

**PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
MLIMBA DISTRICT COUNCIL
FORM FOUR PRE- NATIONAL EXAMINATION SEPTEMBER 2022**

031/1 PHYSICS

TIME: 3HRS

INSTRUCTIONS

01. This paper consists of sections A, B and C
02. Answer all questions in section A and B and (2) two questions from section C
03. Cellular phones and any unauthorized material are not allowed in the examination room.
04. Non-programmable calculators may be used.
05. Write your examination number on every page of your answer sheet(s)
06. Where necessary the following constants may be used
 - (i) Acceleration due to gravity, $g = 10\text{N/kg}$
 - (ii) Density of water = 1g/cm^3
 - (iii) $\text{Pi}, \pi = 3.14$
 - (iv) Speed of light in air = $3 \times 10^8\text{m/s}$
 - (v) Speed of sound in air = 340m/s
 - (vi) Density of gold = 19.3g/cm^3
 - (vii) Density of silver = 10.5g/cm^3
 - (viii) Specific capacity of paraffin = $2200\text{Jkg}^{-1}\text{k}^{-1}$
 - (ix) Specific capacity of brass = $320\text{Jkg}^{-1}\text{k}^{-1}$
 - (x) Specific heat capacity of water = $4200\text{Jkg}^{-1}\text{k}^{-1}$

SECTION A (15 MARKS)

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(s) provided.
 - (i) The basic fundamental quantity measured in mechanics are:-
 - A. Mass, volume and density
 - B. Mass, length and temperature
 - C. Volume, current and time
 - D. Time, mass and length

(ii) A potential difference of 12volts is applied across a resistor of 24 Ohms. The current in the circuit is: A. 0.5A B. 0.05A C. 0.005A D. 288A

(iii) If you are caught outside during thunderstorm you should: -

- A. Take shelter, under power lines
- B. Stand under power lines
- C. Move to high ground
- D. Hide in a ditch

(iv) The net force perpendicular to the surface compressing two surfaces together is called:

- A. Applied force
- B. Normal force
- C. Republic force
- D. Air resistance

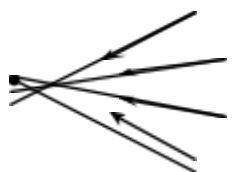
(v) The force of attraction or repulsion between particles of matter is: -

- A. Inter-molecular force
- B. Inter particle force
- C. Inter atomic force
- D. Cohesive force

(vi) Instrument used to convert electrical energy to sound energy is:

- A. Motor
- B. Microphones
- C. Battery
- D. Generator

(vii) The diagram below represents.....



- A. Converging rays
- B. Diverging rays
- C. Parallel rays
- D. Dropping rays

(viii) Material that can be magnetized strongly; hence attracted to a magnet is known as:-

- A. Paramagnetic material
- B. Ferromagnetic material
- C. Magnetic equator
- D. Geographic equator

(ix)is an imaginary line joining the earth magnetic north pole and south pole:-

- A. Magnetic meridian
- B. Geographic meridian
- C. Magnetic equator
- D. Geographic equator

(x) The area covered by the lens that is in use on the camera is known as:-

- A. Shutter
- B. Telephoto lens
- C. View finder
- D. Wide Angle lens

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

| LIST A | LIST B |
|---|---|
| (i) Crust (ii) Epicenter (iii) Hypocenter (iv) Constellation (v) Galaxy | A. Giant collection of stars B. Small solar system bodies orbiting the sun C. Group of stars that form a definite pattern D. The outer solid layer of the earth E. The inner most part of the earth F. The point within the earth where an earthquake begins G. The point on the earth surface vertically above the focus |

SECTION B (60 MARKS)

3. (a) With the help of diagram, state the mode of action of Astronomical telescope.
 (b) A compound microscope consists of two lenses of focal length 12cm and 6cm for the objective lens and the eyepiece lens, respectively. The two lenses are separated by a distance of 30cm the microscope is focused so that the image is formed at infinity. Determine the position of the object.
4. (a) State the following
 (i) Archimedes principle
 (ii) Law of floatation
 (b) A crown made of gold and silver has a volume of 60cm^3 and a mass of 1.05kg. Find the mass of gold contained in the crown.
5. (a) Why does a solid body weigh more in air than when immersed in a liquid?
 (b) An ordinary hydrometer of mass 27g floats with 4cm of its stem out of water. If cross section area of stem is 0.75cm^2 . Calculate
 (i) The total volume of stem just under the surface of the liquid.
 (ii) The relative density of the liquid
6. (a) (i) Outline factors which determine pressure in liquid.
 (ii) How gas exerts pressure?
 (b) A stone of mass 2kg is released from a height of 2m above the ground; find
 (i) Total energy
 (ii) Potential energy at height of 0.5m from the ground
 (iii) Kinetic energy at height of 0.5m from the ground
 (iv) Velocity acquired at 0.5m from the ground

7. (a) (i) Why are the constructed dam banks thicker at the bottom than at the top?
 (ii) Why should we give first aid to an injured person? Give three reasons.
- (b) A brass of cylinder of mass X was heated to 100°C and then transferred into a thin Aluminium can of negligible heat capacity containing 150g of paraffin at 11°C . If the final steady temperature of the paraffin attained was 20°C . Determine the value of X.
8. (a) With the aid of diagram briefly explain the working principle of meter bridge.
- (b) An electric kettle draws a current of 10A when connected to the 230V mains supply. If all the energy produced in 5minutes is used to heat 2kg of water. Calculate
- The power of the kettle
 - The energy produced in 5minutes
 - The rise in temperature.

SECTION C (25 MARKS)

Answer two (2) questions from this section

9. (a) (i) Mention three applications of diffraction of waves.
 (ii) The vibration length of a stretched wire is altered at constant tension until the wire oscillates in unison with a tuning fork of frequency 320Hz. The length of the wire is again altered until it oscillates in unison with a fork of unknown frequency. If the two lengths are 90cm and 65.5cm respectively. Determine the unknown frequency.
- (b) (i) Outline the major regions of the electromagnetic spectrum in the order of increasing wavelength.
- Which region represents radiation capable of promoting the production of vitamin D in the skin?
 - Which region contains radiation used in radar system?
 - Which region is used in agriculture to obtain new plant varieties?
10. (a) How natural radioactivity occurs?
- (b) Radioactive uranium $^{238}_{92}\text{U}$ emits α -particles to become thorium. Thorium emits β -particles to become praseodymium, which then emits another β -particles. What are atomic number, mass number and number of final atom produced?
11. (a) With the aid of well labelled diagram, explain how X – rays are produced?
- (b) (i) Why always NPN are mostly used rather than PNP?
 (ii) Could a transformer be used to increase the voltage of a battery? Explain
 (iii) A transformer used to step down 240V mains supply to 12V for laboratory use. If the primary coil has 600 turns, determine the number of turns in the secondary coil.