THE UNITED REPUBLIC OF TANZANIA

DODOMA REGION

FORM FOUR MOCK EXAMINATION-2023

031/1 **PHYSICS 1**

Time 3 Hours **August, 2023**

Instructions

1. This paper consists of sections **A**, **B** and **C** with total of **eleven**(**11**)questions
2. Answer all questions in section **A** and **B** and any **two (2)** questions from section **C**.
3. Section **A** carries **sixteen (16)** marks, section B **fifty four (54)** marks and section **C** **thirty (30)** marks.
4. Cellphones and any unauthorized materials are not allowed in the examination room.
5. Non programmable calculator and mathematical table may be used in the examination room.
6. Write your examination Number on every page on your answer booklet(s)
7. Where necessary the following constants may be used:
   - Acceleration due to gravity g = 10m/s^2
   - Specific heat capacity of water = 4200Jkg^{-1}K-1
   - Speed of light in air = $3\times10^8 ms^{-1}$
   - Speed of sound in air = $330ms^{-1}$
   - Pie (π) = 3.14

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 beside the item number. **(10 marks)**

(i) A density bottle has mass of 70g when empty, 90g when full of water and 94g when full of a liquid, the relative density of the liquid is;-

A. 0.34 B. 0.83 C. 0.96 D. 1.04 E. 1.2

(ii) A force of 40N is necessary to extend a spring by 20mm. If a mass of 0.5kg is attached to the lower end of the spring, what will be the extension of the spring in mm?

A. 0.20 B. 1.00 C. 2.50 D. 5.00 E. 10.00

(iii) A block rests on the horizontal surface. A girl says that the friction between the block and the surface depends on;-

1. Surface area in contact
2. Nature of the surfaces
3. Weight of the block

Which of A, B, C, D, E is correct?

A. 1, 2 and 3 B. 2 and 3 C. 1 and 2 D. 1 and 3 E. 2 only

(iv) In a process of charging by induction in static electricity;-

A. a conductor is rubbed with an insulator
B. a charge is produced by friction
C. negative and positive charges are separated
D. a positive charge induces a positive charge
E. electrons are sprayed into an object

(v) To test a piece of metal to determine whether it was a magnet or not, one would see if it

A. attract steel filings B. repel a metal bar C. attract a magnet
D. repel a known magnet E. remain stationary

(vi) A mass is projected upwards with a velocity of 10m/s, what is the maximum height reached in metre?

A. 1 B. 5 C. 10 D. 20 E. 100

(vii) Which of these resources of energy is non-renewable?

A. Wave energy B. Biofuels C. Radiant energy D. Fossil fuel
E. Geothermal energy

(viii) At which position will the object be placed for a concave mirror to form virtual, magnified and erect image behind the mirror?

A. Between the principal focus (F) and the pole (P) in front of the mirror.
B. Between the principal focus (F) and the pole (P) behind the mirror
C. Between the centre of curvature (C) and the principal focus (F) in front of the mirror
D. Between the centre of curvature (C) and the principal focus (F) behind the mirror
E. Between the centre of curvature (C) and the pole (P) in front of the mirror

(ix) A students wishes to check upper fixed point and lower fixed point on Celsius scale thermometer. The students has four beakers 1, 2, 3 and 4

1. Contains a mixture of ice and salt
2. Contains a mixture of ice and water
3. Contains a mixture of boiling salt solution and
4. Contains boiling water

Which beakers should a student used to check the fixed points?

A. 1 and 3 B.1 and 4 C. 2 and 4 D. 2 and 3 E. 4 and 3

(x) The layer in the atmosphere where weather phenomena are formed is;-

A. stratosphere B. magnetosphere C. troposphere D. thermosphere E. exosphere

2. The **figure 1** in list B shows an electromagnetic waves spectrum (not drawn in a scale) labeled by alphabets. Match the item in **list A** with the letter of the correct response in the diagram in **list B**. Write the letter beside the item number. **(6 marks)**

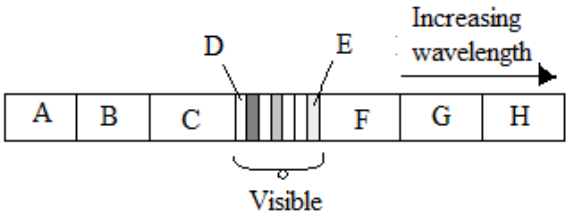
LIST A	LIST B
(i) Represents the red light of electromagnetic wave which stimulates sensation of vision. (ii) Used to sterilise food so that it does not rot so quickly. (iii) It is produced by warm objects such as electric iron. (iv) Used in microwave ovens. (v) It is important in production of vitamin D in human skin. (vi) Doctors and dentists used to check bones and teeth.	

Figure 1

SECTION B (54 Marks)

Answer **all** questions from this section

3. (a) Diving for a coin is more difficult

than it seems to be from the side of the pool. Explain with the aid of a diagram.

(5 marks)

(b) A man finds that at a distance of 25cm the words in the book looks blurred. Describe what eye defect the man is suffering and suggest the way to allow him to see the words clearly. **(4 marks)**

4. (a) Use a well labeled diagram; explain the working principle of a syringe.

(4 marks)

(b) Calculate the value of weight X and Y from the diagram in figure 2.

(5 marks)

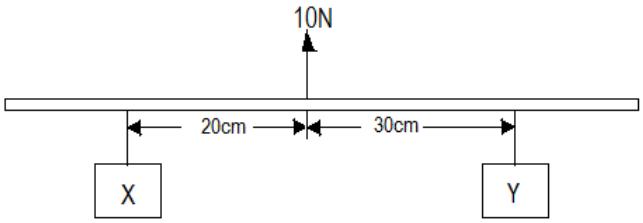


Figure 2

5. (a) Figure 3, shows the hydraulic breaking system in which the effort is applied by leg at the end of lever arm 200mm from the pivot. On the other side of the pivot 40mm away, the lever connects to a piston of area 50mm^2. The piston transmits pressure through the oil to another piston of area 100mm^2 which connected to the brake. If the efficiency of the system is 100%, calculate the force applied to the brake. **(5 marks)**

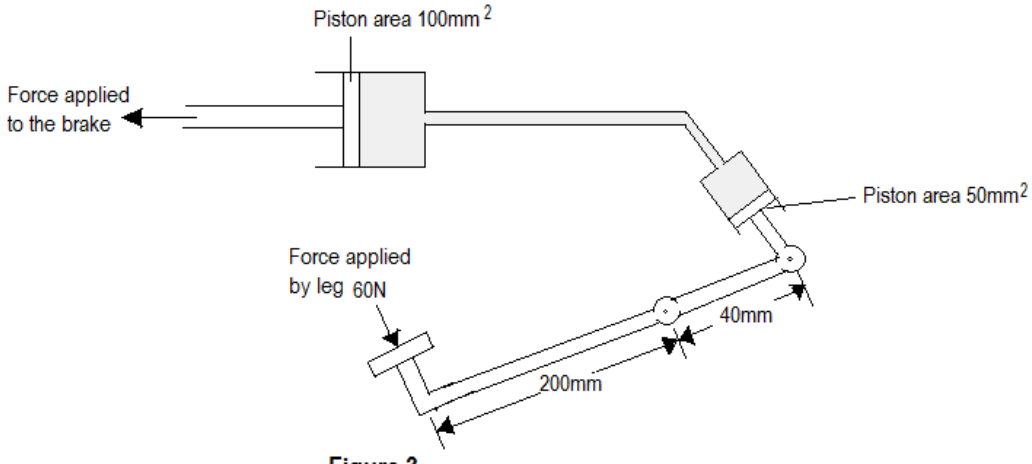


Figure 3

(b) A boy with a mass 50kg jumps out of a rowing boat of mass 300kg on to the bank with horizontal velocity of 3m/s. with what velocity does the boat begin to moves backwards? **(4 marks)**

6. (a) When you take a bottle of cold soft drinks from a refrigerator, water appears on its surface. Explain this observation. **(4 marks)**

   (b) Sketch the graph showing the variation of volume with temperature when a fixed mass of pure ice initial at 0^oC is heated to 20^oC **(5 marks)**

7. (a) Cathode rays and X-ray are both produced by thermionic emission. Give two experiments which can be used to distinguish between them. **(4 marks)**

   (b) A radioactive mixture is made up of element P which gives a count rate of 160 per second and has a half-life of 2 hours and element Q which has also gives a count rate of 160 per second but has half-life of 4 hours. If the initial count rate of the mixture is 320, what will be its value after 8hours? **(5 marks)**

8. (a) Assume the sun suddenly disappears. Give four demerits human kind will face basing on thisdisappearance. **(4 marks)**

   (b) Analyse five measures that can be taken to control global warming. **(5 marks)**

SECTION C (30 Marks)

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

9. (a) When a car battery of e.m.f 12V is connected to the car electric starter motor its terminal voltage falls to 10V. If the resistance of the starter motor is 0.04Ω, determine the internal resistance of the battery. **(5 marks)**

   (b) In choosing a wire for designing electric cattle, student A says it should have high resistance as it is the resistance that causes the heating effect. Student B says the resistance should be low so that the current is as great as possible. Which suggestion will you agree? Give reason**. (5 marks)**

   (c) A transformer is designed to work from 240V a.c. mains. The primary coil has 4800turns. About how many turns of secondary coil would expect it to have in order to give a supply 8V to ring house bell? **(5 marks)**

10. (a) Explain how you would demonstrate the difference between sound wave and water wave using sketched diagram. **(4 marks)**

(b) If 5s elapse between a lightning flash and the clap of thunder, how far away is the storm? **(6 marks)**

(c) A string is set vibrating by plucking at a point one-quarter of the length from the end. Draw a sketched diagram and write the expression of the frequency note produced by the vibrating string. **(5 marks)**

11. (a) How silicon material can be distinguished by copper materials. Give two points **(4 marks)**

(b) Describe the mechanism of doping an intrinsic semiconductor to obtain P-type semiconductor. **(6 marks)**

(c) You are provided with NPN-transistor, collector resistor R_C, base resistor R_B, connecting wires and two capacitors C_1 and C_2. Draw a common-emitter single stage amplifier.

(5 marks)