Candidate's Index Number ……

THE UNITED REPUBLIC OF TANZANIA
THE PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
TANGANYIKA DISTRICT COUNCIL
FORM FOUR MOCK EXAMINATIONS

PHYSICS 1

031/1

Time: 3:00 Hours **April, 2023**

INSTRUCTIONS

1. This paper consists of three sections A, B and C with a total of eleven (11) questions.
2. Answer all questions from Section A and B and 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. Cellular phones and other unauthorized materials are not allowed in the examination room.
5. Non-programmable calculators and mathematical tables may be used.
6. Write your index number on every page of your answer booklet(s) provided
7. Where necessary, the following constants may be used.
   (i) Acceleration due gravity (g) = $10m/s^2$
   (ii) Specific heat capacity of water (C_w) = 4200 $^J/Kg\ °K$
   (iii)Specific heat capacity of copper (C_c) = 390 $^J/Kg\ °K$
   (iv)Pie (II) = 3.14
   (v) Specific heat capacity of solid = $2.5\times10^{+3}$ $^J/Kg\ °C$

FOR EXAMINERS' USE ONLY

QUESTION NUMBER	SCORE	EXAMINER'S INITIALS
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		
11		
TOTAL		
CHECKER'S INITIALS		

Candidate's Index Number ……

SECTION A (16 marks)

Answer all questions in this section

1. For each of the items (i) – (x), choose and write the letter of the most correct answer in the answer sheet(s) provided.

(i) In the crushing can experiment, the can collapse because
- A. It is weakened by the hot water
- B. Pressure outside is atmospheric
- C. Pressure outside is greater than pressure inside
- D. Pressure inside is greater than pressure outside
- E. Pressure inside is atmospheric

(ii) Water is preferred to ethanol to be used as coolant because…
- A. Water has higher density than ethanol
- B. Water has higher specific capacity than ethanol
- C. Ethanol has higher density than water
- D. Ethanol is more volatile than water
- E. Water boils at 100 °C

(iii) Hook's law related the
- A. Distance a spring stretches to the force applied to the spring
- B. Distance a spring stretches to a mass of the spring
- C. Distance a spring stretches to the density of the spring
- D. Density of a spring to the force applied to the spring
- E. Density of the spring to the mass of the spring

(iv) The property which distinguishes longitude from transverse waves is the ……
- A. Speed to the propagation
- B. Wave length
- C. Relative direction of vibrations and propagation
- D. Need for a material medium to propagate
- E. Ability to be refracted, reflected and diffracted

(v) A wire of uniform cross section area has a length of 10m, a resistance of 2Ω and resistivity of 2×10^{-7} Ω m. The cross section area in m^2 is …….
A. 2×10^{-4} B. 1×10^{-5} C. 0.5×10^{-5} D. 1×10^{-6} E. 5×10^{-4}

(vi) A machine is able to lift 200kg of a bricks vertically up to the height of 30m above the ground in 5 seconds. This implies that, power of the machine in kilowatts is…..
A. 0.12 B. 12 C. 1.2 D. 120 E. 3

(vii) A note X from a guitar produces a wave amplitude 3×10^{-3}m and frequency 700 Hz. A note Y from a whistle produces a similar wave form of amplitude 2×10^{-3} m and frequency of 900 Hz. If he two notes X and Y are compared, which of the statements A to E is correct?

A. Y is louder than X
B. X is a higher pitch than Y
C. X and Y have same quality or timbre
D. Y is less louder than X
E. Y has a greater speed than X

(viii) Linear magnification is defined as a ratio of ……..
A. Object distance to image distance
B. Object height to image height
C. Image distance to focal length
D. Image height to object height
E. Image height to object height

(ix) Among of the following are properties of magnetic field lines except:
A. Pass through magnetic materials only
B. Enter or leave a magnetic material at right angles to the surface
C. Start at the north poles and end at the south pole
D. Never cross each other
E. Are continuous and always form closed loops

(x) When a galvanometer is used to measure electric current in circuit, it must be connected with,
A. A shunt in series
B. A multiplier in parallel
C. A shunt in parallel
D. Multiplier in series
E. Ammeter in both series and parallel

2. Match the item in **List A** with the correct responses in **List B** by writing the letter of the correct response beside the item number in the answer sheet (s) provided:

LIST A	**LIST B**
(i) Sonometer (ii) Ripple tank (iii)Audibility range (iv)Pressure waves (v) Holograms (vi)Reverberation	A. 20 KHZ to 20,000 KHZ B. Multiple of reflection of sound waves in enclosed room. C. Sound waves D. Water waves E. Diffraction of waves F. Helps to observe the behavior of waves G. Help to study the properties stationary waves H. 20 Hz to 20000 Hz I. Helps to study properties of non-stationary waves J. Time taken for reflection of sound wave to decay in enclosed room K. Interference of waves

SECTION B (54 Marks)

Answer all questions in this section

3. (a) A uniform metal cube of length 5m and mass 9kg is suspended horizontally by two wires attached at 50cm from the left end of the cube and 150cm from the right end of the cube. What is the tension in each wire?
   (b) Briefly describe why are dams constructed thicker at the bottom than at the top.

4. (a) Why does the sky appear blue while being observed from the earth and black when you are on the moon?
   (b) A string of length 75cm has a mass of 8.2g. If the tension in the string is 18N, calculate the frequency of the tenth and twentieth overtones.

5. (a) The handle of a screw jack is 35cm and the pitch of a screw is 0.5cm. If the efficiency of the jack is 55%, calculate the force required to be applied at the end of the handle to lift a load of 2300N.
   (b) A solid of mass 26g absorbs 800J of heat when heated. If the initial temperature too the body is 30°C, find its final temperature.

6. (a) A piece of iron and a piece of wood are both cooled to a temperature of the 0°C when touched with a finger, the iron feels colder than the wood. Briefly describe why?
   (b) A car starts to move from rest and accelerated uniformly at the rate of 2 m/s^2 for 6 seconds. It then maintains a constant speed for half a minute. After brakes are applied, it retards uniformly to rest in 5 seconds. Calculate:
   (i) The total distance covered in metres.
   (ii) The maximum speed reached.

7. (a) What are:

(i) Alpha α- particles?

(ii) Gamma, ɣ - rays?

(b) (i) With the help of diagram explain how radiation emitted by radioactive element are applied in electric plate and magnetic plates.

(ii) A radioactive element has initial count rate of 1200 count per minutes measured by scale and this falls to 150 counts per minutes in 15 hours. Determine the half life of the element.

8. (a) (i) Define the term earthquake
   (ii) Name four gases that contribute to global warming.
   (b) Briefly explain four hazards associated with earthquake.

SECTION C (30 Marks)

Answer **two** (2) questions from this section

9. (a) (i) State Faraday's law of electromagnetic induction.

(ii) Briefly explain three uses of eddy currents.

(b) The potential difference across the terminals of a cell is 1.2 V when a current of 0.20 A is being drawn from the cell. If the potential difference across the cell is 1.4 V when a current of 0.10A is being drawn, determine the internal resistance of the cell. (c) Draw a well labelled cathode ray tube.

10. (a) Explain briefly:

(i) Why sound produced in a hall with many people is heard more clearly than when the hall has few people.

(ii) Why a duck remains floating at the same place as wave passes by the water in a lake.

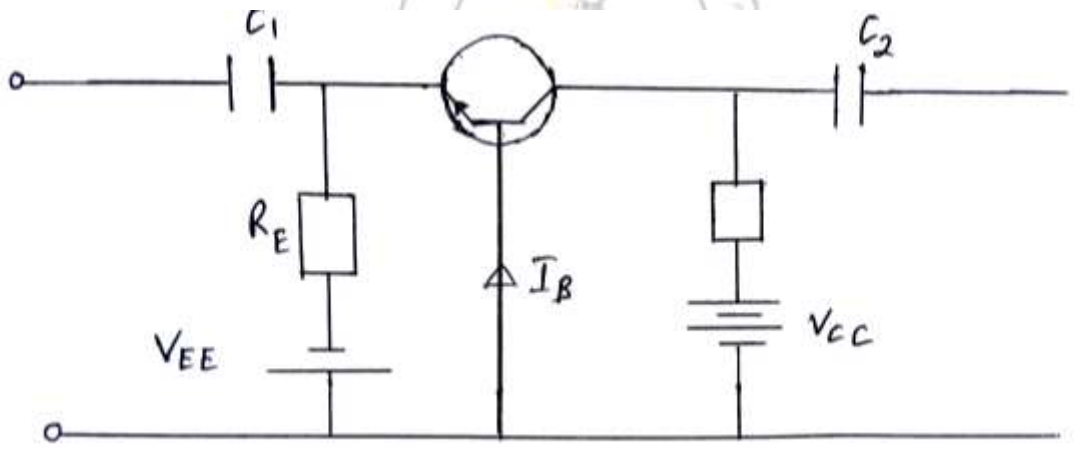
(b) Wind is blowing 30° west of north at 20 Km/h. A bird is flying in the wind and its velocity relative to the ground is 90 Km/h at 75° west of north. Find the direction and velocity of the bird.

(c) A block of wood of mass 5kg is placed on a rough plane inclined at 60°. Calculate its acceleration down the plane if coefficient of friction between the block and the plane is 0.32.

11. (a) (i) Transistor and diodes are electronic devices used in electronic circuit. Give out one use for each.

(ii) Explain why NPN semiconductors are more preferred than PNP semiconductors in most electronic devices.

(b) Consider the figure below:



(i) What is the name of diagram above. Why is called so?

(ii) What is the name of C_1 and C_2, what are their functions in common.

(c) (i) Explain the effect observed when kerosene is mixed with water in a beaker, Give a reason to support your answer.

(ii) A spring balance reads 12N when a metal block is suspended from it in air and reads 10N when totally immersed in water. Find the volume of metal block.