

(c) A 20 - watt lamp with resistance of 7.2Ω uses a power supply from the secondary coil of transformer. If the primary coil is connected to a 120 V a.c outlet;

(i) What is the ratio of the number of turns on the primary to the number of turns on the secondary? **(4 marks)**

(ii) What type of a transformer is it? Explain. **(2 marks)**

**PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
AUTHORITY**

SHINYANGA MUNICIPAL COUNCIL

FORM FOUR DISTRICT MOCK EXAMINATION – MAY, 2023

031

PHYSICS 1

Time: 3: 00 Hours

Wednesday, 24th May, 2023 A.M

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 any two (2) questions from section C.
3. Section A carries sixteen (16) marks, section B carries fifty four (54) marks and section C carries thirty (30) marks.
4. All answers must be in blue or black ink except drawings which must be in pencil.
5. Non – programmable calculators may be used.
6. All communication devices and any unauthorized materials are not allowed in the examination room
7. Write your Examination Number at the top right corner of every page of your answer sheet.
8. Where necessary the following constants may be used.
 - (i) Acceleration due to gravity, $g = 10 \text{ m/s}^2$ or 10 N/kg
 - (ii) Density of mercury = 13.6 kg/cm^3 or 136000 kg/m^3
 - (iii) Pie, $\pi = 3.14$
 - (iv) Specific heat capacity of ice = $2.1 \times 10^3 \text{ Jkg}^{-1} \text{ K}^{-1}$
 - (v) Specific latent heat of fusion of water = $3.4 \times 10^5 \text{ Jkg}^{-1}$
 - (v) Density of water = 1 g/cm^3 or 1000 kg/m^3
 - (vi) Specific heat capacity of water = $4.2 \times 10^3 \text{ Jkg}^{-1} \text{ K}^{-1}$

SECTION A (16 Marks)

Answer **all** questions in this section

1. For each of the items (i) – (x), choose the correct answer among the given alternatives and write its letter besides the item number in the answer sheets provided.
- (i) Statements outlined below correctly describe features of a Physics laboratory, except;
- A. Enough room well supplied with adequate amount of gas, electricity and water
 - B. Adequate sinks, well illuminated and ventilated
 - C. Entrance doors which open outwards and inwards
 - D. Store for keeping apparatus
 - E. A big demonstration table and drainage system
- (ii) A house building contractor fitted window glass panes which someone cannot see through, but the rooms are fully illuminated with light. These types of glass panes materials are said to be;
- A. Opaque
 - B. Dim
 - C. Translucent
 - D. Transparent
 - E. Shine
- (iii) A student at a certain school observed a needle floating on water and was so surprised. What property of water made the needle able to float?
- A. Diffusion
 - B. Cohesive
 - C. Surface tension
 - D. Adhesive
 - E. Osmosis
- (iv) Why are walls of a dam made thicker at the bottom than at the top?
- A. At the bottom, wind exerts a greater pressure
 - B. At the bottom of the dam more stones and other debris collected
 - C. Thicker dam walls at bottom saves space and wall materials to be used
 - D. Pressure is higher at the bottom than at the top
 - E. So as to enable water to have a great collection space
- (v) A negatively charged rod is brought close to an uncharged metal sphere which is held on an insulated stand. Which of the diagram, best showing distribution of charge on the sphere when the rod is near?

S = distance covered

- Derive the third equation of linear motion **(5 marks)**
- (b) A daladala bus travelling from Kolandoto to Ndala stopped suddenly and the passengers started to push it from inside. Will the bus move? Explain how you reached to your answer **(4 marks)**
- (c) Train C and D starts moving at the same time along a straight line with uniform acceleration of 4m/s^2 and 2m/s^2 respectively. Initially, the trains are 10km apart, train C being behind. How long will it take for train C to overtake train D, and what is the distance measured from the starting point of train C? **(6 marks)**
10. (a) We can not hear echo in a room. Explain **(4 marks)**
- (b) Form four students from Masekelo Secondary School visited Kaole Art Centre as part of their study tour. When they were at the music department, they were surprised to find that all the stringed instruments such as guitars and violin were provided with hollow boxes. As a Physicist, explain to them why are all the stringed instruments provided with hollow boxes? **(5 marks)**
- (c) The fundamental frequency of a sonometer wire increases by 5 Hz if its tension is increased by 21%. How will the frequency be effected if its length is increased by 10%? **(6 marks)**
11. (a) With the aid of diagram, describe the structure of induction coil and briefly explain its mode of action. **(6 marks)**
- (b) Briefly explain two reasons why the induced e.m.f in induction coil is usually very large **(3 marks)**

that they leave a small gap between the successive lengths of the rails while laying the railway tracks.

(i) Briefly explain why gaps are left between rails. **(2 marks)**

(ii) If no gap is left, what happens **(2 marks)**

(b) Determine the amount of thermal energy required to change 1 kg of ice at -10°C to water at room temperature 25°C **(5 marks)**

7. (a) Give, with brief explanations, one practical application of a concave mirror in which a real image is used and one in which a virtual image is used. **(4 marks)**

(b) The image in a converging lens is upright and magnified four times. Calculate the object distance if the focal length is 20 cm. **(5 marks)**

8. (a) Satellites are usefully in our daily life. Give two importance of earth's satellite **(4 marks)**

(b) How many alpha and beta particles are emitted when Uranium $^{238}\text{U}_{92}$ decays to lead $^{206}\text{Pb}_{82}$? **(5 marks)**

SECTION C (30 Marks)

Answer any **two** questions from this section

9. (a) Given the first and second equations of linear motion as follows:

$$V = u + at \dots\dots\dots \text{First equation}$$

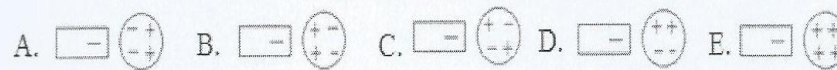
$$S = ut + \frac{1}{2}at^2 \dots\dots\dots \text{Second equation}$$

Where a = acceleration

u = initial velocity

v = final velocity

t = time taken



(vi) Which one of the following is the cause of the ocean tides?

- A. Gravitational force of the earth on the moon
- B. Rotation of the earth about the sun
- C. Rotation of the earth about its axis
- D. Gravitational force of the moon on sea water
- E. Rotation of the moon about the earth

(vii) Why it appears that, when the sun shines on the dark – coloured driving wheel of a car, the wheel feels warm?

- A. It is because the sun warms the car by induction
- B. It is because the sun gives energy to the wheel by convection
- C. It is because the sun radiates thermal energy to the wheel
- D. It is because the sun radiates heat to the glass windows
- E. It is because the sun conducts thermal energy to the wheel

(viii) Two waves pulses one with a positive amplitude and other with equal negative amplitude travel on cord approaching each other. What is the result of the oscillations when pulses reach the same points?

- A. It is a constructive interference with twice the amplitude
- B. It is destructive interference with zero amplitude
- C. It is constructive interference with slight greater amplitude
- D. It is constructive interference with the negative amplitude
- E. The standing wave is produced

(ix) A real object O is placed at a distance x cm in front of a spherical mirror of focal length a cm.

- 1. The image is inverted and the same size as the object O
- 2. The image is real

Choose one of the statements A to E for agreement with 1 and 2

- A. Convex mirror and $x = 2a$
 - B. Concave mirror and $x = 2a$
 - C. Concave mirror and $x = 4a$
 - D. Concave and $x = a/2$
 - E. Concave mirror and $x = a$
- (x) Which substance does not contract if cooled from 2°C to 0°C ?
- A. Iron B. Pure oil C. Pure water D. Brass E. Silver

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

List A	List B
(i) It contains alcohol as its thermometric fluid and mercury as the temperature indicator	A. Upper fixed point
(ii) Works on the principle that as the temperature of a liquid changes the liquid expands or contracts	B. Thermometer
(iii) Have narrow bore tubes and large bulbs	C. Maximum - minimum thermometer
(iv) Used to measure human body temperature	D. Liquid - in - glass thermometer
(v) Is the melting point of water	E. Lower fixed point
(vi) Is the boiling point of water	F. Constriction
	G. Mercury
	H. Sensitive thermometer
	I. Alcohol
	J. Quick - acting thermometer
	K. Clinical thermometer

SECTION B (54 Marks)
Answer all questions

3. (a) A pulley system is used to lift a body of weight 400N when an effort of 100N is applied. If the efficiency of this machine is 80%, draw a sketched diagram of this machine. **(5 marks)**

(b) Uniform metal beam of length 5 m and mass 9 kg is suspended horizontally by two wires attached at 50 cm from the left end of the beam and 150 cm from the right end of the beam. Furthermore, loads of 60 N and 150 N are placed at the quarter and three - quarter length of the beam respectively, from the left end. Determine the tension in each wire. **(4 marks)**

4. (a) When a uniform hydrometer is floated in a liquid of density 0.80 g/cm^3 , 17 cm apart long of hydrometer is submerged in a liquid. What length of the hydrometer will be submerged if it is floated in another liquid of density 0.85 g/cm^3 ? **(4 marks)**

b) Two airplanes A and B are moving with speeds 60 m/s and 60 m/s due east and due north respectively. If wind is blowing at 15 m/s due west, what is the velocity of airplane A with respect to that of B as observed by a stationary observer on the ground. **(5 marks)**

5.(a) The lead - acid car battery is of 12 V. The e.m.f of a dry cell is about 1.5 V. Can you replace the car battery by 8 such cells in series for starting the car? Give reason to your answer **(4 marks)**

(b) The headmaster's house from Ndala Secondary School is fitted with 5 bulbs of 100 W each, one electric press of 220 V drawing 2 A of current, 4 fans of 110 W each and a heater of 1120 W. If all the appliances work for 2 hours a day, find the electric bill for the month of April. The Tanzania Electric Supply Company Limited (TANESCO) charges 250.00 Tanzanian shillings per kWh of the electrical energy supplied. **(5marks)**

6. (a) An engineer of the company that constructs Tanzania Standard Gauge Railway instructed his workers to ensure