

**THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**



**LAKE ZONE FORM FOUR MOCK EXAMINATION
(SHINYANGA, SIMIYU, GEITA, KAGERA, MARA AND MWANZA)**

031/1

PHYSICS - 1

(For Both School and Private Candidates)

Time: 3 Hours

Year: 2026

INSTRUCTIONS

1. This paper consists of sections **A**, **B** and **C** with a total of eleven (11) questions.
2. Answer all questions in sections **A** and **B** and only two questions from section **C**.
3. Section **A** carries 16 Marks, section **B** carries 54 Marks and section **C** carries 30 Marks.
4. Mathematical tables and Non-programmable calculator may be used.
5. All writings must be in blue or black ink, except drawings which must be in pencil.
6. Communication tools and any other unauthorized material are not allowed in examination room.
7. Write your examination number on every page of your answer booklet(s).
8. Where necessary, the following constants may be used
 - (i) Acceleration due to gravity $g = 9.8\text{ms}^{-2}$.
 - (ii) Pie, $\pi = 3.14$
 - (iii) Density of sea water = 1100kgm^{-3}
 - (iv) Density of fresh water = 1000kgm^{-3}
 - (v) Linear expansivity of aluminum = $0.00003\text{ }^{\circ}\text{C}^{-1}$.
 - (vi) Linear expansivity of steel = $0.00001\text{ }^{\circ}\text{C}^{-1}$.
 - (vii) Velocity of sound in air is 340 ms^{-1} .

This paper consists of 6 printed pages

SECTION A: (16 MARKS)

Answer all questions in this section

1. For each of the following items (i) – (x), choose the most correct answer from among the given alternatives and write its letter beside the item number in the answer sheet provided.

(i) What is the zero error shown in the figure 1?

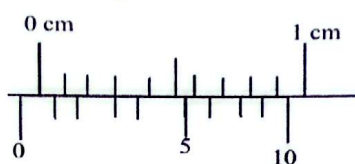


Figure 1

- A. 0.3 mm B. 0.3 cm C. -0.3
D. -0.3 cm E. 2 cm
- (ii) The same body is immersed in a liquid A and then in liquid B. the extent to which the body sinks in liquid B is less than in liquid A. what conclusion can be derived from such an observation?
- A. The density of liquid A is more than that of liquid B.
B. The density of liquid B is more than that of liquid A.
C. The density of solid body is less than that of liquid A.
D. The density of solid body is less than that of liquid B.
E. The density of solid body exceeds the density of liquid in both cases.
- (iii) Which physical phenomenon is observed in kerosene lamp when drawing fuel up into the wick where it can be burnt?
- A. Evaporation B. Osmosis C. Diffusion
D. Streaming E. Capillarity.
- (iv) At which position will the object be placed for a concave mirror to form virtual, magnified and erect image behind the mirror?
- A. Between the principal focus(F) and the pole (P) in front of the mirror.
B. Between the principal focus(F) and the pole (P) behind the mirror.
C. Between the centre of curvature (c) and the principal focus (F) in front of the mirror.
D. Between the centre of curvature (c) and the principle focus (F) behind the mirror.
E. Between the centre of curvature (c) and the Pole (P) in front of the mirror.
- (v) The ball is released from the goalkeeper's hands hits the ground 1.5 seconds later. What is its velocity when hitting the ground?
- A. 15 m/s B. 6.67 m/s C. 14.7 m/s
D. 6.53 m/s E. 150 m/s

(vi) You are provided with three rods x , y , and z of equal length l at the same temperature. The coefficient of linear expansivity α_x, α_y and α_z are such that, $\alpha_x < \alpha_y < \alpha_z$. If the temperature of all rods increases by 0°C , how will the final order of the rods be?

- A. $L_x > L_y < L_z$ B. $L_x > L_y > L_z$ C. $L_y < L_z < L_x$
 D. $L_x < L_y > L_z$ E. $L_x < L_y < L_z$

(vii) The diagram in the figure 2 below shows a rectangular block of mass 8.2 kg immersed in sea water. What is the difference in pressure between the top and the bottom surface of the block?

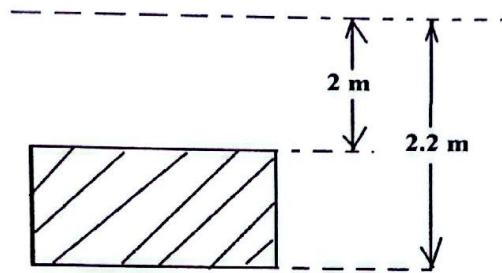


Figure 2

- A. 2156 Pa B. 16.07 Pa C. 2200 Pa
 D. 21560 Pa E. 176.79 Pa

(viii) Suppose an engine raises 200 Kg of water steadily through a height of 60 m in 20 seconds. The upward force used is equal to weight of water raised. Calculate the power in KW .

- A. 5.88 KW B. 32.34 KW C. 0.65 KW
 D. 6.00 KW E. 4.00 KW

(ix) The following are applications of magnetism in daily life, EXCEPT ;-

- A. VHS tapes are manufactured as a result of magnetism.
 B. Banks make use of magnetic ink on cheques.
 C. Magnets are used to lift scraps metals.
 D. Magnets are used to trap non-metallic objects during floor packing.
 E. Electricity can be produced through magnetism.

(x) In figure 3 if block is at rest, what will be the value of normal reaction R ?

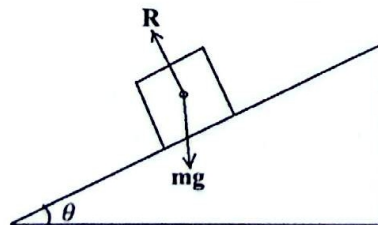


Figure 3

- A. mg B. $mg \sin \theta$ C. $\tan \theta$ D. $mg \tan \theta$ E. $mg \cos \theta$

2. Match the descriptions of motion in List A with the corresponding terms in List B by writing the letter of the correct response beside the corresponding item number in the answer sheet provided.

List A	List B
(i) The rate at which an object travels.	A. Displacement.
(ii) Area under velocity – time graph.	B. Resultant velocity.
(iii) The gradient of velocity-time graph.	C. Average velocity.
(iv) A measure of how far a body is from the straight point.	D. Speed.
(v) The gradient of displacement – time graph.	E. Constant velocity.
(vi) Displacement per unit time.	F. Velocity.
	G. Average acceleration.
	H. Acceleration.
	I. Distance.

SECTION B: (54 MARKS)

Answer all questions from this section

3. (a) In an experiment a narrow beam of light directed onto a glass prism leaves the prism and falls on a white screen. Draw a well labelled diagram to show the experimental set-up and observation on a screen. **(05 Marks)**
- (b) A lens camera of focal length 10 cm is used to take a picture of a girl 1.5 m tall. Determine the magnification of the image if the girl is 11 m from the camera. **(04 Marks)**
4. (a) Suppose a 60 kg woman floats in fresh water with 97% of her volume submerged when her lungs are full of air. Calculate the average density of a woman. **(05 Marks)**
- (b) A uniform pencil XY weighing 40 g can be balanced horizontally on a knife edge at 2 cm from the end X when a mass of 60 g is hung from this end. What is the length of this pencil? **(04 Marks)**
5. (a) Why does a gun appear to have a greater kick when fired with the butt held loosely against the shoulder than when held tightly? **(04 Marks)**
- (b) A pulley system is made up of 8 pulleys. An effort of 200N is applied on the pulley system. If a pulley system has an efficiency of 80%, what is the minimum load that can be raised by the effort applied? **(05 Marks)**
6. (a) Figure 4 shows a bimetallic thermostat strip used to regulate the temperature of the room by a heater and a cooler. Which device between A and B is a Cooler? Justify your answer. **(05 Marks)**

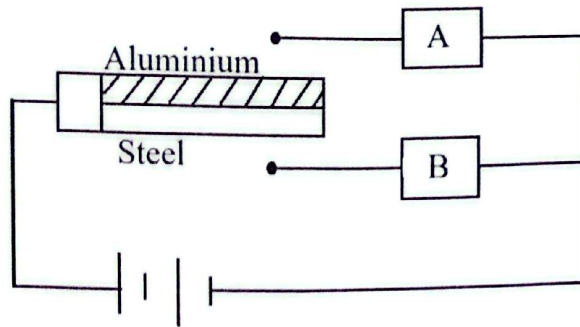


Figure 4

- (b) Suppose 105 g of fresh water at 75 °C is added to 215 g of cold fresh water at 15 °C and the mixture is well stirred, determine the final temperature of the mixture if the heat absorbed by the container is neglected. **(04 Marks)**

7. (a) A circuit in a house is protected by a 10A fuse. The circuit is connected to 240 V mains. The following appliances are connected to the circuit.

Appliance	Power rating
Bulb	100 W
Diffuser	75 W
Subwoofer	300 W
Refrigerator	1500 W

Will the fuse blow or not? Justify your answer.

(05 Marks)

- (b) A certain sample with half-life of 8 days contains 16 g of iodine-131. Estimate the mass of the sample which will remain undecayed after 20 days. **(04 Marks)**

8. (a) Briefly, explain why the inner core of the Earth is solid while the outer core is liquid even though the inner core has higher temperature than the outer core? **(05 Marks)**
- (b) Briefly, explain how tides are formed? **(04 Marks)**

SECTION C: (30 MARKS)

Answer only two (2) questions from this section.

9. (a) Study the circuit in figure 5, then answer the questions that follows.

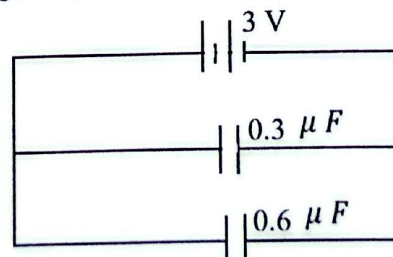


Figure 5

- (i) Determine the effective capacitance of the circuit. **(03 Marks)**
 (ii) How much charge is stored in $0.6 \mu\text{F}$ capacitor? **(02 Marks)**
 (b) Why resistance cannot be accurately measured using voltmeter and an ammeter? **(03 Marks)**
 (c) (i) Briefly, explain how resonance tube works? **(03 Marks)**
 (ii) Calculate the frequency of vibration in resonance tube of shortest length of 0.22 m when next resonance length is 0.47 m . **(04 Marks)**
10. (a) Briefly, explain the function of each of the following apparatus.
 (i) Geiger-Muller tube. **(02 Marks)**
 (ii) Diffusion cloud chamber. **(02 Marks)**
 (b) Distinguish the concept of conductors, semiconductors and insulators in terms of their energy bands. **(06 Marks)**
 (c) Describe the mechanism of doping pure semiconductor to obtain P-type semiconductor. **(05 Marks)**
11. (a) A sound is set out from the ship and its reflection from the floor of the ocean return one second later. Assume that the velocity of sound in water is 1500 m/s , how deep is the ocean? **(05 Marks)**
 (b) Describe the structure of the step-up transformer and state how it works. **(04 Marks)**
 (c) A transformer with 4800 turns in the primary coil is designed to work from 240 V mains to give a supply of 8 V in order to ring a bell. **(02 Marks)**
 (i) What would happen if the transformer were connected to 240 V d.c mains?
 (ii) Briefly explain why the primary current increases when a bell is being rung? **(04 Marks)**