, 65^o$ and 75^o.

(j) Tabulate your results.

(k) Plot a graph of sinr against $\cos\beta$.

(l) Determine the gradient G of the graph.

(m) Calculate the value of the critical angle A from $G = \sin A$.

(25 marks)

Note: The diagrams for question 2 should be attached to answer booklet(s)