PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
LINDI MUNICIPAL COUNCIL
FORM FOUR UMEKTA EXAMINATION
031/1 PHYSICS 1
TIME: 3 HOURS JULY 2023

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 number** on every page of your answer sheets/booklet(s)
6. Whenever necessary, the following constants may be used;
   - Acceleration due to gravity, g=10m/s
   - Pie, $\pi = {}^{22}/_{7}$
   - Density of water =1.0g/cm^3 or 1000kg/m^3
   - Density of sea water $1.3g/cm^3$ or $1300kg/m^3$

SECTION A (16 Marks)

Answer all questions in this section

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) When using a measuring cylinder one precaution to be taken is to
   A. Check for zero error
   B. Look at the meniscus from below the level of the water
   C. Obtain more readings by looking from more than one direction
   D. Positioning the eye in line with base of the meniscus
   E. Make sure that the measuring cylinder is clean

(ii) Which of the following sources of energy are non renewable?
   A. Water, wind, wood and natural gas
   B. Fossils, sun, oil, and nuclear
   C. Natural gas, water nuclear, and wood
   D. Wind, sun, fossils, and oil
   E. Oil, and all natural gases

(iii) A material which allows some light to pass through it but one cannot see through it is said to be;
   A. Transparent B. Translucent C. Luminous D. Opaque E. Colourless

(iv) Which phenomenon causes the dispersion of white light into a spectrum by prism?
   A. Diffraction B. Absorption C. Interference D. Refraction E. Reflection

(v) Two forces of 5N and 8N are acting at the same point and are inclined at an angle of 45^0 to each other. What will be their resultant force?
   A. 11.2N
   B. 12N
   C. 22.4N
   D. 1.2N
   E. 1.12N

(vi) A bus carrying a very big load on its top carrier can easily overturn because;
   A. It cannot run fast
   B. Its equilibrium is stable
   C. Its centre of gravity is low
   D. It is more stable
   E. Its centre of gravity is high

(vii) Which of the following is not a property of magnetic lines of force due to a bar magnet?
   A. They have a direction from North to South pole outside the magnet
   B. They do not exist inside the magnet
   C. They have direction from South pole to North pole inside the magnet
   D. They tend to be closer inside but wider apart outside the magnet
   E. They form complete loop

(viii) A certain wave has a period of 0.2 seconds and a wavelength of 60cm.What is the velocity of wave in cm/s?
   A. 30 B. 0.30 C. 12 D. 3 E. 300

(ix) A diode is an electronic component used to;

A. Rectifying oscillating current
B. Amplifying signal
C. Rectifying oscillating current and detect electrical signals
D. Amplify current and detect electrical signals
E. Rectify the voltage

(x) A rectangular wooden block of density $0.8g/cm^3$ has dimensions 0.5 x 0.8 x 6m. What maximum pressure will it exert on a ground in N/M?

A. 48000
B. 4000
C. 2.4
D. 19200
E. E. 400

2. **Match the item in list A with corresponding response in list B by writing the letter of the correct response beside the item number in the answer sheet (s) booklet provided;**

LIST A	LIST B
(i) The region where two semiconductor meet	A. Junction voltage
(ii) The region near the boundary is fairly free of majority charge carriers	B. Extrinsic semiconductor
(iii) The potential difference in the region near the boundary fairly free of majority charge carrier	C. Depletion layer
(iv) Is formed by the deposition of a metal on a surface of a metal conductor	D. Reverse biased
(v) A device commonly used to amplify or switch electronic signals	E. Transistor
(vi) Its conductivity is high	F. Breakdown current
	G. Junction
	H. Forward bias
	I. Zenar diode
	J. Metal semiconductor diode

SECTION B (54 MARKS)

Answer **all** questions in this section

3. (a) Explain why the freezing compartment of a refrigerator is located near the top of the cabinet (**4 marks)**

(b) A hollow metal sphere of mass 5kg is tied to the bottom of the sea-bed by rope. The tension in the rope is 60N. Calculate the volume of the sphere **(5 marks)**

4. (a) With the aid of diagram, explain how rainbow is formed (**4 marks)**

(b) A 2.0m long resistance wire of cross section $0.5mm^2$ has a resistance of 2.2Ω. Find the;

(i) resistivity of a material **(2 marks)**
(ii) Length of the wire that would give a total resistance of 0.1Ω when placed in parallel **(3 marks)**

5. (a) Explain the observation that the level of liquid being heated in a vessel first falls before starting to rise **(4 marks)**

(b) A certain simple machine has a pitch of 0.1mm and is worked by an arm of length 70mm. If its efficiency is 40%; What load can be raised by effort of 10N? **(5marks)**

6. (a) Give three (3) ways of increasing the frequency of the note produced by a guitar **(3 marks)**
(b) A pendulum bob of mass 100g is pulled aside to the vertical height of 20cm from the horizontal and then released. Find;
(i) the maximum potential energy of the bob **(3marks)**
(ii) the maximum speed of the bob **(3marks)**

7. (a) Briefly explain, why does an object appear coloured when light falls onto it? **(4marks)**
(b) The photographic film of a pin hole camera is 15cm away from the pinhole. A girl of height 1.2m stands 6m from the pinhole. Find the height of the girl's image (**5marks)**

8. (a) State reasons why an astronaut in space
i. Needs special space suit to prevent blood from boiling **(2marks)**
ii. Can float without falling **(2marks)**
b) A spring balance has a scale pan of 0.4N weight attached to it. A load of 2N placed on the pan extends the spring 24mm from its original unstretched length. Calculate the load on the scale pan when the extension is 16mm? **(5marks)**

SECTION C (30MARKS)

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

9. (a) Briefly explain why the strength of a magnet cannot be increased beyond a certain limit? **(4 marks)**
(b) Explain why a coin falling between the poles of a magnet moves slower than in space without magnetic field **(4 marks)**

c) A current of 0.6A is passed through a step up transformer with a primary coil of 200 turns. A current of 0.1A is obtained in secondary coil. Determine the number of turns in the secondary coil and the voltage across the primary coil is connected to a 240V mains. **(7 marks)**

10. (a) Explain why the sound produced in a hall with many people is heard clearly than when the hall has few people? **(3 marks)**
(b) A sonometer consists of a taut steel wire fixed between two bridges. Derive the formula for the first, second and third overtones **(9 marks)**
(c) Explain why television or computer screens often become very dusty as compared to their neigbouring surfaces **(3 marks)**

11. (a) With the aid of a sketch explain how Geiger Muller tube may be used to detect radiation (**8 marks)**
(b) After a long flight a plane may be charged.
(i) What causes a charge? **(3marks)**
(ii) Why is passenger in a plane not charged but an attendant who immediately opens the door from outside after landing of the plane is at risk? **(4marks)**