

131/3A

**TANZANIA HEADS OF ISLAMIC SCHOOLS COUNCIL**  
**FORM SIX INTER ISLAMIC MOCK EXAMINATION**

**PHYSICS 3A**  
**(Actual Practical)**  
**(For both School and Private candidates)**

Time: 3:20 Hours

Tuesday 12<sup>th</sup> March, 2024 a.m.

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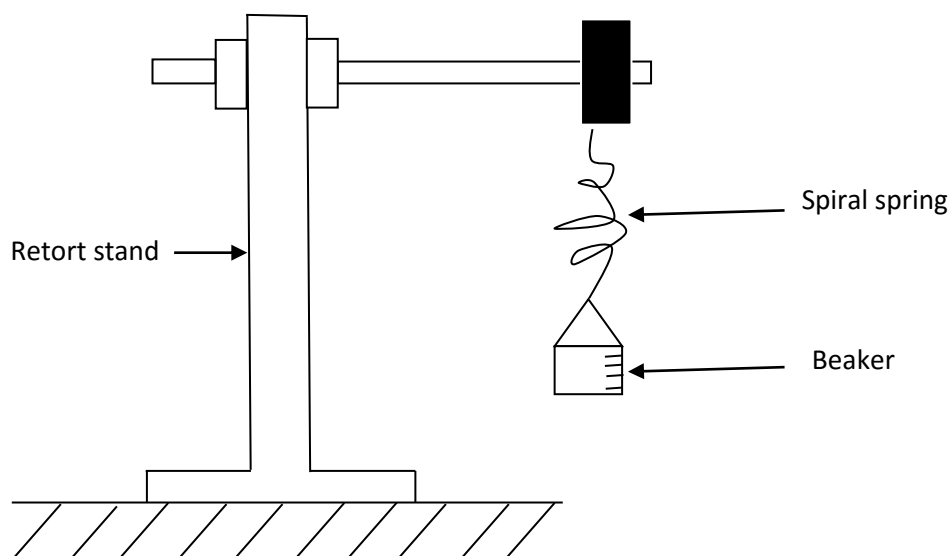
**Instructions**

1. This paper consists of three (3) questions.
2. Answer all questions.
3. Question number one (1) carries twenty (20) marks and the other two (2) carry fifteen (15) marks each.
4. Mathematical tables and non-programmable calculators may be used.
5. Cellular phones and any unauthorized materials are not allowed in the Examination Room.
6. Write your Examination Number on every page of your answer booklet(s).

The following information may be useful:

$$\text{Pie, } \pi = 3.14$$

1. You are provided with the following equipment; retort stand with its accessories, spiral spring, beaker, stop watch and liquid **P**. Proceed as follows:



- (a) Pour 20mls of volume of liquid **P** into a beaker and release it so that the spring makes vertical oscillations. Record time for 20 complete oscillations.
- (b) Increase the volume of liquid **P** in a step of 20mls to get other four readings.
- (c) Tabulate your results for  $V$  (ml),  $t$  in S and  $T^2$  in  $S^2$ .
- (d) Measure mass of an empty beaker by using beam balance.
- (e) Plot the graph of  $T^2$  against  $V$  (ml).
- (f) Determine the spring constant ( $K$ ) of the spiral spring and density of liquid **P** by using the relation.

$$T = 2\pi \sqrt{\frac{m}{k}}, \text{ where}$$

$$m = m_b + m_p$$

$m_b$  = mass of an empty beaker

$m_p$  = mass of liquid **p**

$k$  = spring constant

**[15 marks]**

2. Heat is a part and parcel of our life. Every living organism needs moderate temperature for survival. When the temperature becomes higher than the moderate temperature, some mechanisms of cooling are to be employed. Mr. Ndege Ulaya who is a physics teacher at NYUMBANI high school, while teaching the topic of heat told his students that any liquid if forced to cool, it can obey Newton's law of cooling provided its temperature is higher than surrounding temperature; and surrounding temperature is constant.

Use the liquid **A** provided that has been heated to about 85°C to show that it obeys Newton's law of cooling. Take the readings after every 2 minutes for 16 minutes starting when the temperature of the liquid is about 80°C. **[15 marks]**

3. You are provided with ammeter **A**, resistance box **R**, dry cell **D**, switch **K** and connecting wires.

Proceed as follows:

- (i) Connect the circuit in series.
- (ii) Draw the circuit diagram for this experiment.
- (iii) Put  $R = 1\Omega$  and quickly read the value of current **I** on the ammeter.
- (iv) Repeat procedures (iii) above for  $R=2\Omega$ ,  $3\Omega$ ,  $4\Omega$  and  $5\Omega$  and record your results in tabular form.
- (v) Plot the graph of  $R$  against  $\frac{1}{I}$
- (vi) Determine the slope of your graph.
- (vii) Compute the e.m.f, **E** and internal resistance, **r** of a dry cell.
- (viii) State two sources of error in this experiment and suggest one way of minimizing it.

**[15 marks]**

*Wabillah Tawfiq*