



THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
KIGAMBONI DISTRICT JOINT EXAMINATION



FORM TWO
031 PHYSICS

Time: 2½ hours

Friday, 16th May 2025 a.m.

Instructions

1. This paper consists of sections A, B and C with ten (10) questions.
2. Answer **all** questions in each section
3. All answers should be in the spaces provided
4. All writing must be in blue or black ink, **except** drawing which must be in pencil
5. Communication devices and unauthorized materials are **not** allowed in the assessment room
phones and any authorized materials are not allowed in examination room
6. Whenever necessary the following constants may be used
 - i. Acceleration due to gravity, $g = 10 \text{ m/s}^2$
 - ii. $\pi = 3.14$

Question number	For examiners use only	
	score	Examiner's initials
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
TOTAL		
CHECKER'S INITIALS		

SECTION A (15 MARKS)

1. For of the item (i) - (x), choose the correct answer from the given alternative and write its letter in the box provided
- i. A vernier caliper has 1 mm marks on the main scale. It has 20 equal divisions on the Vernier scale, which match with 16 main scale divisions. For this Vernier calipers, the least count is:
 - A. 0.02 mm
 - B. 0.05 mm
 - C. 0.1 mm
 - D. 0.2 mm
 - ii. A Liquid has a volume of 100 cm^3 and mass of 85 g. The density of water is 1.0 g/cm^3 How does the density of the liquid compare with the density of water?
 - A. Its density is higher than that of water
 - B. Its density is lower than that of water
 - C. Its density is the same as that of water
 - D. It is impossible to say with only this data
 - iii. The SI unit for capacitance is...
 - A. Farad
 - B. Joules
 - C. Volts seconds
 - D. Coulombs
 - iv. The mass of an object is reduced if its...
 - A. State is changed
 - B. Amount of matter is reduced
 - C. Surface is reduced
 - D. Volume is reduced
 - v. Which of the following is not a force at a distance?
 - A. Electrostatic force
 - B. Force of gravity
 - C. Frictional force
 - D. Magnetism force
 - vi. When a large body of experimental evidence supports the hypothesis or does not support the hypothesis, what may the hypothesis eventually be considered?
 - A. An observation
 - B. An insight
 - C. A conclusion
 - D. A law
 - vii. Which of the following best describes of a variable?
 - A. A trend that shows an exponential relationship
 - B. Something whose values can change over multiple measurements
 - C. A measurement of how much a plot line changes along the y-axis
 - D. Something that remains constant over multiple measurements

- viii. Physics is the fundamental branch of science, because the knowledge obtained in studying Physics is strongly connected to the other branches of science. Which of the following statements describes how Physics is connected to the other disciplines like chemistry and biology?
- Physics studies the properties of matter and energy, which are fundamental to all sciences
 - Physics focuses solely on celestial bodies and space exploration
 - Physics deals with the human mind and cognitive processes
 - Physics has many applications in medical fields
- ix. A sample of milk diluted with water has density of 1040 Kg/m^3 . If pure milk has a density of 1080 kg/m^3 then the percentage of water by volume in the diluted milk is...
- 55%
 - 40%
 - 50%
 - 45%
- x. The resistance of most of metals...
- Increase with increase in temperature
 - Increase with decrease in temperature
 - Decrease with increasing temperature
 - Decrease with decreasing temperature

i	ii	iii	iv	v	vi	vii	viii	ix	x

2. Match each item in **list A** against its corresponding item in **column B** by writing the correct response in the space provided

Column A		Column B
i.	Stores charge	A. Repel
ii.	$C = C_1 + C_2$	B. Capacitor
iii.	Electric current	C. Insulator
iv.	Similar charges	D. Leaf electroscope
v.	Detects charges	E. One the fundamental quantity
		F. Resulting from accumulation of stationary charges
		G. Metal cap
		H. Capacitors in parallel

SECTION B (70 MARKS)

3. (a) Mention four types of magnets according to their shapes.

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iv.
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(b) Give three properties of magnetic lines of force

- i.
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- ii.
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- iii.
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4. (a) Explain why

- i. Nylon clothes crackles as you undress

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- ii. Petrol road tankers usually have a metal chain hanging down touching the ground.

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(b) A capacitor of capacitance $200\mu F$ is being charged. The potential difference between its plates is 10V. How much charge will accumulate on the plates during the period of charging.

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5. (a) i. Why is it important to keep the centre of gravity of a bus as low as possible?

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ii. State two conditions that must be satisfied for a body to be in equilibrium

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(b) With examples, explain three type of equilibrium.

- i.
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- ii.
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- iii.
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6. (a) i. Explain the meaning of magnetization as applied in magnetism

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ii. State four application of the earth's magnetic field

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(b) In order to maintain the magnetism in magnets for a long period, some practices have to be observed, explain four such practices.

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7. (a) i. Define the term light

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ii. State the laws of reflection

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(b) How many images are formed when two plane mirrors?

i. Are placed in such a way that they make 60°

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ii. Parallel to each other

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8. (a) A model car mass of 20 kg moves at speed of 6m/s for 10s. Find the power developed by its engine.

i. In watts

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ii. In horse power

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(b) Differentiate potential energy from kinetic energy.

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9. (a) Briefly explain why:

i. The wall of the dam is made much thicker at the bottom than at the top

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ii. It is easier to cut a bar of soap using a thin piece of wire than a thick object.

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(b) The advantages of Aneroid barometer over the Fortin barometer are

- i.
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- ii.
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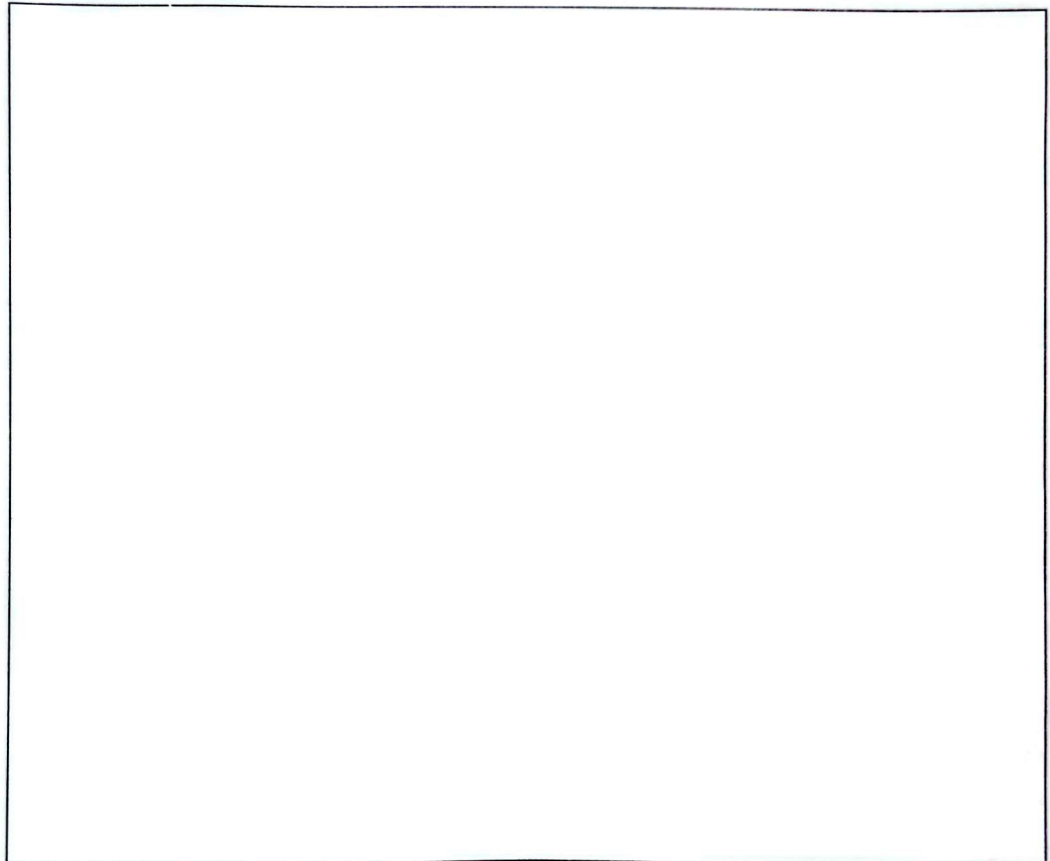
SECTION C (15 MARKS)

10. Suppose you are physics laboratory leader and you are asked by your teacher to prepare the electrical components and instruments for an experiment to determine the relationship between voltage and current

(a) List five electrical components which will be used in this experiment

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(b) Draw a simple electric circuit which will be suitable for that experiment.



(c) Using the simple electric circuit drawn in 10(b), state the criteria used to connect the ammeter and voltmeter electrical component in the circuit.

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**FORM TWO
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MARKING SCHEME MAY 2025

SECTION A (15 MARKS)

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
D	B	A	B	C	C	B	A	C	A

2.

i.	ii	iii	iv	v
B	H	E	A	D

SECTION B (70 MARKS)

3. (a) Four types of magnets according to their shape **(4 marks)**

- Bar magnet.....
- Horseshoe Magnet.....
- Disc magnet any four type 1@
- Ring magnet
- Ball ended magnet
- Cylindrical magnet

(b) Three properties of magnetic lines of force **(6 marks)**

- i. They are continuous and always form closed loop
- ii. Line of force from a bar magnet leave the north pole and enters the south pole and back to the north pole form a closed loop any three 2@
- iii. Magnetic lines of a force are closer together where the magnetic field is stronger and they are far where magnetic force is weaker
- iv. Magnetic lines of a force never cross one another
- v. Parallel magnetic lines of force in the same direction repel one another

4. (a)

- i. Nylon clothes crackles as you undress **(3 marks)**
This is because static charges charge (negative) develop when the nylon clothes are rubbed. As amount of charges increases the negative charges on the nylon tend to make path towards the positive charges, and it results in and electrical discharge ., electrical discharge is associated with sound

- ii. Petrol road tankers usually have a length of metal chain hanging down touching the ground. (3 marks)

It is because the motion of the tanker produce charges when the tanker moves, in so doing the tanker gets charged by friction, the metal chain enables the charges to flow to the ground. If the metal chain is not attached then due to the production of charges the tankers may get in fire

- (b) Charge that will accumulate on the plates during the period of charging

Soln.

Given that capacitance = $200\mu F = 200 \times 10^{-6} F$ (01mark)

$C=10V$

from $Q= CV$ (01 mark)

= $200 \times 10^{-6} F \times 10V$ (01 mark)

= $2 \times 10^{-3} C$ (01 mark)

5. (a) i. Important of keeping the centre of gravity of a motor –bus as low as possible:

Because the low centre of gravity increases the stability of a motor bus , which prevents from overturning(02 mark)

- ii. State two conditions that must be satisfied for a body to be in equilibrium

- The sum of Upward forces must equal to sum of do downward force .(02 marks)
- Sum of clockwise moment must be equal to sum of ant-clockwise moment (02 marks)

- (b) The three types of equilibria are:

- i. Stable equilibrium A body is said to be in stable equilibrium if after a small disturbance it returns to its original position when released. A center of gravity raises its centre of gravity and gravity pulls back .. (02 mark)
- ii. Unstable equilibrium A body is said to be in un stable equilibrium if after a small disturbance, the object moves further from its initial position example when balancing on a tip of a finger ... (02 mark)
- iii. Neutral equilibrium A body is said to be in neutral equilibrium if the object neither tends to return to its initial nor moves far away. For instance ... (02 mark)

6. (a) i. Magnetization as applied in magnetism (2 marks)

Magnetization - is process of aligning the atomic dipole in a material in one direction so as to produce net effect of attraction or repulsion

- ii. State four application of the earth's magnetic field (04 marks) any four points

- It is used by map researchers to find locations of different places
- Gives useful information in the such for minerals
- Reversal of the earth's magnetic field provide the basis for dating rocks and sediments

- It protects the earth from cosmic radiation
- Map –readers with a magnetic north can locate the direction of the magnetic north using compass

(b) In order to maintain the magnetism in magnets for a long period, some practices have to be observed, explain four such practices **(04 marks)**

- Avoid storing magnets in places where they come into contact with ferrous objects such as steel shelves and tools
- Store magnets in pairs with the unlike poles facing each other. Pieces of magnetic keepers are used at the ends to preserve the strength of magnets
- Don't over heat magnets
- Do not store the or keep magnets near strong magnetic or electric field
- Do not subject magnets to any form of severe stress such as vibrations or mechanical impacts

7. (a) i. **(2 marks)**

Light is a form of energy that stimulates the sensation of vision

ii. Laws of reflection **(02 marks)**

First law of reflection states that 'incident ray, the reflected ray and the normal ray , lie on the same plane

Second law state that 'The of incidence is equal to the angle of reflection “

(b) How many numbers of images are formed when two plane mirrors? (03 marks)

i. are placed in such a way that they make 60°C

To find the number of images formed by two plane mirrors inclined at an angle, we

use the formula $n = \frac{360^\circ}{\theta} - 1$ 1marks

Where n is number of image formed

θ is the angle formed by two mirrors

$$\text{now } n = \frac{360^\circ}{90^\circ} - 1$$

$$= 4-1 \text{1marks}$$

$$= 3 \text{ images}$$

$\therefore$ there will be three images formed1marks

ii. Parallel to each other

When two plane mirrors are arranged parallel to each other they form an infinite number of images. This happens because the light reflects back and forth between the two mirrors endlessly, creating a series of images that appear to go on forever.....3 marks

Alternatively

From $n = \frac{360^\circ}{\theta} - 1$ when they are parallel then angle between them is zero

, now from the given formula we have $n = \frac{360^\circ}{0^\circ} - 1 \rightarrow n = \infty - 1 = \infty$

8. (a) The power developed by its engine:

i. In watts Given that mass = 20kg Speed = 6m/s Time = 10s From $Power = \frac{mv^2}{2t}$01 Then $power = \frac{20kg \times (6m/s)^2}{2 \times 10s}$01 = 36 W.....01 $\therefore power = 36w$..... 01	ii. In horse power From 1hp = 746 watts01 ? = 36 watts Thus, $P = \frac{1hp \times 36 \text{ watts}}{746 \text{ watts}}$ $\therefore power \text{ is } 0.048 \text{ hp} \dots\dots 01$
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(b) Potential energy from kinetic energy (04marks)

- Potential energy is energy possessed by an object due to its position while kinetic energy is energy possessed by an object due to its position

9. (a) (i) The wall of the dam is made much thicker at the bottom than at the top

The pressure exerted by the water increases with depth. At the bottom of the dam, the pressure is much higher due to the weight of the water above. To withstand this increasing pressure, the dam needs to have a thicker base to provide structural integrity and prevent failure. (3marks)

ii. It is easier to cut a bar of soap using a piece of wire than the thick one

When using a piece of wire, the wire has a smaller cross-sectional area than a thick object (like a knife), which allows it to exert more pressure on the soap, effectively slicing through it. The wire minimizes the contact area, making it easier to penetrate the surface of the soap (3marks)

(b) The advantages of the aneroid barometer over the Fortin barometer are:

i. Compactness and Portability:(2 marks)

Aneroid barometers are smaller and more portable than Fortin barometers, which makes them easier to carry and use in various locations.

ii. No Need for Liquid.....(2 marks)

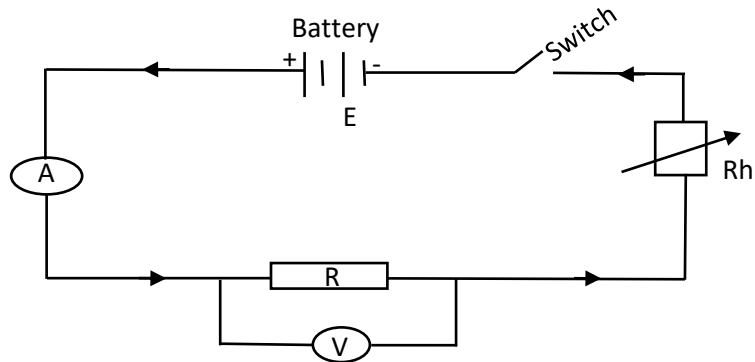
Aneroid barometers do not require liquid (like mercury) to function, making them safer to use as they eliminate the risk of spills or breakages that can happen with liquid-based barometers.

SECTION C (15 MARKS)

10. (a) **(5 marks)**

- Battery01 mark
- Voltmeter.....01mark
- Resistor.....01mark
- Switch.....01 mark
- Ammeter,.....01mark

(b) Solution **(5 marks)**



(c) **(5 marks)**

- Ammeter should be connected in series with other electrical component so as to measure the current(02.5 marks)
- Voltmeter should be connected parallel with a resistor in order to draw a very small current which would not affect the current of the circuit **(02.5 marks)**