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

TABORA REGION
FORM FOUR MOCK EXAMINATION

031/1

PHYSICS 1

(For both School and Private Candidates)

Time: 3 Hours **July 2024**

INSTRUCTIONS:

1. This paper consists of section **A, B** and **C** with total of eleven (11) questions.
2. Answer all questions section **A** and **B** and only **two** (2) questions from section **C.**
3. Section **A** carries sixteen (16) marks, section **B** fifty four (54) marks and section **C** carries thirty (30)marks
4. Cellular phones and any unauthorized materials are not allowed in the examination room.
5. Non - programmable calculators and mathematical table may be used.
6. Write your Examination Name on every page of your answer.
7. Where necessary the following constants may be used.
   (i) Acceleration due to gravity (g) = $10m/s^2$
   (ii) Density of water = $1g/cm^3$ or $1000kg/m^3$
   (iii) Near point (D) = 25cm
   (iv) Speed of light wave (C) = $3.0x10^8m/s$

This paper consists of **6** printed pages

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SECTION A: (16 MARKS)

Answer all questions in this section

1. For each of the items (i) – (x) choose the correct answer from among the given alternatives and write its letter beside the item number in the answer sheet provided

(i) A ray of white light incident upon a triangular glass prism is dispersed into its colour components which of the following color experiences most deviation?

A. Blue B. Orange ( )
C. Violet D. Red
E. Indigo

(ii) A helical has unstretched length of 15.0 cm and a stretched length of 15.6cm when loaded with a weight of 3N. The load on the spring when stretched length is 15.8cm in Newton is

A. 10 B. 8 C. 6 ( )
D. 4 E. ZN

(iii) A pin hole camera gives a sharp image

A. Because the image is small
B. Because the object is a long way from the camera hole ( )
C. If the hole is extremely large
D. If the hole is small
E. Because the object is very big

(iv) Examples of contact forces are

A. Friction, stretching, compression and air resistance
B. Air resistance, gravity, compression and restoring ( )
C. Gravity, attraction, friction and repulsion
D. Friction, compression, gravity and air resistance
E. Electromagnetic force, weak nuclear force, strong nuclear force and air resistance.

(v) The diagram below shows the main sections of the electromagnetic waves spectrum in order of decreasing wave length

Radio waves		R	Light			Gamma rays

Section R may be applied in

A. Killing cancerous cells B. Television remote control ( )
C. Detecting the cracks in pipes D. Sterilization of food and air
E. Satellite television

(vi) A layer of colorless water is carefully in a cylinder on top of blue copper sulphate crystals. After a time, the water becomes blue because

A. Pressure change B. Viscosity ( )
C. Osmosis D. Diffusion
E. Surface tension

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(vii) Sometimes alcohol may be better than mercury for use in thermometers because:

A. Expands more than mercury
B. It is suitable in measuring high temperature ( )
C. It is distils the walls of the tube
D. Has small heat capacity
E. Poor conductor of heat.

(viii) In many materials there is equal number of electrons orbiting and spinning in opposite directions, a situation which brings the resultant magnetic field to zero. These materials are called:

A. Paramagnetic B. Ferromagnetic ( )
C. Diamagnetic D. Alloys
E. Magnetic shoulders

(ix) Two forces of 5N and 8N are acting at the same point and are inclined at an angle of 45° to each other. Their resultant force is ..... .

A. 14N B. 1.2N C. 4.0N ( )
D. 12.5N E. 12N

(x) Which statement is not true about a wheel barrow?

A. Load is between effort and fulcrum
B. Mechanical advantage is less than one
C. Effort arm is longer than load arm ( )
D. It is a second class lever
E. Nut crackers are in its group

2. Match the items in list A with the correct response in list B by writing the letter of the correct response beside the item number

LIST A	LIST B
(i) Ensure revolution of the moon around the earth	A. Zodiac
(ii) A sign of asteroids in space observed by an observer on earth	B. Meteorites
(iii) Constellations in the same plane as the orbital plane of the earth around the sun	C. Terrae
(iv) Bright lunar highlands	D. Gravity force
(v) One high tide and one low tide pattern of tide each day	E. Zodiacal light
(vi) Shooting stars	F. Gravitational force
	G. Maria
	H. Meteors
	I. Diurnal tide
	J. Mixed semidiurnal tide
	K. Comets

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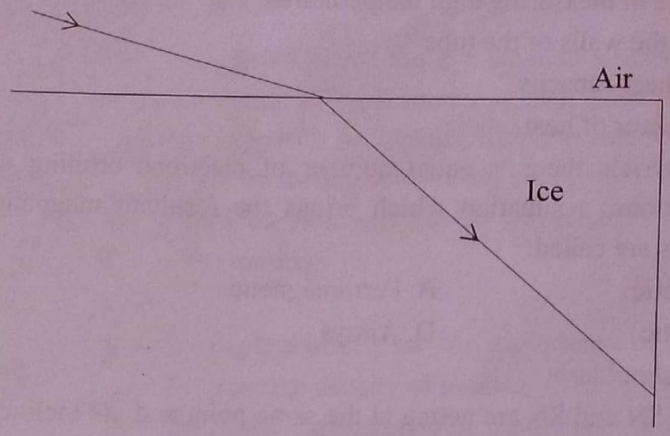
SECTION B: (54 MARKS)

Answer all questions

3. (a) Explain why the sky appears blue when observed. From the earth. **(02 marks)**

(b)



(i) By using direction of light ray which medium is denser than the other? Give a reason (01 mark)

(ii) Determine the refractive index of ice ($03\frac{1}{2}$ marks)

(iii) Determine the critical angle of ice. ($02\frac{1}{2}$ marks)

4. (a) At a camp site there are two tents for the shades. One camp is made with black fabric white the other is made with white fabric. Which one will you prefer for using on hot summer afternoon? Give a reason for your choice. Would you use the same tent during winter?

(b) While swimming, a swimmer pushes the water backwards with his/her hands. Explain. (03 marks)

5. (a) How does a Geiger- muller tube works? (5marks)

(b) At a particular place, there is a lake. The atmospheric pressure is 1.01×10^5 pa, but the water at the surface of the lake has a temperature of 277K. If the bubble of gas released at the bottom of the lake increases three times as it reaches the surface of the lake, calculate:

(i) The pressure at the bottom of the lake (02 marks)

(ii) The depth of the lake (02 marks)

6. (a) Trucks A and B can carry the maximum load of 1 ton each. The truck A was loaded with 300kg of maize while truck B was loaded with 600kg of maize. After a 3000km drive, truck B tyres were worn out than truck A tyres. If both trucks hade new tyres of the same material from the same company, why was there difference in tearing and wearing out of tires of two trucks? Explain (05 marks)

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(b) The resistance of a copper wire is found to be 34Ω. What is the resistance of a copper wire of the same length but whose radius is twice to that of the first wire? (04 marks) (04 marks)

7. (a) An optician tested the eye sight of a person and noticed that the client can only see division scale 2mm in size at near point. He wishes to prescribe the spectacles such that each division appears 10mm in size when read through. Calculate the focal length of the lens he/she will fit into the frame for making such spectacles. ($04^1/_2$ marks)

(b) Briefly explain why the air conditioners are fitted at the top of the wall for a room ($04^1/_2$ marks)

8. (a) (i) Explain briefly the two importance of stratosphere to living things (03 marks)

(ii) How the density of magma affects the flow of lava? ($01^1/_2$ marks)

(b) The count rate recorded by a ratemeter when the alpha particles source is held near it is 400 per minute after allowing for the back ground count. If the half-life of the source is 4 days

(i) What is the fraction decayed in 12 days? ($02^1/_2$ marks)

(ii) Why should the count rate be determined over a period of several minutes rather than over a few seconds? (02 marks)

SECTION C: (30 MARKS)

Answer any two questions

9. (a) By using a well labeled diagram explain the action of a bridge rectifier (07 marks)

(b) (i) Explain why it would not be practical to make a fortin type barometer with water? (03 marks)

(ii) A student placed a 150 cm^3 of a solid substance in water. 60% of the solid of the substances volume submerged. What late the density of the solid substance. (05 marks)

10. (a) You are an interviewee in the battery manufacturing company and you are taken to the room of the laboratory having all items needed to prepare a dry cell. Sketch a well labeled diagram to represent the appearance of what you have assembled. Mention one importance of each labeled part. (06 marks)

(b) A uniform half metre rule is freely pivoted at 17cm marks, and balances horizontally when a body of mass 40g is hung from 5cm mark. Calculate the mass of the rule. (04½ marks)

(c) When someone looks in the clear sky during the night, the stars appear to twinkle. Why is this? (04 ½ marks)

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11. (a) (i) Sketch a diagram showing an open pipe sounded with its third harmonic (2 marks)

(ii) A pipe closed at one end sounds with its second overtone of 2000Hz, end correction neglected. Determine by calculation the frequency of the sound by air vibrating at is lowest possible vibration inside the pipe. (02 marks)

(b) A boy standing between two vertical high walls, 480m from the nearest wall makes a loud shout. He hears two echoes. The first echo is heard 3 seconds after the shout while the other echo is heard 2 seconds later. Calculate the distance between the walls. (06 marks)

(c) How is the e.m.f in secondary coil of an induction coil made larger? Explain briefly referring two ways (5 marks)

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