

SECTION A [30 MARKS]
ANSWER ALL QUESTIONS

Question 1a

[15]

Direction: For each question, there are FOUR responses: A, B, C and D. Choose the corresponding letter of your response and CIRCLE it neatly. NO score will be awarded if you circle more than ONE letter.

- i. The cell organelles are paired with the function they play in everyday life as shown below. Study the following information and identify the correct pairs.

I	Cell membrane	————→	sieve
II	Ribosome	————→	factory
III	Mitochondria	————→	water tank
IV	Nucleus	————→	generator

- A I and II.
B I and IV.
C II and III.
D III and IV.

- ii. The table below shows the organs of digestive system and their functions. The content of saliva, gastric juice and intestinal juice are respectively

Sl. No.	Organ	Function
1	mouth	secrets saliva
2	stomach	produces gastric juice
3	small intestine	secrets intestinal juice

- A amylase, hydrochloric acid and pancreatic juice
B pancreatic juice, amylase and hydrochloric acid
C hydrochloric acid, pancreatic juice and intestinal juice
D pancreatic juice, hydrochloric acid and intestinal juice

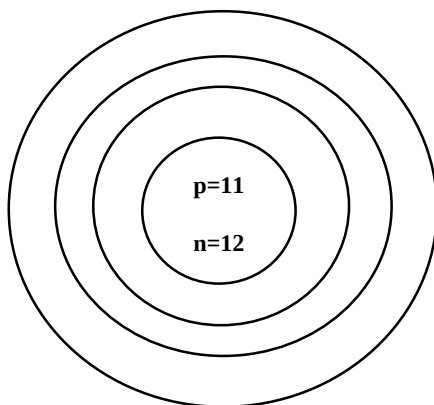
- iii. Mr Dorji and Ms Zangmo planted rose plants by cutting the stem from the bigger rose plant. This method is known as

- A germination.
B natural propagation.
C sexual reproduction.
D artificial propagation.

- iv. 'The people of Gomtu in Samtse are grappling with dust and air pollution every day. The emissions from the cement industries, coupled with dusty roads, have led to an increasing number of patients with eye, skin and respiratory issues at the Gomtu hospital' (BBS, 2019).

All of the following are the remedies to the people's problem **EXCEPT**

- A wearing mask.
 - B planting trees.
 - C installing air filters.
 - D increase hospitals in the place.
- v. A farmer prefers practising organic farming to inorganic farming. This is due to the numerous advantages associated with organic farming. One of the advantages of organic farming is
- A it enhances soil fertility.
 - B it produces greenhouse gases.
 - C it causes health issues if consumed.
 - D it causes bio-magnification in organism.
- vi. An atom consists of electrons, protons and neutrons. How many electrons are there in the given atomic structure?



- A 10
- B 11
- C 12
- D 23

- vii. Which of the following correctly describes the isotopes of ${}^6_6\text{C}^{12}$?
- A Proton-6, Neutron-6 and Electron-6
 - B Proton-5, Neutron-6 and Electron-5
 - C Proton-7, Neutron-7 and Electron-7
 - D Proton-6, Neutron-7 and Electron-6
- viii. Calcium carbonate breaks into calcium oxide and carbon dioxide upon heating, as shown below. What type of chemical reaction is it?
- $$\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$$
- A Synthesis reaction
 - B Combination reaction
 - C Displacement reaction
 - D Decomposition reaction
- ix. Students conducted an experiment using magnesium and hydrochloric acid in the laboratory. While carrying out the experiment, they observed the bubbles of gas in the form of effervescence. The gas produced during the chemical reaction is
- A oxygen.
 - B nitrogen.
 - C hydrogen.
 - D carbon dioxide.
- x. Mr Phurpa Thinley exerted a force of 40N to pull a cupboard over a distance of 3 metres in 15 seconds. The power utilized in completing the work is
- A 8W.
 - B 9W.
 - C 10W.
 - D 120W.

- xi. The following objects weigh 130 kg each but they have different bases that come in contact with the surface of the table. Which object will have the maximum pressure on the table?

Diagram A

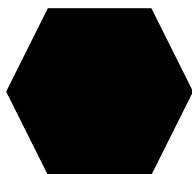


Diagram B

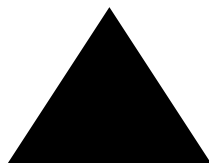


Diagram C

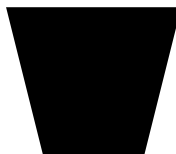


Diagram D



- A Object B, as the body has less surface area
 B Object D, as the body has least surface area
 C Object A, as the body has more surface area
 D Object C, as the body has greater surface area
- xii. You are provided with a list of four groups of chemical substances as given below. Some groups consist of elements and compounds, whereas other groups consist of either elements or compounds only. Identify the group that consists of only compound.

1

Ag
Na
Hg
NaCl

2

H ₂
MgO
O ₂
CO ₂

3

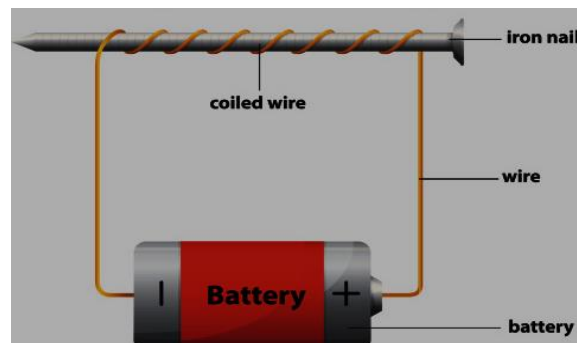
Cu
Ca
Cl
Zn

4

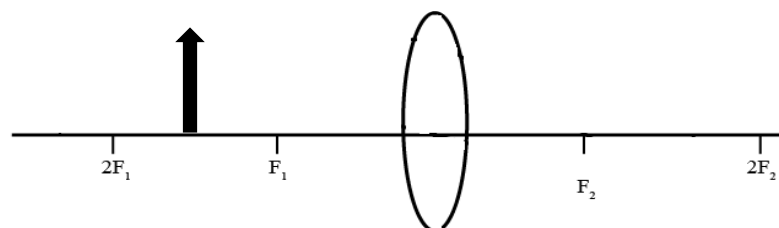
NaOH
H ₂ O
H ₂ SO ₄
HCl

- A 1
 B 2
 C 3
 D 4

- xiii. The figure below represents the electromagnet to magnetise a temporary magnet. If you want to increase the strength of the electromagnet, what could be the possible ways?



- I Add more batteries in the experiment.
 - II Increase the size of a nail.
 - III Increase the length of a wire.
 - IV Increase the numbers of turns of coil in the experiment.
- A I and II
B I and III
C I and IV
D II and III
- xiv. A group of students set up an experiment to study the image formation of an object using convex lens as shown in the figure. Where will the image be formed if the object is placed in between $2F_1$ and F_1 ?



- A at F_2
B at $2F_2$
C beyond $2F_2$
D between F_2 and $2F_2$

xv. Which of the following is an example of centrifugal force?

- A Water flowing down a drain
- B Car turning around the curve
- C Plane flying at a constant altitude
- D Person standing still on the ground

Question 1b

Direction: Fill in the blanks with appropriate word(s).

[5]

i.	Old people usually complain about joint pain. This is due to the decrease in	
ii.	The method of propagating a plant by bending and covering its branch with a moist soil is	
iii.	The process where an organism develops traits that helps them to survive and reproduce in a particular habitat is called	
iv.	If an atom has 17 protons and 20 neutrons, it's mass number is	
v.	The atomic radius across a period in the periodic table decreases due to the increase in	

Question 1c

Direction: Write TRUE or FALSE against each statement in the space provided.

[5]

i.	The process of releasing heat to its surrounding during a chemical reaction is known as exothermic reaction.		
ii.	The acceleration due to gravity increases with increasing distance from the centre of the Earth.		
iii.	In conduction, heat is transferred through the movement of fluid.		
iv.	Ohm's law provides a fundamental relationship between current, voltage and resistance in a circuit.		
v.	When a green object is illuminated by red light, it appears blue.		

Question 1d

Match each item under Column A with the item in Column B. Write the correct pairs [5]
by writing the letter against the number in the answer column.

Column I	Column II	Answer	
i. The physiological process that helps plants to absorb water	a. mixture	i.	
ii. The outermost electron in an atomic shell	b. compound	ii.	
iii. Glucose is an example of	c. voltage	iii.	
iv. The potential difference between two points in a circuit	d. amplitude	iv.	
v. Loudness or intensity of a sound wave is measured by	e. osmosis	v.	
	f. valence electron		
	g. current		
	h. frequency		

SECTION B [50 MARKS]

ALL QUESTIONS ARE **COMPULSORY**

Direction: Answer the following questions in the spaces provided. The marks for each question are given in the brackets [].

Question 2

a) Explain **THREE** important roles of cells in human body. [3]

- b) It is crucial to create awareness about substance abuse by including it in science lessons. Do you agree? Provide **THREE** reasons to support your answer. [3]

- c) The figure shown below is the electricity bill for the month of June 2023. Using the information from the bill, answer the following questions.

BHUTAN POWER CORPORATION

(Registered office: Thimphu, Bhutan)
Electricity Service Division
ESD:Thimphu

Electricity Bill

Bill No : 00025615341
Bill Date : 12-06-2023 13:22:20
Due Date : 08-07-2023 00:00:0
Prv.Rdg Date : 09-05-2023
Routine : 66 Cycle: 6
Premise No. 2000247012
Consumer No : 70038625
BP No : 0001041932
Flat No: 4
Ramtokto, Chang Gewog
Metre No : 11057430, Q0416347 Status: **OK**
Type : TP EM
Category: LV Commercial
Rating : 10 M.F :1
Reader : Ram Bdr Ghalley
Cur. Rdg : 929 Prv. Rdg : 818
Energy Cost :
Charge Details:
.....@ 2.66=

- i. Calculate the electrical energy consumed in the month. [1]

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- ii. Find the total cost of energy consumed in the month. [1]

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- iii. Suggest **TWO** ways to reduce energy consumption at home. [2]

Question 3

- a) Teenage pregnancy has become a common issue in our country. As a science student, suggest **TWO** ways to prevent it. [2]

- b)** Organic farming is eco-friendly compared to inorganic farming. Discuss the importance of practising organic farming. **[2]**

- c)** Gaseous exchange is an important process in an organism for the exchange of oxygen and carbon dioxide. Explain the process of gaseous exchange in alveoli with the help of a diagram. **[2]**

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- d) Despite creating public awareness on the impacts of forest fire in the country, fire destroys large areas of forest every year. If you are the Dzongkhag Environmental Officer, how will you minimise the forest fire in the Dzongkhag? [2]

- e) Acid rain is harmful to all the living beings. Suggest **TWO** preventive measures to reduce acid rain. [2]

Question 4

- a) Explain inter-specific and intra-specific competition with an example each. [2]

- b) Planets in the solar system remain in their own orbits and do not change their paths. [1]
Give a reason.

- c) The sun shines during the day and the moon shines during the night. Which one is [2]
luminous and which is non-luminous? Explain.

- d) Study the information related to elements provided in the table below and answer [1]
the following questions.

Element	Atomic number
A	20
B	13

- i. Draw the atomic structure for element A. [1]

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- ii. Classify element A and B into metals or non-metals with justification. [2]

Element A =	
Element B =	

- e) Balance the following chemical equations.

- i. $\text{H}_2 + \text{Cl}_2 \longrightarrow \text{HCl}$ [1]

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- ii. $\text{NaOH} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$ [1]

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Question 5

- a) Hydrogen atom is neutral, explain it. [1]

- b) In a chemical reaction, heat is either released or absorbed depending on the type of reaction. Study the chemical reaction given in the table and answer the following questions.

Sl.No.	Chemical reaction	Observation
1	$A + B \longrightarrow AB + \text{heat}$	The test tube feels warm when touched
2	$AB \xrightarrow{\text{Heat}} A + B$	The test tube feels cold when touched.

- i. Which chemical reaction is exothermic and which one is endothermic? [1]

- ii. Provide a reason each to support your answer. [2]

- c) You are provided with two unknown solutions and asked to identify them as acidic and basic solution. Explain **TWO** methods of identifying these unknown solutions. [2]

- d) Ugyen has a mass of 55kg, and she is standing on her pencil heels having an area of 0.0001m^2 . Calculate the pressure exerted by her heels on the ground. [2]
(Take 'g'=10m/s²)

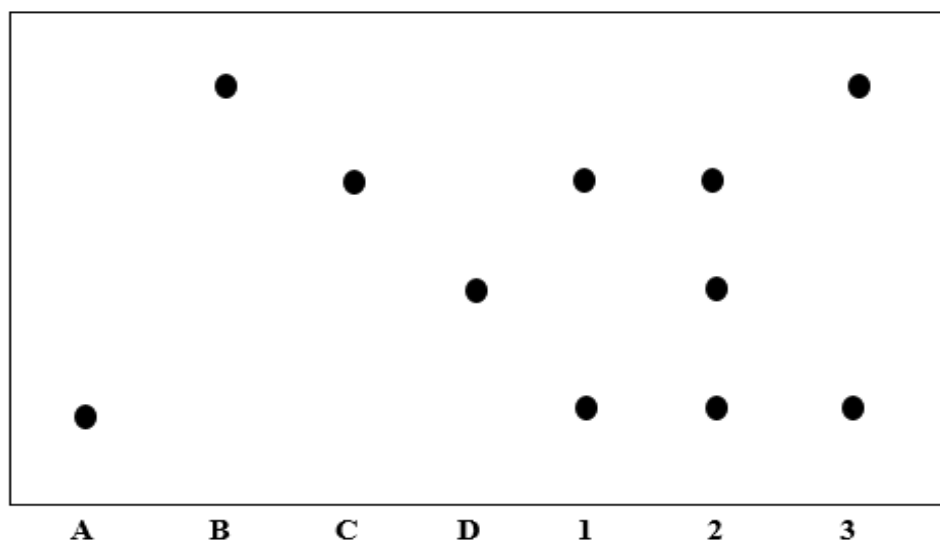
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- e) Pema completed 1500m run in 40 seconds during the Annual School Sports Day. [2]
How fast did he run to complete the race?

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Question 6

- a) A group of students conducted an experiment using paper chromatography with the samples provided by their teacher. The samples 1, 2 and 3 are mixtures and A, B, C and D are pure substances. The students found that the distance travelled by the pure substances present in the mixture is same as the respective pure substances. Study the figure of the chromatogram shown below and answer the following questions.



- i. What are the pure substances found in sample 1? [1]

- ii. Identify the pure substance found in all the three samples. [1]

- iii. Mention **ONE** application of chromatography in our life. [1]

- b)** A bag of 25kg rice is kept on a rack in a shop at the height of 10m from the ground. **[2]**
What would be the potential energy of the rice bag? Take 'g'=10m/s².

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- c)** Dissipation of energy contributes to exhaustion of energy resources. Justify. **[1]**

- d)** Prolonged exposure to noise pollution generally damage hearing. State **TWO** **[2]**
reasons to support the statement.

- e) A boy took a beaker and filled 200mL of water in it. He then immersed a pen into the beaker and observed. While observing, he saw his pen bending in the water. The bending of pen appears due to the differences in the speed of light while travelling through different mediums. Draw ray diagrams for the light travelling through rare medium to denser and also for the light passing from denser to rare medium. [2]

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