



THE INDIAN SCHOOL
PRE-BOARD EXAMINATION (2023-24)
SCIENCE (086)
X
SET-A

Time allowed: 3 hours

Maximum Marks: 80

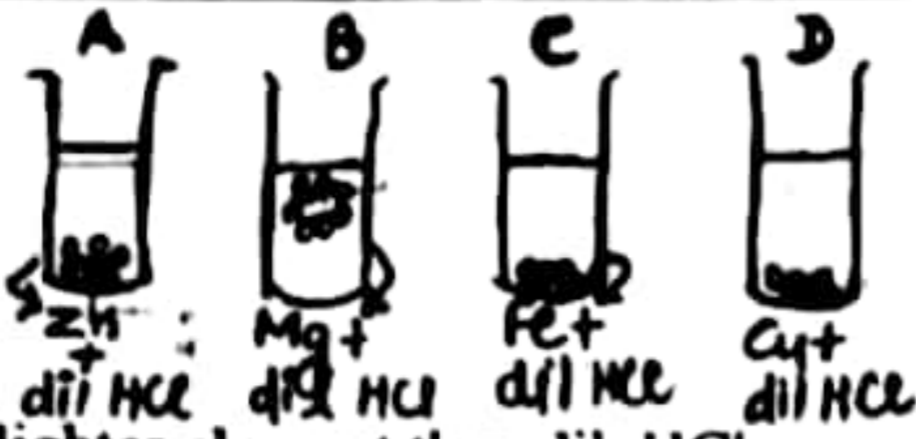
No. of printed pages: 09

General Instructions:

- (i) This question paper consists of 39 questions in 5 sections.
- (ii) All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
- (iii) Section A consists of 20 objective type questions carrying 1 mark each
- (iv) Section B consists of 6 very short questions carrying 2 marks each. Answers to these questions should be in the range of 30 to 50 words.
- (v) Section C consists of 7 short answer type questions carrying 3 marks each. Answers to these questions should be in the range of 50 to 80 words.
- (vi) Section D consists of 3 long answer type questions carrying 5 marks each. Answers to these questions should be in the range of 80 to 120 words.
- (vii) Section E consists of 3 source-based/case-based units of assessment of 4 marks each with sub-parts.

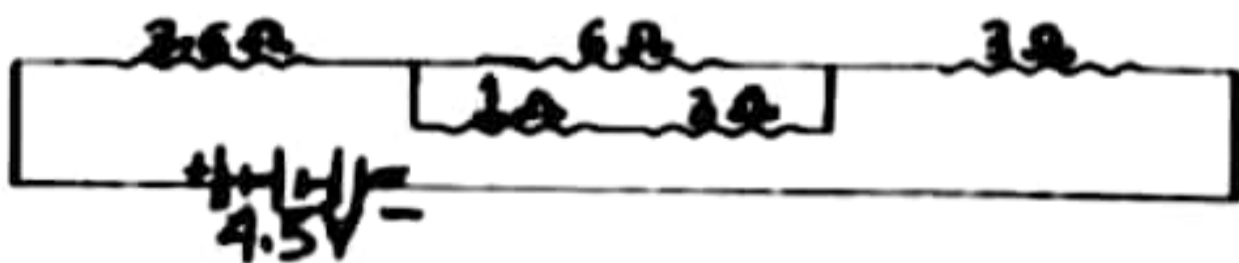
SECTION-A**Multiple Choice Questions (20 Marks)**

Q.No.	Question	Marks
1	<p>Reema took 5ml of lead nitrate solution in a beaker and added approximately 4ml of potassium iodide solution to it. What did she observe?</p> <p>(a) A solution turned red.</p> <p>(b) A yellow precipitate was formed.</p> <p>(c) A white precipitate was formed.</p> <p>(d) The reaction mixture became hot.</p>	1
2	<p>Which of the following correctly represents a balanced chemical equation?</p> <p>(a) $\text{Fe(s)} + 4\text{H}_2\text{O(g)} \rightarrow \text{Fe}_3\text{O}_4\text{(s)} + 4\text{H}_2\text{(g)}$</p> <p>(b) $3\text{Fe(s)} + 4\text{H}_2\text{O(g)} \rightarrow \text{Fe}_3\text{O}_4\text{(s)} + 4\text{H}_2\text{(g)}$</p> <p>(c) $3\text{Fe(s)} + \text{H}_2\text{O(g)} \rightarrow \text{Fe}_3\text{O}_4\text{(s)} + \text{H}_2\text{(g)}$</p> <p>(d) $3\text{Fe(s)} + 4\text{H}_2\text{O(g)} \rightarrow \text{Fe}_3\text{O}_4\text{(s)} + \text{H}_2\text{(g)}$</p>	1

3	An element with atomic number _____ will form an acidic oxide. (a) 7 (2,5) (b) 11 (2,8,1) (c) 10 (2,8) (d) 12 (2,8,2)	1															
4	<p>What is the reason for the different behaviour of Mg in test tube B?</p>  <p>(a) Mg is a lighter element than dil. HCl.</p> <p>(b) Mg reacts with dil. HCl produces H_2 gas which helps in floating.</p> <p>(c) Mg reacts with dil. HCl produces N_2 gas which helps in floating.</p> <p>(d) Mg reacts with dil. HCl produces CO_2 gas which helps in floating.</p>	1															
5	Anita added a drop each of diluted acetic acid and diluted hydrochloric acid on pH paper and compared the colours. Which of the following is the correct observation? (a) pH of acetic acid is more than that of hydrochloric acid. (b) pH of acetic acid is less than that of hydrochloric acid. (c) Acetic acid dissociates completely in aqueous solution. (d) Acetic acid is a strong acid	1															
6	Which of the given options correctly represents the parent acid and the base of calcium carbonate?	1															
<table border="1" data-bbox="293 1699 1813 2160"> <thead> <tr> <th>OPTION</th> <th>PARENT ACID</th> <th>PARENT BASE</th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>HCl</td> <td>NaOH</td> </tr> <tr> <td>(b)</td> <td>H_2CO_3</td> <td>$Ca(OH)_2$</td> </tr> <tr> <td>(c)</td> <td>H_3PO_3</td> <td>$CaSO_4$</td> </tr> <tr> <td>(d)</td> <td>H_2SO_4</td> <td>$CaSO_4$</td> </tr> </tbody> </table>			OPTION	PARENT ACID	PARENT BASE	(a)	HCl	NaOH	(b)	H_2CO_3	$Ca(OH)_2$	(c)	H_3PO_3	$CaSO_4$	(d)	H_2SO_4	$CaSO_4$
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(a)	HCl	NaOH															
(b)	H_2CO_3	$Ca(OH)_2$															
(c)	H_3PO_3	$CaSO_4$															
(d)	H_2SO_4	$CaSO_4$															
7	An element 'M' has 50% of the electrons as in the 2nd shell filled in the 3rd shell. The atomic number of 'M' is: (a) 10 (b) 12 (c) 14 (d) 18	1															
8	Which of the following statements is true about the uptake of water in plants? (a) It occurs all the time due to diffusion.	1															

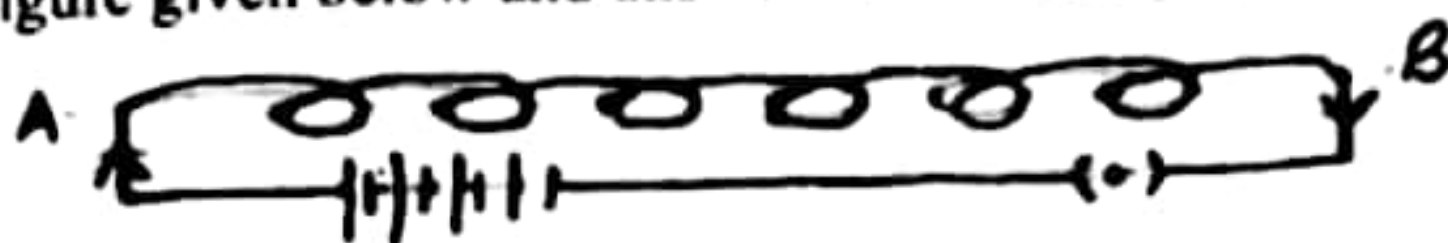
	<p>(b) Water enters the roots by osmosis.</p> <p>(c) At night when transpiration is low, roots do not absorb water.</p> <p>(d) The movement of water from the roots to the leaves is bidirectional.</p>					
9	<p>Rajesh noticed that a potted plant placed in the window of his room bent towards the sunlight. This could be due to _____.</p> <p>(a) more growth in a well-lit region due to the diffusion of the auxin hormone</p> <p>(b) more growth in the region away from light due to the diffusion of the auxin hormone</p> <p>(c) more growth in the well-lit region due to the diffusion of the cytokinin hormone</p> <p>(d) more growth in the region away from light due to the diffusion of the cytokinin hormone</p>	1				
10	<p>Which of the following method/s is/are useful to prevent fertilisation even when ovulation occurs?</p> <table border="1" style="margin-left: 20px;"> <tr> <td>P) surgical blocking of the fallopian tube</td> </tr> <tr> <td>Q) copper-T</td> </tr> <tr> <td>R) oral pills</td> </tr> <tr> <td>S) condom</td> </tr> </table> <p>(a) only P</p> <p>(b) only Q and R</p> <p>(c) only P, Q and S</p> <p>(d) only Q, R and S</p>	P) surgical blocking of the fallopian tube	Q) copper-T	R) oral pills	S) condom	1
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Q) copper-T						
R) oral pills						
S) condom						
11	<p>A cross between pure tall and pure short pea plants gives hybrid tall pea plants in the first generation. What would be the genotypic ratio in the offspring of the second generation if these F1 plants were self-pollinated?</p> <p>(a) 3:1</p> <p>(b) 9:3:3:1</p> <p>(c) 1:2:1</p> <p>(d) 1:1</p>	1				
12	<p>Patient X is suffering from a pancreatic condition due to which the pancreas is not functioning adequately. Which of the following is a doctor likely to suggest to such an individual?</p> <p>(a) Including a large amount of protein in the diet</p> <p>(b) Eating a diet with low-fat content</p>	1				

	<p>(c) Eating only carbohydrates</p> <p>(d) Including only liquid foods in the diet</p>	
13	<p>Which statement is incorrect for a convex mirror?</p> <p>(a) The image distance is always positive.</p> <p>(b) The object distance has a negative sign.</p> <p>(c) It always forms an image behind the mirror.</p> <p>(d) The focal length is always negative.</p>	1
14	<p>At noon, the sun appears white as</p> <p>(a) the light is least scattered</p> <p>(b) all the colours of the white light are scattered away</p> <p>(c) the blue colour is scattered the most</p> <p>(d) the red colour is scattered the most</p>	1
15	<p>If all the organisms of one trophic level in a food chain die, what would be its impact on the population of organisms in the other trophic levels?</p> <p>(a) It will remain the same in the next trophic level</p> <p>(b) It will increase in the next trophic level</p> <p>(c) It will increase in the lower trophic level</p> <p>(d) It will remain the same in the lower trophic level</p>	1
16	<p>Which among the following is crucial to the formation of ozone?</p> <p>(a) humans</p> <p>(b) sunlight</p> <p>(c) carbon dioxide</p> <p>(d) chlorofluorocarbons</p>	1
	<p>The following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:</p>	

	<p>(a) Both A and R are true and R is the correct explanation of A.</p> <p>(b) Both A and R are true but R is not the correct explanation of A.</p> <p>(c) A is true but R is false.</p> <p>(d) A is false but R is true.</p>	
17	<p>Assertion (A): Usually sulphide ore is converted to oxide before reduction.</p> <p>Reason (R): Reduction of sulphide ore is easier.</p>	1
18	<p>Assertion (A): Variations always provide a survival advantage to an organism.</p> <p>Reasons (R): Variations can be caused due to incorrect DNA copying.</p>	1
19	<p>Assertion (A): On changing the direction of flow of current through a straight conductor, the direction of the magnetic field around the conductor is reversed.</p> <p>Reason (R): The direction of the magnetic field around a conductor can be given in accordance with the left hand thumb rule.</p>	1
20	<p>Assertion (A): All kitchen waste cannot form compost.</p> <p>Reason (R): Material like milk packets may not be biodegradable.</p>	1
SECTION - B (12 Marks)		
Q No.	Question	Marks
21	'A sweet tooth may lead to tooth decay' Explain. What is the role of toothpaste in preventing cavities?	2
22	<p>(i) Name the reproductive and non-productive parts of the <i>Rhizopus</i>.</p> <p>(ii) How are the spores protected till they begin to grow?</p>	2
23	<p>A. Kidneys remove waste from the body. How is this waste generated in the cells? Give the composition of urine.</p> <p style="text-align: center;">OR</p> <p>B. What is the role of the tubular part of the nephron and the collecting duct in excretion?</p>	2
24	The linear magnification produced by a spherical mirror is -1. Analysing this value, state (i) the type of mirror and (ii) the position of the object with respect to the pole of the mirror. Draw a diagram to justify your answer.	2
25	<p>A. Find the current flowing through the following electric circuit.</p> 	2

OR

B. Observe the figure given below and answer the following questions:



- (i) State the nature of the magnetic field inside AB when a current is passed through it.
- (ii) List two factors on which the strength of the magnetic field produced by AB depends.
- (iii) What is the effect of placing an iron core in the coil AB?

26 Why is an ecosystem said to be self-sustaining? How is it achieved? Give an example.

2

SECTION-C (21 Marks)

Q No.	Question	Marks
27	<p>(i) Mention the names of the two metals which are alloyed with iron to make stainless steel.</p> <p>(ii) Zinc is a metal found in the middle of the activity series of metals. In nature, it is found as a carbonate ore, $ZnCO_3$. Mention the steps carried out for its extraction from the ore. Support with equations.</p>	3
28	<p>A. An element 'M' with electronic configuration 2 8 3 combines separately with Cl^-, SO_4^{2-} anions. Write the chemical formulae of the compounds formed. Predict with a suitable reason, the nature of the bond formed by element 'M' in general. How will the electrical conductivity of the compounds formed, vary with respect to 'M'?</p> <p>OR</p> <p>B. A reddish-brown metal 'X', when heated in air, gives a black compound 'Y', which when heated in the presence of H_2 gas gives 'X' back. 'X' is refined by the process of electrolysis. This refined form of 'X' is used in electrical wiring. Identify 'X' and 'Y'. Draw a well-labelled diagram to represent the process of refining 'X'.</p>	3
29	<p>In animals, hormones can be secreted by one organ and can act on multiple organs. Justify this statement by explaining the effect of a single animal hormone on three organs</p>	3
30	<p>Rajesh wanted to learn the outcome of crossing different varieties of pea plants. He crossed a tall and wrinkled pea plant with a short and round pea plant. He grew all the seeds obtained after selfing F_1. After counting and observing all F_2 plants closely, he found 800 plants in the F_2 progeny. Write the number of plants having the following traits:</p> <p>(i) Tall plant with round seeds</p>	3

	(ii) Short plant with wrinkled seeds Write the conclusion of the above experiment as understood by Rajesh.									
31	<p>The speed of light in vacuum and in two different glasses is given in the table below:</p> <table border="1"> <thead> <tr> <th>Medium</th> <th>Speed of light</th> </tr> </thead> <tbody> <tr> <td>Vacuum</td> <td>3.00×10^8 m/s</td> </tr> <tr> <td>Flint glass</td> <td>1.86×10^8 m/s</td> </tr> <tr> <td>Crown glass</td> <td>1.97×10^8 m/s</td> </tr> </tbody> </table> <p>(i) Calculate the absolute refractive indices of flint glass and crown glass.</p> <p>(ii) Calculate the relative refractive index for the light going from crown glass to flint glass.</p>	Medium	Speed of light	Vacuum	3.00×10^8 m/s	Flint glass	1.86×10^8 m/s	Crown glass	1.97×10^8 m/s	3
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Vacuum	3.00×10^8 m/s									
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32	<p>(i) A 100 W electric bulb is connected to a 220 V mains power supply. Calculate the strength of the electric current passing through the bulb. (ii) If the same bulb is taken to the U.S.A where the main power supply is 110 V, how much electric current will pass through the bulb when connected to the mains?</p> <p>(ii) An electric iron of resistance 20Ω consumes a current of 5 A. Calculate the heat developed in 30 sec.</p>	3								
33	<p>(i) Two identical wires one of nichrome and the other of copper, are connected in series and a current (I) is passed through them. State the change observed in the temperatures of the two wires. Justify your answer. State the law which explains the above observation.</p> <p>(ii) A wire of resistance 10 ohm is bent in the form of a closed circle. What is the effective resistance between the two points at the end of any diameter of the circle?</p>	3								
SECTION-D (15 Marks)										
Q No.	Question	Marks								
34	<p>A. Shristi heated ethanol with a compound A in the presence of a few drops of concentrated sulphuric acid and observed that a sweet smelling compound B is formed. When B is treated with sodium hydroxide, it gives back ethanol and a compound C.</p> <p>(i) Identify A and C.</p> <p>(ii) Give one use each of compounds A and B.</p> <p>(iii) Write the chemical reactions involved and name the reactions.</p> <p style="text-align: center;">OR</p> <p>B. (i) Write the IUPAC name of $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH-COOH}$.</p> <div style="text-align: center;"> $\begin{array}{c} \\ \text{CH}_3 \end{array}$ </div>	5								

	<p>(ii) Reshu, forgot to label the two test tubes containing ethanol and ethanoic acid. Suggest an experiment to identify the substances correctly. Illustrate the reactions with the help of chemical equations.</p> <p>(iii) What is the role of concentrated sulphuric acid when it is heated with ethanol at 443 K? Give the reaction involved.</p>	
35	<p>A. (i) Certain specialised cells in animals called stem cells have the ability to divide and differentiate into different cell types. This helps in the replacement of a damaged organ. Name and explain two methods of asexual reproduction that are similar to stem cells and occur mostly in multicellular organisms.</p> <p>(ii) Identify two pairs of reproductive organs in males and females that are functionally similar to each other. Justify.</p> <p style="text-align: center;">OR</p> <p>B. (i) Aakash saw a beautiful rose and leaned to smell it. As he did so, he happened to touch a thorn and pull his hand away. State two differences and similarities each, in the way the nervous system performed the two actions.</p> <p>(ii) Are all involuntary actions, reflex actions? Justify.</p>	5
36	<p>A. (i) A student sitting on the back bench in a class is not able to see what is written on the blackboard. He however, sees it clearly when sitting on the front seat at an approximate distance of 1.5 m from the blackboard. Draw ray diagrams to illustrate the image formation of the blackboard when he is seated on the (a) back seat (b) front seat. (c) Write the causes of this defect.</p> <p>(ii) What is meant by the power of accommodation of an eye? Which part of the human eye is responsible for this special ability? Explain the causes in the case of any defect in the same.</p> <p style="text-align: center;">OR</p> <p>B. (i) Which phenomenon of vision is made use of, in cinematography?</p> <p>(ii) Draw a labelled ray diagram to show the refraction of light through a glass prism.</p> <p>(iii) Why does the sun appear reddish at sunrise? What is the colour of the clear sky during the day time? Give reason.</p>	3+2
SECTION-E (12 Marks)		
Q No.	Question	Marks
	Question No. 37 to 39 are case-based/data -based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.	
37	Soap is a water-soluble compound which is made by a process called saponification by the reaction between sodium hydroxide or potassium hydroxide with vegetable or animal	4

	<p>oil (fats). Amphipathic molecules that contain charged hydrophilic or polar groups at the end of long lipophilic hydrocarbon groups are called detergents. The charged hydrophilic group is also called the head and the long lipophilic hydrocarbon group is called the tail. Detergents are also known as surfactants as they have the ability to decrease the surface tension of water.</p> <p>(i) Explain the action of soap in removing an oil stain from a piece of cloth.</p> <p>(ii) Why are soaps not considered suitable for washing, in hard water?</p> <p style="text-align: center;">OR</p> <p>(ii) How does detergent act effectively in hard water?</p>	
38	<p>Ram and Asha had four children. One of these children had an attached earlobe whereas the other four children had free earlobes. Ram and Asha have free earlobes. The trait of the earlobe is not linked to the sex chromosomes.</p> <p>(i) Is the attached earlobe caused by a dominant or a recessive trait? Why?</p> <p>(ii) A child with an attached earlobe got married to a person without a mutation in the earlobe gene. State the percentage of their children that would have an attached earlobe. Support your answer with a cross.</p> <p style="text-align: center;">OR</p> <p>(ii) Identify the genotype of the ear lobe trait in Asha and Ram and use that to predict the genotype in the other four children who had free ear lobes.</p>	4
39	<p>The electrical energy consumed by an electrical appliance is given by the product of its power rating and the time for which it is used. The SI unit of electrical energy is Joule. Actually, Joule represents a very small quantity of energy and therefore it is inconvenient to use where a large quantity of energy is involved. So for commercial purposes we use a bigger unit of electrical energy which is called kilowatt hour. 1 kilowatt-hour is equal to 3.6×10^6 joules of electrical energy.</p> <p>(i) The electric refrigerator rated 400 W operates 8 hours a day. The cost of electrical energy is Rs.5 per kWh. Find the cost of running the refrigerator for thirty one days.</p> <p>(ii) When a current of 0.5 A passes through a conductor for 5 min and the resistance of the conductor is 10 ohm, calculate the amount of heat produced.</p> <p>(iii) Two wires of the same material, one of length L and area of cross-section A, and the other wire is of length 2L and area A/2. Calculate and compare the resistance and the resistivity of the two wires.</p> <p style="text-align: center;">OR</p> <p>(iii) Draw a circuit diagram of three resistors 5Ω, 10Ω and 30Ω connected with the 6V battery, so as to obtain the maximum amount of current. Calculate the minimum amount of current flow in the circuit.</p>	4