

**THE PRESIDENT'S OFFICE**  
**REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**  
**UKEREWE DISTRICT COUNCIL**



**FORM FOUR MOCK EXAMINATION**

**031/1**

**PHYSICS**

**TIME 3:00 Hours**

**Year: 2025**

**INSTRUCTIONS**

1. This paper consists of sections A, B and C with a total of **eleven (11)** questions.
2. Answer **ALL** questions in section A and B and **two (2)** questions from section C
3. Cellular phones and unauthorized materials are not allowed in the examination room
4. Non- programmable calculator may be used
5. Write your **examination name** on every page of your answer sheets/booklet(s)
6. Whenever necessary, the following constants may be used;
  - Acceleration due to gravity,  $g=10\text{m/s}^2$
  - Pie,  $\pi=22/7$
  - Density of water  $=1.0\text{g/cm}^3$  or  $1000\text{kg/m}^3$
  - Density of sea water  $1.3\text{g/cm}^3$  or  $1300\text{kg/m}^3$

## SECTION A (15 MARKS)

### Answer all questions

1. For the item (i) - (x), choose the correct answer from among the given alternatives and write its letter beside the item number in the answer sheet(s)/booklet provided

i) Oil is used as a lubricant because

- A. It has low density
- B. It is highly viscous
- C. It is flammable
- D. It is less viscous
- E. It has high density

ii) When charging a body by friction the charges (particles) that are transferred are

- A. Protons
- B. Nuclei and protons
- C. Nuclei
- D. Electrons
- E. Protons and electrons

iii) When a bus starts or stops moving. Passengers tend to be jerked forward. This is due to

- A. Newton's 1<sup>st</sup> law of motion
- B. Newton's 2<sup>nd</sup> law of motion
- C. Newton's 3<sup>rd</sup> law of motion
- D. Newton's law of universal gravitation
- E. Law of conservation of momentum

iv) Diffusion occurs more quickly in a gas than in a liquid because

- A. The liquid contains a layer on its surface
- B. The gas contains semi permeable membrane
- C. The gas molecules is small insize compared to the liquid molecules
- D. The adhesion is larger than cohesion
- E. Speed of gas molecules in gas is greater than in liquid

v) Which of the following sources of energy is non renewable?

- A. Wave energy
- B. Bio fuels
- C. Radiant energy
- D. Fossil fuel

E. Geothermal energy

vi) The temperature of a certain liquid is measured to be 273k. What will be its temperature in degree centigrade?

A. 273.°C

B. 100°C

C. 57°C

D. 0°C

E. 37°C

vii) Buoyancy is mainly determined by using two factors namely

A. Volume and density

B. Volume and mass

C. Weight and mass

D. Weight and density

E. Weight and volume

viii) The shaving mirror is a typical application of a

A. Concave mirror

B. Convex mirror

C. Plane mirror

D. Rotating mirror

E. Magnifying mirror

ix) A pin at the bottom of a basin full of water appears to be 6cm from the surface. Given that the refractive index of the water is  $\frac{3}{4}$ . What is the actual distance of the pin from the surface?

A. 1.33 cm

B. 4.85 cm

C. 7.33cm

D. 8.0cm

E. 2.47cm

x) A car moving at steady speed has a frictional force whose size depends on

A. Its speed and surface area

B. Its speed only

C. Its area only

D. Its weight

E. Its wheel speed

2. Match each item in **COLUMN A** against its corresponding item from **COLUMN B** by writing the number of the correct response in the answer column.

LIST A	LIST B
i) Blurred image ii) Critical angle iii) Photo cells iv) Long wavelength v) Total internal reflection vi) Refractive index	A. Is used in fire alarms to detect the smoke that comes from the fire B. Is the reason to why a person sees a pond of water ahead when walking a tarmac road during the day C. The reason why engineers dealing with motor cars use red light in car brakes D. Responds due to change in light intensity. E. Our eyes focus on object clearly F. Determine whether total internal reflection will occur or not G. When your eyes find it harder to focus an object H. Determine the purity of a particular substance

### SECTION B (54 Marks)

Answer **all** questions from this section

3. a) A plane mirror and concave mirror both produce an image from a given object. Draw a diagram to represent the formation of image in each case (for the centre of curvature C).

Hence show two similarities and two differences of the images formed.

b) A simple microscope is a useful product of physics. Explain shortly three uses of a simple microscope.

4. a) Mercury barometer in physics laboratory read 732mmHg. Calculate the atmospheric pressure in Pascal.

b) A heavy uniform beam AB of weight 500N is supported at its ends. The beam carries a weight of 3000N at a distance of 1.5m from the end A. If the beam is 4m long find the thrust at A and B.

5. a) Ngorongoro crater is thought to have been formed by the impact of a meteor with earth thousands of years ago. The mass of the meteor is estimated to be  $5 \times 10^{10}$  kg and its speed at 7200m/s. what speed would such a meteor give Earth in a head on collision? (Mass of earth =  $6 \times 10^{24}$  kg)

b) Machine is a device used to simplify work. With examples explain how the following machines simplify work in their respective stated area.

i) Inclined plane at home

ii) Screw jack in garage

6. a) A 0.5kg block of aluminum at temperature of  $100^{\circ}\text{C}$  is placed in 1.kg of water at  $20^{\circ}\text{C}$ . Assuming that no thermal energy is lost to the surrounding, what will be the final temperature of the aluminum and will be the final temperature of the aluminum and water when they attain the equilibrium temperature?

b) An ice forms at the top of oceans and other water bodies during freezing conditions but not at the bottom. Identify the name given to this phenomenon and draw a graph of density against temperature that leading to this phenomenon.

7. a) i) You as a sound engineer, suggest three conditions for a clear echo to be heard

ii) The first resonance in the tube of resonance occurs when the length of the air column is 20cm. what are the lengths of air column in the second resonance respectively?

b) The half life of iodine -131 is 8 days. A sample contains 800g iodine-131. How much of the sample will remain undecayed after 40 days?

8. a) In Arusha town, where volcanic activities have shaped the landscape, local communities have observed various environmental changes. Based on this, explain three (3 points) which volcanic eruptions can impact agriculture, human health, infrastructure and the economy

b) i) Given your understanding of environmental science, show and explain three gases that contribute to the greenhouse effect.

ii) Explain, using specific examples, the three main benefits of tides in relation to marine life, coastal economies and environmental balance.s

### SECTION C (30 Marks)

Answer two questions in this section

9. a) i) When a capacitor is provided with more charge, the value of its positive and negative potential increases, why does this happen?

ii) Three capacitors A,B and C are arranged in series, their capacitances are given as  $10\mu F$ ,  $20\mu F$  and  $30\mu F$  respectively. Calculate the value of a single capacitor that could replace them.

b) i) You are required to use  $3\Omega$  resistor in your electric circuit unfortunately there are only  $2\Omega$  resistors in a school's physics laboratory. How could you design the required resistors from available resistors?

ii) Given that the charge of an electron is  $6.0 \times 10^{-19}C$ , find the number of electrons that pass in one second through any cross-section of a conductor in which there is a steady current of 1 ampere

10. a) i) Jelvin, a form four student in Dar es salaam, is preparing a science presentation. Based on her knowledge of physics, explain briefly how he would describe the process through which x-rays are produced.

ii) A students at Mwanza secondary school, visited a hospital radiology department during a science field trip. Based on what observed and learned, explain six uses of X-rays in real-life situations

b) i) How does a P-N junction operate in regulating the flow of current in semiconductor devices? Use clear explanation to support your response

ii) With the help of a graph, explain how temperature affects the conductivity of conductors, semiconductors and insulators

11. a) i) Why do we hear sound of approaching car before the car reaches us?
- ii) If the frequency of a wave is doubled and its the speed remains constant, what will happen to its wavelength?
- b) i) What are the necessary conditions for production of an induced e.m.f?
- ii) A step-up transformer has 1000 turns in the secondary coil and 100 turns in the primary coil. An a.c of 5A flows in the primary coil when connected to a 12V a.c supply. Calculate the voltage across the secondary coil and current in the secondary coil if the efficiency is 90%