THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

LAKE ZONE FORM FOUR MOCK EXAMINATION
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031/1 **PHYSICS 1**

(For Both School and Private Candidates)

Time: 3Hours **Year: 2025**

INSTRUCTIONS

1. This paper consists of section A, B and C.
2. Answer all questions in section A and B and only two (2) questions from section C
3. Non-programmable calculators may be used.
4. Cellular phones and any unauthorized materials are not allowed in the examination room
5. Write your examination number on every page of your answer sheet(s) provided.
6. Where necessary, the following constants maybe used
   (a) Acceleration due to gravity g = 10 m/s^2
   (b) Density of water = 1g/cm^3 or 1000kg/m^3
   (c) Specific heat capacity of copper, C = 390J/kg°C.

SECTION A: (16 MARKS)

Answer all questions in this section

1. For each of the following items (I – X) choose the correct answer from among the given alternatives and write its letter beside the item number in the answer sheets provided
   (i) Which of the following are good examples of ferromagnetic materials
   A. Iron and ceramic B. Zinc and iron ( )
   C. Copper and nickel D. Nickel and cobalt E. Cobalt and ceramic
   (ii) People eat food every day without missing. What form of energy do people get from the food after eating?
   A. Mechanical energy B. Heat energy ( )
   C. Solar energy D. Radiant energy E. Chemical energy

(iii) A transistor is a device which
A. Amplifies alternating current or voltage
B. Amplifies direct current or voltage ( )
C. Rectifying power input
D. Rectifying direct current or voltage
E. Rectifies alternating current

(iv) Which of these resources of energy is non-renewable ( )
A. Wave energy B. Bio fuel
C. Radiant energy D. Fossil fuel E. Geothermal energy

(v) A layer of colourless water floating on a blue copper (II) sulphate solution becomes blue after sometimes. Which process supports the observations made ( )
A. Diffusion B. Cohesive
C. Surface tension D. Adhesive E. Osmosis

(vi) A resistor of 100Ω is connected across a battery of 12V. How much heat is dissipated across the resistor in 5 seconds? ( )
A. 7200 J B. 0.72J
C. 7.2J D. 80.0072J E. 720J

(vii) Which among the following could be the best reason as to why the sky appears blue while being observed from the earth's surface?
A. Selective scattering of light B. Regular refraction of light ( )
C. Irregular refraction of light D. Diffuse refraction of light
E. Selective scattering of moonlight

(viii) Atmosphere is classified into different layers, the layer in the atmosphere where weather phenomena are formed is
A. Stratosphere B. Troposphere ( )
C. Exosphere D. Thermosphere E. Ionosphere

(ix) Light waves differ from sound waves because
A. Light is an electromagnetic wave
B. Light wave is long and sound waves are short ( )
C. Interference is obtained in light waves but not in sound waves
D. The speed of light is independent of the medium in which it travels
E. Sound waves do not travel in water

(x) Which of the following is the condition for wave refraction to take place
A. Decrease in velocity and frequency B. Increase in velocity ( )
C. Inter new medium D. Increase in frequency
E. Merge with another wave

2. Match the items in list A with the response in list B by writing the letter of the correct response in your answer booklet

LIST A	LIST B
(i) Electromagnetic waves which are used in cooking	A. Radio waves

(ii) Electromagnetic waves which are used by plants for making their own food (iii) Electromagnetic radiations which are used in CD and DVD player to read content of the discs (iv) Electromagnetic radiations which are used for satellite communications or telecommunications (v) Electromagnetic radiations which stimulate the production of vitamin D on the human skin (vi) Electromagnetic radiation which is used to sterilize food so as to improve hygiene using a technique known as food irradiation	B. Microwaves C. Visible light D. Ultra violet E. X-rays F. Gamma rays G. Infrared waves

SECTION B (54 MARKS)

Answer all questions in this section

3. (a) A body dipped in a liquid experience an up thrust. Explain three factors on which the up thrust depends on. **(3 marks)**

   (b) Two identical free running trolleys each of mass m are on smooth horizontal runway. One trolley is at rest and the other approaches it at a constant speed of 20m/s

   (i) Use the principle of conservation of linear momentum to find the common speed of the two trolleys after collision **(3marks)**

   (ii) Calculate total kinetic energy before and after collision **(3 marks)**

4. (a) Why does a buble of air increase in volume as it rises from the bottom of a pond of water to the surface? **(4 marks)**

   (b) A half meter rule AB is freely pivoted at 18cm from end A and balances horizontally when a body of mass 35g is hung 48cm from end B. calculate the mass of the rule **(5 marks)**

5. (a) Explain why the table cloth can be easily pulled out without disturbing the dish placed on it? **(3 marks)**

   (b) (i) A crate B of mass 40 kg is raised by the rope of a crane from a ship. If the tension in the rope is 480N, find the acceleration of the crate as it rises **(3 marks)**

   (ii) A block of mass 270kg is pulled along a horizontal surface. If the coefficient of kinetic friction between the block and the surface is 0.4, what is the force acting on the block as it slides? **(3 marks)**

6. (a) Briefly explain each of the following observations

   (i) It is difficult to unscrew wheel nuts in the morning, while it is relatively easy to unscrew them on a hot day **(3 marks)**

   (ii) Corrugated iron – sheet roofs make cracking noises on a cold night after a hot day **(3 marks)**

(b) The temperature of a 600g block of copper rises from 15°C to 30°C on being heated. Determine the amount of heat supplied to the block **(3 marks)**

7. (a) How does the size of a gap in a barrier affect the diffraction of waves **(3 marks)**

(b) (i) State two ways in which visible light differ from radio waves **(2 marks)**

(ii) The fundamental frequency of vibrating string is F. what will be the fundamental frequency if the length of the string is halved and the tension of the string is increased four times **(4 marks)**

8. (a) What is global warming? **(1 mark)**

(b) Name four gases that contribute to global warming. For each gas, write at least one source producing it **(4 marks)**

(c) Write at least four effects of global warming **(4 marks)**

SECTION C: (30 MARKS)

Answer only two questions in this section

9. (a) Explain why petrol road tankers usually have a length of metal chain hanging down touching the ground? **(3 marks)**

(b) Draw diagram of an instrument used to detect the presence of electric charges in a conductor. **(5 marks)**

(c) (i) State ohm's law **(2 marks)**

(ii) Determine the internal resistance of a cell and the value of R given that the P.d of the cell in open circuit is 1.5V. When connected to a 10Ω resistor its P.d becomes 1.OV, but when connected to a resistor RΩ the P.d falls to 0.5V **(5 marks)**

10. (a) With the aid of diagram explain how X-rays are produced in an X-ray tube.

(b) Distinguish between hard and soft X-rays. Explain the use of each **(4 marks)**

(c) Explain the difference between conductors, semiconductors, and insulators using the energy band theory. **(6 marks)**

11. (a) (i) What is electromagnetic induction? **(2marks)**

(ii) Why efficiency of a transformer is less than 100%? **(3 marks)**

(b) A step up transformer has 10000 turns in the secondary coil and 100 turns in the primary coil. A current of 5.0A flows in the primary circuit when connected to a 12.0V supply

(i) Calculate the voltage across the secondary coil **(2 marks)**

(ii) If the transformer has an efficiency of 90%, what is the current in the secondary coil? **(3 marks)**

(c) A sample containing caesium-137 isotopes have a mass of 20mg. If the half-life of caesium-137 is 30 years. What will be the mass of the sample in mg remain after 90 years? **(5 marks)**