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

PHYSICS 2
ALTERNATIVE TO PRACTICAL
(For Both School and Private Candidates)

031/2

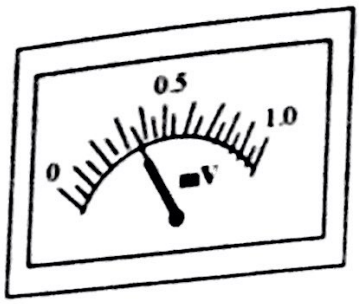
Time: 2:30 Hours **Wednesday, 11th November 2015 a.m.**

Instructions

1. This paper consists of **five (5)** questions. Answer **all** the questions.
2. Marks for each question or part thereof are indicated beside the question.
3. Calculators and cellular phones are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).
5. Use $\pi = 3.14$.

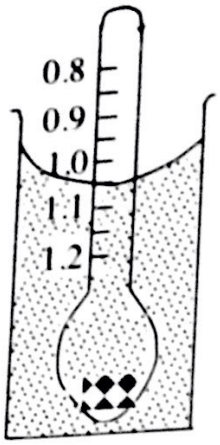
1. (a) **Study the following instruments and provide in the space provided the name, application and the correct reading from the scale.**

(i)



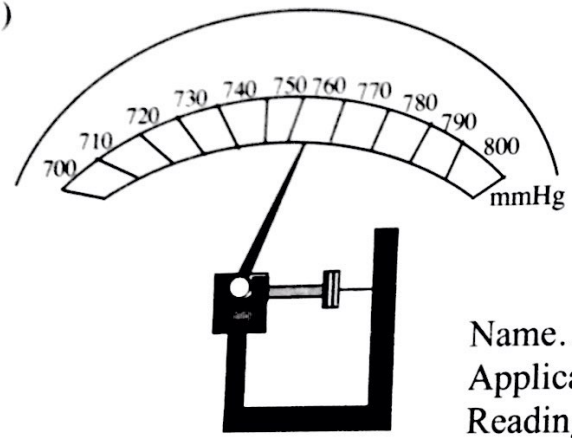
Name..... **(0.5 mark)**
Application..... **(1 mark)**
Reading..... **(0.5 mark)**

(ii)



Name..... **(0.5 mark)**
Application..... **(1 mark)**
Reading..... **(0.5 mark)**

(iii)



Name..... **(0.5 mark)**
Application..... **(1 mark)**
Reading..... **(0.5 mark)**

(b) Suggest one precaution when taking reading of the instruments in 1 (a) (i) – (iii). **(0.5 mark)**

(c) Draw warning sign for danger of electric shock and radioactive substances. **(1 mark)**

(d) Mention five vital safety measures in a physics laboratory. **(2.5 marks)**

In a certain experiment, Musa balances a uniform light metre rule AB at its centre C. When a mass M of magnitude 100g is hung at D 10cm from the end A, the new balance point, E is 40cm from A.

(a) Illustrate this information by a diagram. **(4 marks)**

(b) Write the equation of the weight, W, of the metre rule in terms of the mass M, and the distances EC and ED. **(1.5 marks)**

(c) Using the real values of EC, ED and M, determine the mass of the metre rule AB. **(1.5 marks)**

(d) Name and state the principle governing this experiment. **(2 marks)**

(e) State any two sources of error in this experiment. **(1 mark)**

In an experiment to determine the specific heat capacity, c_m; the following data were collected:

Mass of metal $M_m = 50g$

Mass of calorimeter $M_c = 80g$

Mass of calorimeter with water = 140.5g

Initial temperature of water $\theta_1 = 14^0C$

Final temperature of water $\theta_2 = 19^0C$

Temperature of hot metal $\theta = 100^0C$

Specific heat capacity of water $C_w = 4.2J/gK$

Specific heat capacity of calorimeter $C_c = 0.4J/gK$

(a) Determine the mass of water M_w. **(1 mark)**

(b) Compute the heat gained by water. **(1 mark)**

(c) Find the heat gained by calorimeter. **(1 mark)**

(d) Calculate the heat lost by metal in terms of its specific heat capacity C_m. **(1.5 marks)**

(e) Using the appropriate heat equation, calculate the specific heat capacity C_m of the metal. **(2.5 marks)**

(f) State any source of error in this experiment. **(1 mark)**

(g) State two precautions you would take in carrying out this experiment to ensure a more accurate value for the specific heat capacity. **(2 marks)**

In an experiment to determine the relationship between the diameter of a vibrating string and its frequency when the length of the string is kept constant, its diametre was varied in order to tune the string to a series of tuning forks.
The results for frequency and diametre were recorded as follows:

Table 1

Frequency of fork, f (Hz)	100	200	270	380	475
Diameter of string, d (cm)	0.83	0.42	0.31	0.22	0.18
Reciprocal of diameter $\frac{1}{d}$ (cm^{-1})					

(a) Complete Table 1. **(2.5 marks)**

(b) Plot the graph of frequency, f, against $\frac{1}{d}$. **(3 marks)**

(c) What is the nature of the graph? **(1 mark)**

(d) Find the slope of the graph. **(1 mark)**

(e) What is the physical meaning of the slope obtained in 4 (d)? **(1 mark)**

(f) State the relationship between the frequency of the vibrations and the diameter of the string. **(1 mark)**

(g) State a source of error in this experiment. **(0.5 mark)**

5. In an experiment to determine the resistance per metre, σ, of a given constantan wire, the following results were obtained:

Table 2

Length of wire, X, (cm)	Balance length, l, $\times 10^{-2}$ (cm)	$\frac{2}{l}$ (cm^{-1})
100	24.50	
80	29.20	
60	35.60	
40	46.00	
20	63.00	

(a) Complete Table 2. **(2.5 marks)**

(b) Plot the graph of X against $\frac{2}{l}$. **(3 marks)**

(c) Determine the slope, S, of the graph. **(1 mark)**

(d) Find the X intercept. **(1 mark)**

(e) Calculate the resistance per unit square metre, σ, of the wire given that, $\frac{2}{l\sigma} = \frac{X\sigma + 2}{\sigma}$. **(2.5 marks)**