

**SCIENCE (086)**  
**CLASS X**  
**SAMPLE QUESTION PAPER (2023-24)**

**Time allowed: 3 hours**

**Maximum Marks: 80**

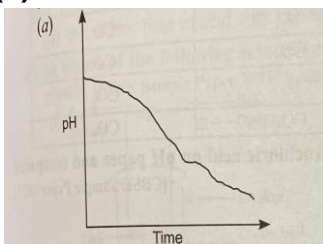
**General Instructions**

- 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 02 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 03 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 05 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 04 marks each with sub-parts.*

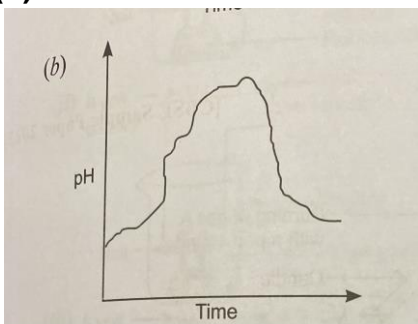
<b>SECTION - A</b>		
<b>Select and write one most appropriate option out of the four options given for each of the questions 1-20.</b>		
<b>Q. No.</b>	<b>Questions</b>	<b>Marks</b>
1	<p>Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following are true about slaking of lime and the solution formed ?</p> <p>(i) It is an endothermic reaction. (ii) It is an exothermic reaction. (iii) The pH of the resulting solution will be more than seven. (iv) The pH of the resulting solution will be less than seven.</p> <p>(a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iv) (d) (iii) and (iv)</p>	1

2	<p>In the balanced equation :</p> $a\text{Fe}_2\text{O}_3 + b\text{H}_2 \text{ -----} > c \text{Fe} + d\text{H}_2\text{O}$ <p>What are the values of a,b,c and d respectively?</p> <p>(a) 1,1,2,3  (b) 1,1,1,1  (c) 1,3,2, 3  (d) 1,2,2,3</p>	1
3	<p>When the gases sulphur dioxide and hydrogen sulphide react , the reaction is</p> $\text{SO}_2 + 2\text{H}_2\text{S} \text{ -----} > 2\text{H}_2\text{O} + 3\text{S}$ <p>Here hydrogen sulphide is acting as:</p> <p>(a) Oxidising Agent  (b) Dehydrating Agent  (c) A catalyst  (d) A reducing agent</p>	1
4	<p>The sting of an insect has pH 6. Which of the following can be used to treat effect of the sting?</p> <p>(a) Hydrochloric acid  (b) Vinegar  (c) Sodium hydrogen carbonate  (d) Sodium hydroxide</p>	1
5	<p>Which of these graphs shows how pH of milk changes as it forms curd ?</p>	1

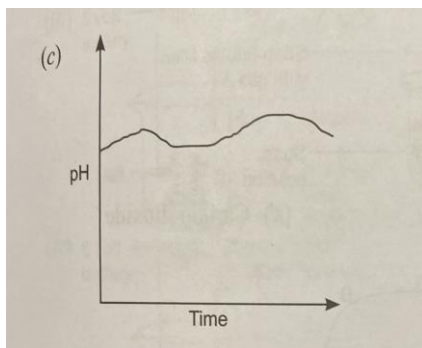
(a)



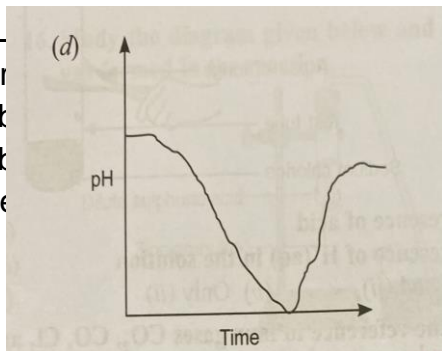
(b)



(c)



(d)



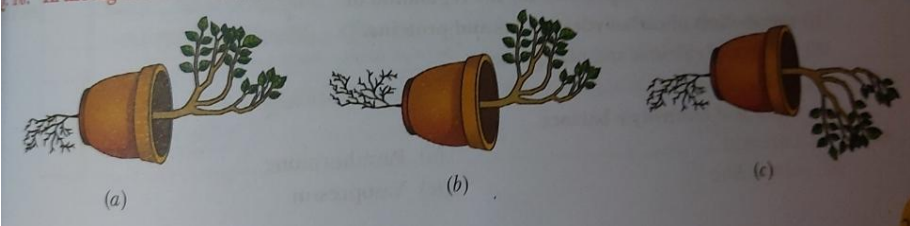
6

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on of iron sulphate was taken in each of the four test  
and aluminum were placed separately in the four test  
ed in two of them. Which two metals have formed the

1

- (c) iron and aluminum
- (d) zinc and aluminum

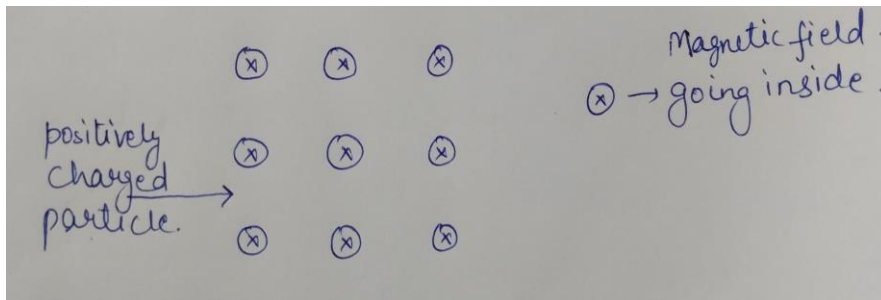
7	<p>What may have prevented Iron pillar near Qutub Minar in Delhi from getting rusted?</p> <p>(a) It has a layer of <math>Fe_2O_3</math> deposited on its surface.  (b) It has a coating of paint on its surface.  (c) It has been electroplated.  (d) It is made of an alloy.</p>	1
8	<p>In the figure given below, which one accurately depicts geotropism.</p>  <p>(a) a  (b) b  (c) c  (d) b and c</p>	1
9	<p>A person is suffering from a severe cold and he is not able to differentiate the fragrance of a perfume from that of an incense stick. What could be the possible reason?</p> <p>a) During cold, the mucus blocks the gustatory receptors in respiratory passage.  b) During cold, the mucus blocks the auditory receptors in respiratory passage.  c) During cold, the mucus blocks the olfactory receptors in respiratory passage.  d) Because a person is not able to take in air through nose.</p>	1
10	<p>Phloem in mango tree transports</p> <p>a. Sucrose  b. Starch  c. Glucose  d. Sucrose, amino acids and other substances.</p>	1
11	<p>The following figure shows the structure of a mammalian heart.</p>	1



Which blood vessel experiences the highest blood pressure?

- a. X
- b. Y
- c. W
- d. Z

	<p>Which blood vessel experiences the highest blood pressure?</p> <ul style="list-style-type: none"> <li>a. X</li> <li>b. Y</li> <li>c. W</li> <li>d. Z</li> </ul>	
12	<p>Rajan, under the effect of alcohol, is not able to maintain his balance while walking. Which part of his brain would have been affected in this condition?</p> <ul style="list-style-type: none"> <li>a) Cerebellum</li> <li>b) Cerebrum</li> <li>c) Pons</li> <li>d) Medulla</li> </ul>	1
13	<p>50 Joule of heat is produced each second in a 2 ohm resistance coil. The current produced in the resistance is</p> <ul style="list-style-type: none"> <li>A) 2 Ampere</li> <li>B) 5 Ampere</li> <li>C) 5 milliampere</li> <li>D) 25 Ampere</li> </ul>	1
14	<p>What will be the motion of a positively charged particle entering in a magnetic field as shown below-</p>	1

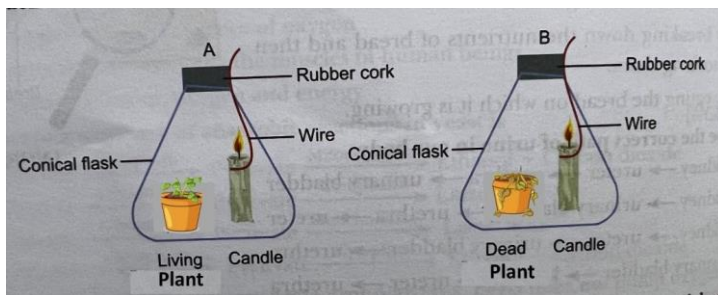


- (a) Upward
- (b) Downward
- (c) Left
- (d) Right

15

A student set up an experiment in which he placed a candle and a living plant in flask A while a candle and a dead plant in flask B. He observed that the candle in flask A burns longer than the one in flask B. State reason for this observation.

1

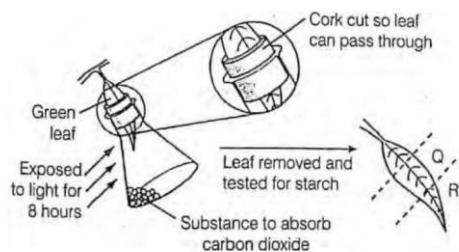


- a) Water vapours produced by living beings prevents burning of candle.
- (b) Green plant produce oxygen which support burning of candle.
- (c) Burning of candle decreases the life span of plant.
- (d) Candle produces high amount of carbon dioxide.

16

A potted plant is kept in the dark for two days. A leaf (still attached to the plant) is used in an experiment to investigate the effect of two factors (light and carbon dioxide) on photosynthesis as shown in the diagram.

1



What are the colours of Q and R , when the leaf is tested for starch, using iodine solution?

Q	R
(a) Blue	Black brown
(b) Brown	Brown
(c) Blue/black	Blue/black
(d) Brown Blue	Brown

**Q. no. 17 to 20 are Assertion - Reasoning based questions. These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:**

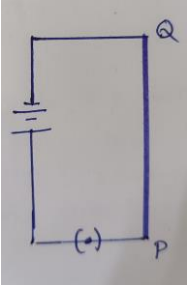
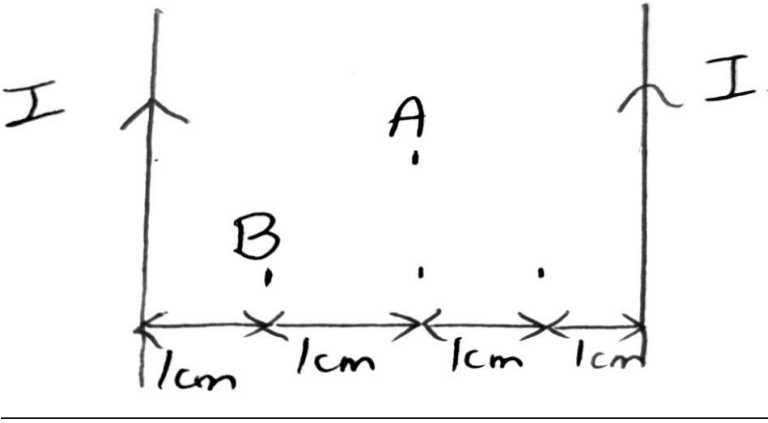
- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true and R is not the correct explanation of A.  
 (c) A is true but R is false.  
 (d) A is false but R is true.

17	<p><b>Assertion:</b> The colour of an aqueous solution of copper sulphate changes from blue to colourless when a zinc strip is placed in it.</p> <p><b>Reason:</b> Copper is a more reactive metal than zinc.</p>	1
18	<p><b>Assertion-</b> The lungs remove respiratory waste ie CO<sub>2</sub>.</p> <p><b>Reason</b> -This carbon dioxide enters from the body tissues into the bloodstream by the diffusion.</p>	1
19	<p>A: Fuse is used to protect appliances by stopping the flow of any unduly high electric current.</p> <p>R: Fuse is placed in series with the appliances.</p>	1
20	<p><b>Assertion:</b> Plants don't have a nervous system for control and coordination.</p> <p><b>Reason:</b> Plants use electrochemical means to convey information from cell to cell.</p>	1

### SECTION – B

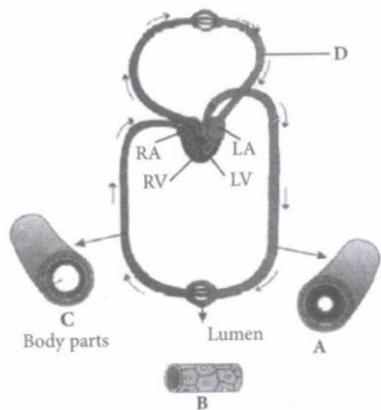
**Q. no. 21 to 26 are very short answer questions.**

21	In the electrolysis of water, why is the volume of gas collected over one electrode double that of the other electrode? Explain with the help of a chemical equation.	2
22	<p>A rabbit got scared of seeing a cat. Its body has to prepare for either fighting or running away.</p> <p>a) Name the hormone found to be high in its blood.</p>	2

	b) State the immediate physiological changes that take place in its body so that the rabbit is either able to fight or run.	
23	A tendril provides support to a plant with weak stem. How do auxin promote the growth of a tendril around the support?	2
24	<p>A compass needle is placed near a conductor PQ of length <math>l</math>. The conductor PQ is connected to a battery of 6V and a plug key in series to it. Now as the key is inserted in the circuit, the compass needle starts deflecting. Find the direction of magnetic field lines around the conductor PQ. Now the same conductor is connected to a 9V battery. Find the direction of the magnetic field lines around the conductor PQ. Also tell what will be the change in the deflection of the compass needle.</p> 	2
25	<p>Q25 a) Two wires carrying same current '<math>I</math>' flowing in them in the same direction are arranged as shown in the following figure. At which point out of A and B magnetic field is zero? Give reason.</p>  <p>b) Draw magnetic field lines in the region between X and Y magnets of the same strength.</p>	2



26	Priya, a class 10 student, observed a fish in an aquarium in the Biology lab. She was amazed to see the fish continuously opening and closing its mouth. She compared the breathing rate of fish with her's ,which was very slow. She went to her teacher to ask the reason for difference in breathing rate between her and fish- What would be the possible reason for priya's observation?	2
<b>SECTION - C</b> <b>Q.no. 27 to 33 are short answer questions.</b>		
27	(a) State and explain any two methods of preventing rancidity of food. (b) What type of chemical reaction is responsible for causing rancidity?	3
28	<p>(a) A white compound becomes hard when mixed with water. It is used in the medical industry. Write the chemical name and formula of this compound. (b) Why does this substance become hard on mixing with water? Explain with the help of a chemical equation.</p> <p style="text-align: center;"><b>OR</b></p> <p>A white coloured compound 'X' , on strong heating, produces a white solid 'Y' and a colourless gas 'G'. 'Y' on mixing with water gives a colourless solution of 'Z' and heat is evolved. When carbon dioxide is passed through the 'Z' it turns milky. The aqueous solution of 'Z' turns red litmus blue.</p> <p>(a) Write the chemical names of 'X' , 'Y' , 'Z' and 'G'. (b) Write the balanced chemical equation for the reaction between 'G' and 'Z'.</p>	3
29	<p>When gas HCl is a mineral acid which is highly corrosive by nature. It plays a key role in the process of digestion. HCl is produced in which part 'G' is passed through lime water, it turns milky. of the alimentary canal?</p> <p>b. What is its function? c. How does the human body protect the alimentary canal from the corrosive effect of this acid?</p>	3
30	The following figure shows blood circulation in humans with labels A to D.	3

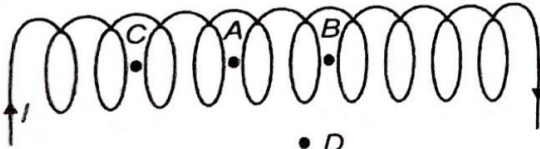
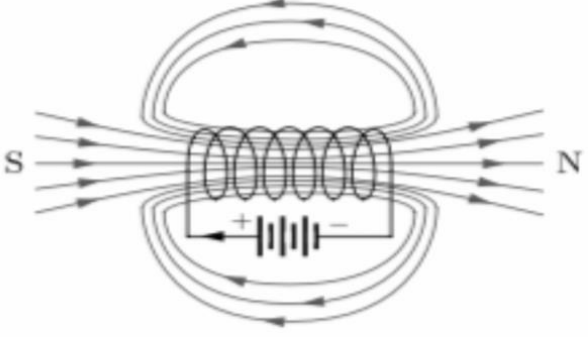


- a) Compare the structures of the blood vessels labeled as A and C.  
 b) Why is B considered to be very important in the circulation process?(2+1)

31	<p>1) Two resistors X and Y of resistances <math>2\Omega</math> and <math>3\Omega</math> respectively are first connected in parallel and then in series. In each case the voltage supplied is 5V.</p> <p>(a) Draw circuit diagram to show the combination of resistors in each case.          (b) Calculate the voltage across the <math>3\Omega</math> resistor in the series combination of resistors.</p>	3
32	<p>(a) What are the factors on which the resistance of a conductor depends on a particular temperature?</p> <p>(b) Two resistances, <math>R_1</math> &amp; <math>R_2</math>, <math>R_1 &gt; R_2</math>, are connected in series with a voltage source <math>V</math>. Which resistance will have a higher potential drop and why?</p>	3
33	<p>(a) Mention a factor on which resistivity depends.          (b) If a wire is doubled on it, by what factor the resistivity and resistance change?</p>	3

**SECTION - D**  
**Q.no. 34 to 36 are Long answer questions.**

34	<p>An element 'X' has two electron in M-shell and another element 'Y' has six electrons in L-shell.</p> <p>(a) Show the formation of a compound between 'X' and 'Y', with the help of electron dot structure.</p> <p>(b) What type of bond exist between the species formed by 'X' and 'Y' during formation of the above compound ?</p> <p>(c) Describe the nature of the compound formed in terms of its melting point, solubility in water and conduction of electricity</p> <p style="text-align: center;"><b>OR</b></p>	5
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	<p>An element 'X' is burnt in air in a jar. The ash formed by burning of 'X' is mixed with water to form a solution. This solution turns red litmus blue.</p> <p>a) Describe two characteristic physical properties of element 'X' which make it useful for making cooking utensils and bells.</p> <p>b) Metals, except Mg and Mn, do not evolve hydrogen gas on reaction with nitric acid. Explain why?</p> <p>c) Element 'X' reacts with an aqueous solution of both <math>YSO_4</math> and <math>ZSO_4</math>, but element 'Y' does not react with <math>ZSO_4</math>. Arrange the elements 'X', 'Y' and 'Z' in the decreasing order of their reactivity.</p>	
35	<p>a) In human beings energy is obtained by aerobic respiration but sometimes anaerobic respiration occurs in muscles during vigorous exercise. Trace the pathway of anaerobic respiration in human beings with the help of a flow chart.</p> <p>b) Draw the diagram of the human excretory system and label the following parts.</p> <p>i) Long tubes which collect urine from the kidney</p> <p>ii) Stores urine until it is being passed out.</p>	5
36	<p>a) A long solenoid is shown in the figure. The magnetic field at points A, B, C and D given in the figure is same or different at all points. Support your answer with reason.</p> <div style="text-align: center;">  </div> <p>) Diagram below shows a current carrying circuit with the solenoid. Observe it carefully and answer the following :</p> <div style="text-align: center;">  </div> <p>i) Draw the magnetic lines of force in the solenoid if the polarity of the above circuit is reversed.</p>	5

ii) State the rule used to draw the magnetic lines of force in the current carrying straight conductor..

c) There are two different electrical circuits set ups with a coil of copper wire of 25 turns in each of the circuit , but the current rating is different in both the circuits. Circuit -1 has the current rating of 5 A and Circuit -2 has the current rating of 15 A . Compare and mention which one of the circuit has more magnetic strength and why?

### SECTION - E

Q.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

### CASE BASED STUDY QUESTIONS:

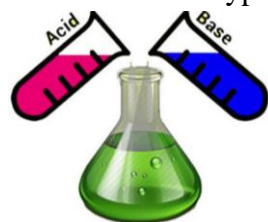
4



The acids are sour in taste while bases are bitter in taste. Tasting a substance is not a good way of finding out if it is an acid or a base. Acids and bases can be better distinguished with the help of indicators. Indicators are substances that undergo a change of color with a change of acidic, neutral or basic medium. Many of these indicators are derived from natural substances such as extracts from flower petals and barriers. Some indicators are prepared artificially. For example, methyl orange and phenolphthalein.

**Answer the following questions:**

1. Identify the color change ,when a few drops of phenolphthalein is added to a solution having pH 12.
2. What happens when a solution of an acid is mixed with a solution of a base in a conical flask? Name the type of reaction involved.



3. Rishabh takes three solutions P, Q and R and makes the reaction of all these solutions with phenolphthalein indicator and methyl orange indicator. He got the following result:

Solutions	Colour change with phenolphthalein indicator	Colour change with methyl orange indicator
<i>P</i>	Pink	Yellow
<i>Q</i>	Colourless	Orange
<i>R</i>	Colourless	Red

Out of P, Q and R, which of the following is an acidic solution.

**OR**

3. On washing with soap, what is the change of color of turmeric stain on the cloth. Justify your answer.

38

In the month of July, Raman tied a polythene bag around a bunch of green twigs of a tree rooted in the garden in the early morning. After 7 hrs he observed the water collected in that polythene bag.



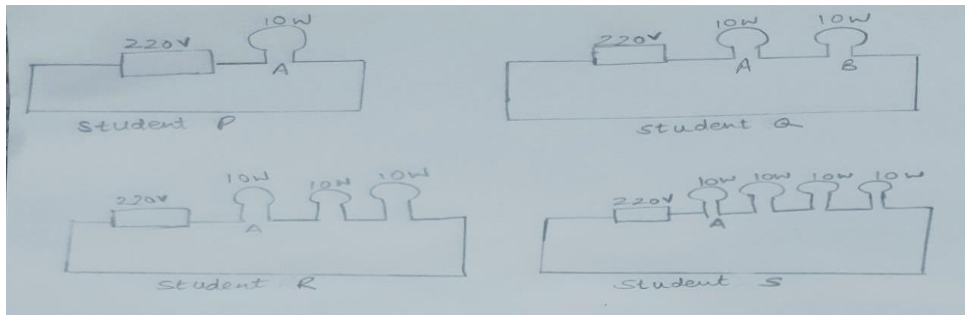
- Name the process responsible for the collected water in polythene.
- What would happen if the polythene is tied at night and observed next morning?
- How does this process help the plant to maintain its life processes? (any two points)

4

39

Four students P, Q, R, S are working in a physics lab. The identical bulbs of power 10W are provided to them. They made four circuits as shown below.

4



- a) In which student brightness of bulb A will be more?
- b) What will be the value of current made by student P in his circuit?
- c) Compare the value of potential drop across bulb A calculated by all the four students in their respective circuits.

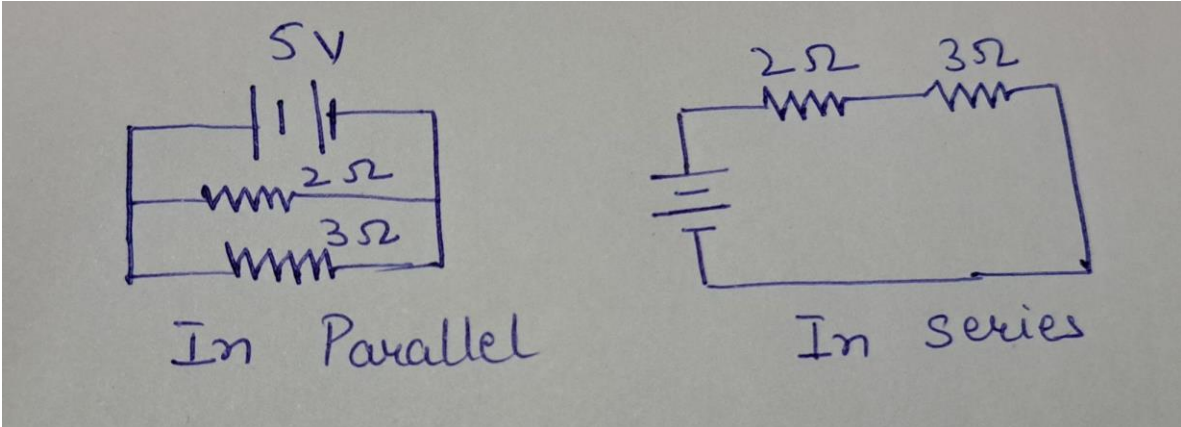
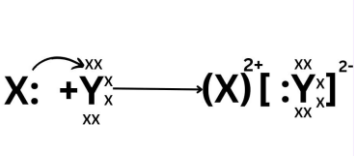
**SCIENCE (086)  
CLASS X  
MARKING SCHEME (2023-24)**

Q. No.	Questions	Marks
<b>SECTION - A</b>		
1	b	1
2	c	1
3	d	1
4	c	1
5	a	1
6	d	1
7	d	1

8	a	1
9	c	1
10	d	1
11	b	1
12	a	1
13	b	1
14	a	1
15	b	1
16	b	1
17	c, A is true but R is false.	1
18	b.	1
19	a	1
20	a	1
<b>SECTION - B</b>		
21	<p>In electrolysis, water is decomposed in the presence of electricity to its components. The reaction is shown as below:</p> $2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$ <p>As we can see, water splits into 2 molecules of hydrogen and 1 molecule of oxygen. Since, the number of molecules of hydrogen released is double the number of molecules of oxygen released, Volume occupied by hydrogen gas is double the volume occupied by oxygen gas.</p> <p>Hence, the electrode at which hydrogen gas is collected (Cathode) shows double the volume than the electrode at which oxygen gas is collected (Anode).</p>	2
22	<p>a) Adrenaline (1)</p> <p>(b)- Heart beats faster</p> <p>-Increased supply of O<sub>2</sub> to muscles.</p> <p>. -Blood to digestive system &amp; skin reduced, (½+½) (any two points)</p>	2
23	<p>-Auxin accumulates on the side away from touch.</p> <p>-Cell elongation on that side &amp; tendril curls around the support (1+1)</p>	2
24	<p>Outward- on the left side (½)</p> <p>Inward - on the right side of conductor(½)</p>	2

	Even if a 9V battery is used instead of 6V, the direction of magnetic field does not change but deflection in the magnetic compass will be more as intensity of magnetic field increases with the increase in current. (1)	
25	At point A magnetic field will be zero.(1) Diagram (1)	2
26	-A fish being an aquatic organism obtain oxygen dissolved in water which is comparatively less so it needs to breathe faster. - Priya being a terrestrial organism takes oxygen from atmospheric air which is comparatively more so she breathes slowly.(1+1)	2
<b>SECTION - C</b>		
27	a) 1.Use of antioxidant: antioxidant are those substances prevent from oxidation 2. Use of nitrogen gas:it is a inert gas, does not react with fats and oils 3. Use of air tight container : reduces the exposure of air and slow down the oxidation process ( any2) (2) b) Redox / Oxidation reaction (1)	3
28	(a)Chemical name : Calcium hemihydrate Chemical formula: CaSO <sub>4</sub> .1/2H <sub>2</sub> O  (b) Plaster of paris/calcium hemihydrate ,on mixing with water, gives gypsum which is a hard solid mass.  CaSO <sub>4</sub> .1/2H <sub>2</sub> O + 3/2H <sub>2</sub> O → CaSO <sub>4</sub> .2H <sub>2</sub> O  plaster of paris                      gypsum    1+2  <b>OR</b> a) X=Calcium carbonate                      Z= Calcium hydroxide Y= Calcium oxide                              G = Carbon dioxide (½ X4)  b) Ca(OH) <sub>2</sub> + CO <sub>2</sub> → CaCO <sub>3</sub> + H <sub>2</sub> O    1	3
29	(a) stomach.(1) b)Acidic medium/Kill germs present in food.(1)	3



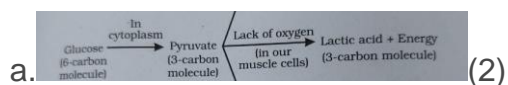
	C) Mucus present in gastric juice protects the inner lining of the stomach. (1)	
30	.a). A Artery C-Vein (any 2 difference) b). B- Capillaries i) Connecting vessels between arterial and venous system. ii) the exchange of materials take place across capillaries. (Any one point)(2+1)	3
31	 <p style="text-align: right;">(2)</p> <p>Voltage across 3 ohm resistor =3V (1)</p>	3
32	(a) Resistance is directly proportional to length of conductor, inversely proportional to area of cross section and also depends upon nature and material of the conductor. (2) (b) Potential drop will be higher across R1 as V is directly proportional to R. (1)	3
33	(a) Nature of the material. (1) (b) Resistivity will remain the same. (½) Area is twice and length is halved. (½) So according to the formula $R \propto l/A$ (½) New resistance will decrease by a factor 4.(½)	3
<b>SECTION - D</b>		
34	a)  b) ionic bond c)1. high melting and boiling point because large amount of energy is required to break strong inter-ionic attraction	5

2. solubility- ionic compounds are soluble in water  
 3. Conduction- in solid state they do not conduct electricity but in molten/ aqueous state they conduct electricity because ions can move freely

OR

- a) 'X' is a good conductor of heat, therefore, it is used for making cooking utensils.  
 'X' produces sound when it strikes a hard surface ,the substance are said to be sonorous and the property is called sonorosity. Therefore, it is used for making bells.  
 b) It is because nitric acid is a strong oxidizing agent.  
 It oxidizes the H<sub>2</sub> gas produced to water and itself gets reduced to nitrogen oxides.  
 c) X > Z > Y

35



b. Diagram (1)

Labels

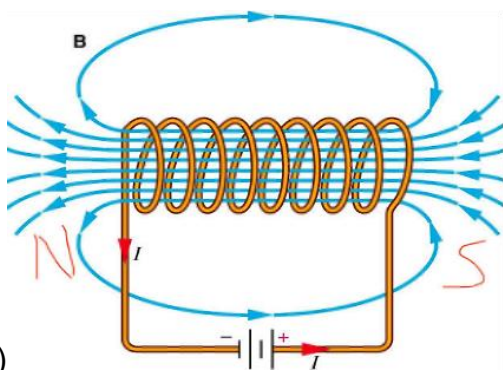
- i) Ureter  
 ii) Urinary bladder (1+1)

5

36

Ans1 . The magnetic field at points A,Band C is uniform and magnetic field lines move from south to north whereas at point D the magnetic field is not uniform and field lines move from north to south .as in bar magnet.

Ans2.



i)

ii) Right hand thumb rule: Thumb rules state that if thumb of the right hand points along direction of current, then the remaining curled , fingers of same hand gives the direction of the magnetic field due to the current.

Ans3 Circuit 2 with 15 A current has more strength of current as magnetic strength

5

	is directly proportional to the amount of current flowing through the circuit hence more the current more is the strength of magnet .	
<b>SECTION - E</b>		
37	<p>1.Changes to pink</p> <p>2.Neutralization reaction occurs when a solution of an acid is mixed with a solution of a base in a test tube. The result of the reaction is the production of salt and water with the evolution of heat.</p> <p>3.Solution - R</p> <p style="text-align: center;"><b>OR</b></p> <p>3.Turmeric is a natural indicator which turns red when it comes in contact with bases. Since soap is basic in nature, the turmeric stain turns red.</p>	4
38	<p>a)Transpiration (1)</p> <p>(b) Very less as rate of transpiration is slow at night (1)</p> <p>(c)i)Ascent of Sap -absorption and upward movement of water and minerals..</p> <p>ii)Temperature regulation. (1+1)</p>	4
39	<p>a) Student P (1)</p> <p>b) <math>I = ?</math>  <math>P = 10W</math>  <math>V = 220V</math>  <math>P = VI</math>  <math>I = P/V = 10/220 = 0.045A</math> (1)</p> <p>c) In case of student P  <math>V = 220V</math>  In case of student Q  Total Power = <math>10+10 = 20W</math>  <math>V = 220 V</math>  <math>I = P/V = 20/220 = 1/11</math></p> <p>Potential drop across  Bulb A = <math>V = P/I = 10 / (1/11) = 110V</math></p> <p>In case of student R  Total Power = <math>10+10+10 = 30W</math>  <math>V = 220V</math>  <math>I = P/V = 30/220 = 3/22 A</math></p>	

Potential drop across

$$\text{Bulb A} = V = P/I = 10 / (3/22) = 220/3 = 73.33\text{V}$$

In case of student S

$$\text{Total power} = 10 + 10 + 10 + 10 = 40\text{W}$$

$$V = 220\text{V}$$

$$I = P/V = 40/220 = 2/11$$

Potential drop across

$$\text{Bulb A} = V = P/I = 10 / (2/11) = 55\text{V}$$

( $\frac{1}{2} \times 4 = 2$ )