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

031/2

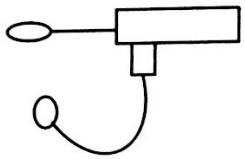
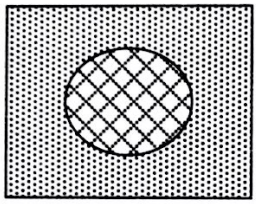
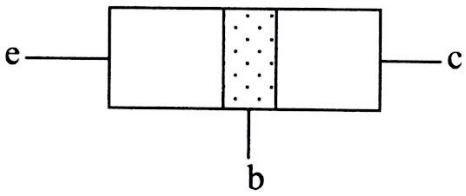
PHYSICS 2
ALTERNATIVE TO PRACTICAL
(For Both School and Private Candidates)

Time: 2:30 Hours **Wednesday, 12th November 2014 a.m.**

Instructions

1. This paper consists of **five (5)** questions. Answer **all** questions.
2. Marks for each question 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. Fill in the gaps with correct responses.

Name of Device	Sketch	Application/Uses
(a) A pair of tongs		
(b)		
(c) Deflagrating spoon		
(d)		
(e)		
(f)		Measure the density of liquids.

(10 marks)

2. Table 1 contains data of an experiment carried out with the aim of determining the relative density of a solid substance.

Table 1

Weight of a solid in air, W_1 (N)	Weight of a solid in water, W_2 (N)	Volume of water displaced (cm^3)	Upthrust, U	Weight of water displaced, W (N)
0.2	0.1	20		
0.4	0.2	40		
0.6	0.3	60		
0.8	0.4	80		

(a) Complete Table 1 by filling the values of U and W. **(4 marks)**
(b) Plot a graph of W against U. **(3 marks)**
(c) Determine the slope of the graph. **(1 mark)**
(d) What does the slope in 2 (c) theoretically represent? **(1 mark)**
(e) State the relationship between W and U. **(1 mark)**

3. In an experiment to determine the refractive index of water, a form three student collected the data as shown in Table 2.

Table 2

Volume of water, V, (cm)	Depth (H_1) of the image (cm)	Depth (H_2) of the water (cm)
150	2.5	13.2
175	3.5	15.1
200	4.8	17.0
225	5.5	18.1
250	6.5	20.0

After plotting a graph of H_2 against H_1, a slope of 1.3 is obtained.

(a) What does the slope theoretically represent? **(1 mark)**
(b) Establish the equation used to find the slope of the graph. **(2 marks)**
(c) Find the reciprocal of the slope. **(1 mark)**
(d) What does the answer in 3 (c) represent? **(1 mark)**
(e) Name and state the law governing this experiment. **(3 marks)**
(f) State a possible source of error in this experiment. **(1 mark)**
(g) How can you minimize error in 3 (f)? **(1 mark)**

4. In a certain experiment, the following apparatus were connected; an ammeter, rheostat, a d cell, a key and some connecting wires. The results obtained were as follows:

Table 3

Resistance (Ω)	Current I (A)	$\frac{1}{I}$ (A^{-1})
1	0.68	
2	0.46	
3	0.36	
4	0.30	
5	0.24	

(a) Complete Table 3. **(2.5 marks)**

(b) Draw a circuit diagram that could have been used to obtain the given data. **(3 marks)**

(c) When the graph of R against $\frac{1}{I}$ is plotted, the slope and $\frac{1}{I}$ intercept were found to be 1.43ΩA and 1.1Ω respectively. If the graph obeys equation $R = \frac{E}{I} - r$, calculate the values of E and r. **(2.5 marks)**

(d) State a possible source of error in this experiment. **(1 mark)**

(e) How can you minimize the error in 4 (d)? **(1 mark)**

5. In an experiment to determine the properties of β-particle, the following rates were obtained.

Table 4

Time (min)	0.00	07.00	14.00	21.00	28.00
Count rate/min	298.00	162.00	90.00	51.00	29.00

(a) Plot a graph of count rate/min against time (min). **(2.5 marks)**

(b) Find the half-life of the source. **(1.5 marks)**

(c) From the graph, determine the value of count rate when time = 18.66 min. **(1 mark)**

(d) Name the device used to measure the number of pulses per second. **(1 mark)**

(e) What is the effect of placing a sheet of thin paper between the source and the tube? **(2 marks)**

(f) What will happen when the sheet of thin paper is replaced by a thick sheet of aluminium? **(2 marks)**