

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

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

03/12

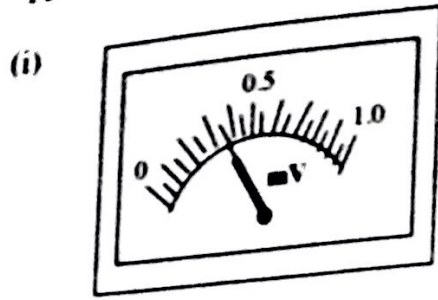
Time: 2:30 Hours

Wednesday, 11th November 2015 a.m.

Instructions

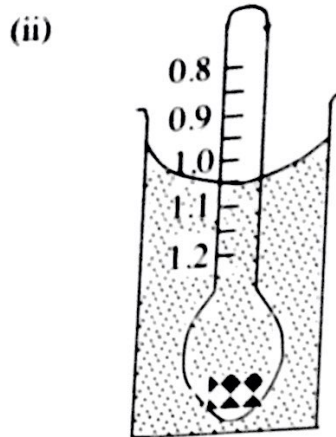
1. This paper consists of **five (5)** questions. Answer **all** the questions.
2. Marks for each question or part thereof are indicated beside the question.
3. Calculators and cellular phones are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer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



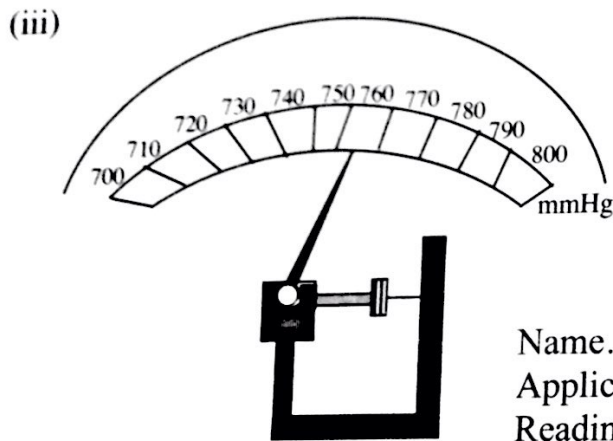
Name.....
Application.....
Reading.....

(0.5 mark)
(1 mark)
(0.5 mark)



Name.....
Application.....
Reading.....

(0.5 mark)
(1 mark)
(0.5 mark)



Name.....
Application.....
Reading.....

(0.5 mark)
(1 mark)
(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. **(1.5 marks)**
 (e) State any two sources of error in this experiment. **(2 marks)**
(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 $\theta_1 = 14^\circ C$
- Final temperature of water $\theta_2 = 19^\circ C$
- Temperature of hot metal $\theta = 100^\circ C$
- 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 diameter was varied in order to tune the string to a series of tuning forks.

The results for frequency and diameter 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, (2.5 marks)
- $$\frac{2}{l\sigma} = \frac{X\sigma + 2}{\sigma}$$