

## SAMPLE PAPER - 9

### Class 10 - Science

Time Allowed: 3 hours

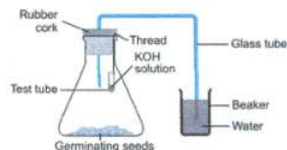
Maximum Marks: 80

#### General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts

#### Section A

1. Ohm's law gives a relation between: [1]
  - a) Resistance and potential difference
  - b) Potential difference and electric charge
  - c) Current and potential difference
  - d) Current and resistance
2. The principle of inheritance of acquired characters was given by [1]
  - a) Weismann
  - b) Darwin
  - c) Hugo De Vries
  - d) Lamarck
3. An experimental set-up is given below to demonstrate that  $\text{CO}_2$  is given out during respiration. Four students made the following observations marked I, II, III and IV : [1]
  - I. Level of water remained the same in both the beaker and the delivery tube
  - II. Level of water increased in the delivery tube
  - III. Level of water gets reduced in both the beaker and the delivery tube
  - IV. Water ascends into the delivery tube and back flows into the beaker.



Which one of the above is the correct observation?

a) IV

b) III

c) II

d) I

4. Which of the following is correct? [1]

- A. A field lines forms a closed loop.
- B. Neutral wire is always at zero voltage.
- C. Heat loss in DC is less than AC.
- D. Electric fuse is a current generating device.

a) A and C

b) A, B, C and D

c) B and D

d) A, B and C

5. Generally, non-metals are not lustrous. Which of the following nonmetal is lustrous? [1]

a) Iodine

b) Nitrogen

c) Sulphur

d) Oxygen

6. By how much atomic mass unit successive members of a homologous series vary? [1]

a) Sixteen

b) Twelve

c) Fourteen

d) One

7. HCl is a strong acid since in solution it gives [1]

a) more number of water molecules

b) less number of  $H^+$  ions

c) more number of  $Cl^-$  ions

d) more number of  $H^+$  ions

8. Chlamydia is related to: [1]

a) Urethra

b) Syphilis

c) Gonorrhoea

d) HIV

9. pH (power of Hydrogen) value of black coffee is: [1]

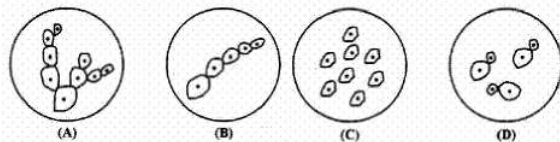
a) 5

b) 3

c) 7

d) 8

10. The following are the sketches made by some students. The sketch not illustrative of budding in yeast is : [1]



a) B

b) D

c) C

d) A

11. If a round, green seeded pea plant (RRyy) is crossed with wrinkled, yellow seeded pea plant (rrYY) the seeds to be produced in F<sub>2</sub> generation will be: [1]

a) Wrinkled and yellow

b) Round and yellow

c) Round and green

d) Wrinkled and green

12. If the potential difference between the end of a wire of fixed resistance is doubled, by how much does the electric power increase? [1]

a)  $\frac{4V}{R}$

b)  $\frac{3V}{R}$

c)  $\frac{6V}{R}$

d) None of these

13. The lateral displacement of an incident ray passing out of a rectangular glass slab [1]
- a) independent of the thickness of the glass slab.      b) None of these
- c) is directly proportional to the thickness of the glass slab.      d) inversely proportional to the thickness of the glass slab.
14. Which of the following elements occurs in free state in nature? [1]
- a) Fe      b) Ni
- c) Pt      d) CO
15. Anaerobic process [1]
- a) takes place in yeast during fermentation      b) produces ethanol, oxygen, and energy
- c) takes place in the presence of oxygen      d) produces only energy in the muscles of human beings
16. A group of organisms that can interbreed to produce fertile offspring is called [1]
- a) order      b) genus
- c) species      d) family
17. **Assertion (A):** When two long parallel wires, hanging freely are connected in series to a battery, they come closer to each other. [1]
- Reason (R):** Wires carrying current in opposite direction repel each other.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.      d) A is false but R is true.
18. **Assertion (A):** Gas bubbles are observed when sodium carbonate is added to dilute hydrochloride acid. [1]
- Reason (R):** Carbon dioxide is given off in the reaction.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.      d) A is false but R is true.
19. **Assertion (A):** The effect of auxin hormone on the growth of root is exactly opposite to that on a stem. [1]
- Reason (R):** Auxin hormone increases the rate of growth in root and decreases the rate of growth in stem.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false.      d) A is false but R is true.
20. **Assertion (A):** The crown fires are most destructive as they burn the treetop. [1]
- Reason (R):** Due to crown fire the temperature of that area may rise upto 700° C.
- a) Both A and R are true and R is the correct explanation of A.      b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

### Section B

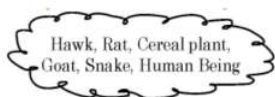
21. Draw the structures of the following compounds: Hexanal [2]

OR

Out of sodium chloride (NaCl) or methyl chloride (CH<sub>3</sub> Cl), which has higher melting and boiling points? Why?

22. How do we detect the smell of an agarbatti (Incense sticks)? [2]

23. i. From the following group of organisms create a food chain which is the most advantageous for Human beings in terms of energy. [2]



ii. State the possible disadvantage if the cereal plant is growing in soil rich in pesticides.

iii. Construct a food web using the organisms mentioned above.

24. DDT was sprayed in minute amount on food plants but was detected in high concentration in man? How did it happen? Explain. [2]

25. The image of a candle flame formed by a lens is obtained on a screen placed on the other side of the lens. If the image is three times the size of the flame and the distance between the lens and image is 80 cm, at what distance should the candle be placed from the lens? What is the nature of the image at a distance of 80 cm and the lens? [2]

OR

An object is placed at a distance of 12 cm in front of a concave mirror. It forms a real image four times larger than the object. Calculate the distance of the image from the mirror

26. Name the oxidising agent used for the conversion of ethanol to ethanoic acid. Distinguish between ethanol and ethanoic acid on the basis of [2]

i. litmus test,

ii. reaction with sodium carbonate.

### Section C

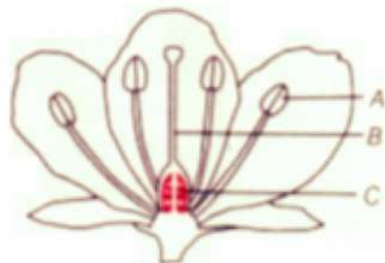
27. Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions. [3]

a. Zinc reacts with silver nitrate to produce zinc nitrate and silver.

b. Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

28. "A concave mirror of focal length  $f$  can form a magnified, erect as well as an inverted image of an object placed in front of it." Justify this statement stating the position of object with respect to the mirror in each case for obtaining these images. [3]

29. Name the parts A, B and C shown in the following diagram and state one function of each. [3]



OR

The embryo gets its nutrition from the mother's blood with the help of special tissue.

- i. What is this special tissue called?
- ii. Give any other function of this tissue apart from one mentioned above.
- iii. Explain the structure of this special tissue.

30. 1. Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles. [3]
2. Millions of people of the developing countries of world are suffering from corneal blindness. These people can be cured by replacing the defective cornea with the cornea of a donated eye.
- A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact.
- If you are asked to participate in this mission how would you contribute in this noble cause?
1. State the objective of organising such campaigns.
  2. List two arguments which you would give to motivate the people to donate their eyes after death.
  3. List two values which are developed in the persons who actively participate and contribute in such programme.

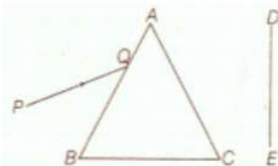
31. Give reason and name the type of chemical reaction taking place in each case: [3]
- i. Dissolution of ammonium chloride in water leads to cooling of the glass apparatus used for dissolutions.
  - ii. Silver chloride powder which is white in colour, turns grey when kept in sunlight.
  - iii. Blue colour of copper sulphate solution fades when an iron nail is dipped inside the solution.

32. Give the respective scientific terms used for studying [3]
- i. The mechanism by which variations are created and inherited.
  - ii. the development of new types of organisms from the existing ones.

OR

Explain how sexual reproduction gives rise to more viable variations than asexual reproduction. How does this affect the evolution of those organisms that reproduce sexually?

33. A narrow beam PQ of white light is passing through a glass prism ABC as shown in the diagram. [3]



Trace it on your answer sheet and show the path of the emergent beam as observed on the screen DE.

- i. Write the name and cause of the phenomenon observed.
- ii. Where else in nature is this phenomenon observed?
- iii. Based on this observation, state the conclusion which can be draw about the constituents of white light.

#### Section D

34. What happens when: [5]
- i.  $\text{ZnCO}_3$  is heated in the absence of oxygen?
  - ii. a mixture of  $\text{Cu}_2\text{O}$  and  $\text{Cu}_2\text{S}$  is heated?

OR

- i. By the transfer of electrons, illustrate the formation of bond in magnesium chloride and identify the ions present in this compound.
- ii. Ionic compounds are solids. Give reasons.
- iii. With the help of a labelled diagram show the experimental set up of action of steam on a metal.

35. Define nutrition. What are the different modes of nutrition? [5]

OR

Why and how does water enter continuously into the root xylem of plants?

36. i. State Fleming's Left-hand rule. [5]

ii. List three characteristic features of the electric current used in our homes.

iii. What is a fuse? Why is it called a safety device?

iv. Why is it necessary to earth metallic electric appliances?

#### Section E

37. **Read the text carefully and answer the questions:** [4]

The heating effect of current is obtained by transformation of electrical energy into heat energy. Just as mechanical energy used to overcome friction is converted into heat, in the same way, electrical energy is converted into heat energy when an electric current flows through a resistance wire. The heat produced in a conductor, when a current flows through it is found to depend directly on (a) strength of current (b) resistance of the conductor (c) time for which the current flows.

The mathematical expression is given by  $H = I^2Rt$ .

The electrical fuse, electrical heater, electric iron, electric geyser etc. all are based on the heating effect of current.

(i) What are the properties of heating element?

(ii) What are the properties of electric fuse?

OR

When the current is doubled in a heating device and time is halved, what will be the heat energy produced?

38. **Read the text carefully and answer the questions:** [4]

We have seen that the different parts of our body have specific functions. Our mouth waters when we see the food we like without our meaning to. Our heart's beat without our thinking about it. In fact, we cannot control these actions easily by thinking about them even if we wanted to. So, in between the simple reflex actions like change in the size of the pupil, and the thought out actions such as moving a chair, there is another set of muscle movements over which we do not have any thinking control. Many of these involuntary actions are controlled by the mid-brain and hind-brain. All these involuntary actions including blood pressure, salivation and vomiting are controlled by the medulla in the hind-brain. Think about activities like walking in a straight line, riding a bicycle, picking up a pencil. These are possible due to a part of the hind-brain called the cerebellum. It is responsible for the precision of voluntary actions and maintaining the posture and balance of the body. Imagine what would happen if each of these events failed to take place if we were not thinking about it.



(i) Identify the part of the nervous system which controls the reflex action.

(ii) Does reflex action involve all parts of the voluntary nervous system?

(iii) Identify the part of the autonomic nervous system which controls involuntary actions.

OR

**Beating of heart muscles**, which type of action is this? Out of voluntary and involuntary action which is

slower?

39. **Read the text carefully and answer the questions:**

**[4]**

Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.

- (i) If given acids are phosphoric acid, carbonic acid, hydrochloric acid and sulphuric acid, then which acid does not form an acidic salt?
- (ii) What is the formula of baking soda?
- (iii) Name the substance which on treatment with chlorine to obtain bleaching powder.

**OR**

Which salt is used for removing the permanent hardness of water?

## Solution

### SAMPLE PAPER - 9

#### Class 10 - Science

##### Section A

- (c)** Current and potential difference  
**Explanation:** Current and potential difference
- (d)** Lamarck  
**Explanation:** Lamarckism - Theory of Inheritance of Acquired Characters is the first theory of evolution, which was proposed by Jean Baptiste de Lamarck (1744-1829), a French biologist. Although the outline of the theory was brought to notice in 1801, his famous book "Philosophic Zoologique" was published in 1809, in which he discussed his theory in detail.
- (c)** II  
**Explanation:** Seeds release CO<sub>2</sub> during respiration. KOH absorbs CO<sub>2</sub> in flask, creates a vacuum and causes rise in water level in the delivery tube.
- (d)** A, B and C  
**Explanation:**  
A. A curl is always present when a field line forms a closed loop.  
B. The voltage of the neutral wire is always zero.  
C. AC power transmission losses are greater than DC losses.  
D. Fuse is an electrical safety device that operates to provide overcurrent protection of an electrical circuit.  
So, statements A, B, and C are correct and statement D is incorrect.
- (a)** Iodine  
**Explanation:** Lustre means to shine. Shining metals are also called lustrous metal. For example, gold. Non-metals such as sulphur, oxygen, nitrogen are non-lustrous but iodine is a greyish black solid and crystals have a metallic lustre.
- (a)** Sixteen  
**Explanation:** Sixteen
- (d)** more number of H<sup>+</sup> ions  
**Explanation:** HCl dissociates completely in an aqueous medium to form a large number of H<sup>+</sup> ions.  
$$\text{HCl(g)} + \text{H}_2\text{O(l)} \rightarrow \text{H}^+(\text{aq}) + \text{Cl}^-(\text{aq})$$
  
This is not a reversible reaction, and 100% of the HCl molecules dissociate into ions.
- (a)** Urethra  
**Explanation:** Chlamydia is a common sexually transmitted disease. It is caused by bacteria called Chlamydia trachomatis. It can infect both men and women. In Men, this condition often causes swelling and inflammation of the urethra, accompanied by a penile discharge.
- (d)** 8  
**Explanation:** 8
- (c)** C  
**Explanation:** Buds appear as protuberance. In C all the cells are separate and single.
- (b)** Round and yellow  
**Explanation:** Since roundness and yellow colour are shown by capital letters in the genotype so they are dominant traits. We know that only dominant traits are expressed in the F1 generation.
- (a)**  $\frac{4V}{R}$   
**Explanation:** We know that,  
$$P = \frac{V^2}{R}$$
  
R is constant  
V is doubled  
Therefore, 
$$P = \frac{2(V^2)}{R}$$



$$P = \frac{4V}{R}$$

Therefore, when the resistance is doubled, power becomes four times the actual value.

13. (c) is directly proportional to the thickness of the glass slab.

**Explanation:** The lateral displacement of an incident ray passing out of a rectangular glass slab is directly proportional to the thickness of glass slab, angle of incidence, and refractive index however it is inversely proportional to the wavelength of the incident light.

14. (c) Pt

**Explanation:** Pt

15. (a) takes place in yeast during fermentation

**Explanation:** takes place in yeast during fermentation

16. (c) species

**Explanation:** A **species** is often defined as the largest group of organisms in which two individuals can produce fertile offspring, typically by sexual reproduction.

17. (b) Both A and R are true but R is not the correct explanation of A.

**Explanation:** The wires are parallel to each other but the direction of current in it is in same direction so they attract each other. If the current in the wire is in opposite direction then wires repel each other.

18. (a) Both A and R are true and R is the correct explanation of A.

**Explanation:** Both A and R are true and R is the correct explanation of A.

19. (c) A is true but R is false.

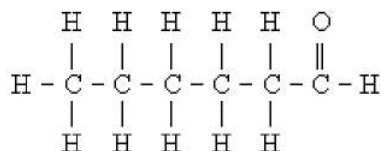
**Explanation:** A is true but R is false.

20. (a) Both A and R are true and R is the correct explanation of A.

**Explanation:** Both A and R are true and R is the correct explanation of A.

### Section B

21. Hexanal :



OR

The intermolecular forces are small in the covalent compounds. So, These bonds break easily. Hence, covalent compounds have low melting and boiling point. The intermolecular forces are small in the covalent compounds. These bonds break easily. Hence, covalent compounds have low melting and boiling point.

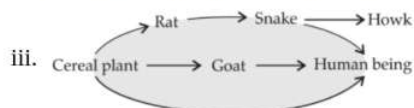
Sodium chloride ( $\text{Na}^+\text{Cl}^-$ ) is an ionic compound, therefore its melting and boiling points are higher than methyl chloride ( $\text{CH}_3\text{Cl}$ ) which is a covalent compound.

22. Sensory information regarding smell is received by olfactory lobes of brain. As the air passes through the nasal chambers, the olfactory epithelial cells get stimulated and convey the information as electrical impulses to brain which have the power of interpretation.

23. i. Short food chains are more efficient in terms of energy. The shorter the food chain is, more is the available amount of energy.

Cereal Plant  $\rightarrow$  Human being

- ii. Harmful for human consumption as the traces of pesticide will be carried by food.



24. This occurs due to biological magnification. When pesticides like DDT are used to protect crops from diseases and pests sprayed on the plants, these non-biodegradable substances enter the soil. From soil these substances are absorbed by plants along with water and minerals. The food plants when consumed by organisms, they get accumulated at different trophic levels. As the human beings occupy the top position in any food chain, maximum concentration of such harmful chemicals get accumulated in the bodies of man.

25. As the image is obtained on the screen, it is real.

So.

Magnification, = -3

$v = 80 \text{ cm}$

$u = ?$

As  $m = \frac{v}{u}$

so,

$$-3 = \frac{80}{u}$$

$$u = \frac{-80}{-3} \text{ cm}$$

From

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$= \frac{1}{80} + \frac{3}{80} = \frac{4}{80}$$

$$= \frac{1}{20}$$

$$\frac{1}{f} = \frac{1}{20} \text{ cm}$$

so,

$f = 20 \text{ cm}$

The lens is convex and image formed at 80 cm from the lens is real and inverted.

OR

$u = -12 \text{ cm}$

$m = -4$

$v = ?$

$$\frac{-v}{u} = -4$$

$v = 4u$

$v = 4(-12)$

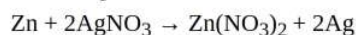
$v = -48 \text{ cm}$

26. Alkaline  $\text{KMnO}_4$  or acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  is oxidising agent used for the conversion of ethanol to ethanoic acid.

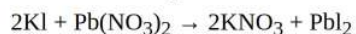
Ethanol	Ethanoic acid
Litmus test: Ethanol is a neutral substance. It does not change colour of litmus paper.	Litmus test: It turns blue litmus paper to red colour.
Ethanol will not react with sodium carbonate ( $\text{Na}_2\text{CO}_3$ ). $\text{C}_2\text{H}_5\text{OH} + \text{Na}_2\text{CO}_3 \rightarrow \text{No reaction}$	It reacts with $\text{Na}_2\text{CO}_3$ to produce brisk effervescence of $\text{CO}_2$ Reaction: $2\text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$

**Section C**

27. a. It is a displacement reaction.



b. It is a double displacement reaction.



28. When an object is placed between Focus and Pole of concave mirror, the image formed is virtual, magnified, erect and behind the mirror. When an object is placed between Curvature and Focus of concave mirror, the image formed is real, magnified, inverted at the same side of mirror.

29.

Part	Function
A- Anther	Formation of pollen grains and storing it till pollination starts.
B- style	Connecting stigma to ovary. Where pollen grains stuck to stigma, grows its pollen tube to facilitate the movement of 2 male gametes.
C- Ovary	Contains ovule which develop into seeds after fertilization of male and female gamete, while ovary forms the fruit.

OR

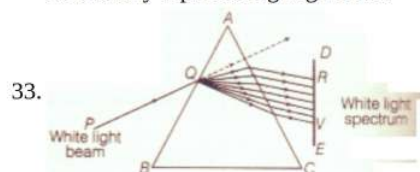
i. This special tissue that provides nutrition is called the placenta.

- ii. Besides providing nutrition to the embryo, placenta helps in removing waste products from embryo, it also helps in providing oxygen to the embryo and eliminating carbon dioxide from embryo.
- iii. The placenta is a disc-like structure that is attached to the wall of the uterus. It is formed by two sets of a minute finger-like process called villi. One set from uterine wall and other set from the embryo. The blood flows through the fine capillaries of the placenta.
30. 1. Functions of following parts of human eye are given below :
1. Cornea - It is a thin membrane which provides 67% of the eye's focussing power.
  2. Iris - It controls amount of light entering the eye by controlling the size of pupil similar to the aperture of a camera which has capacity to decrease or increase the amount of light entering eye.
  3. Crystalline lens - It helps to focus light on retina for image formation.
  4. Ciliary muscles - It contracts and relax in order to change the lens shape for focussing image at retina. when it contracts the lens become thicker and when it relaxes the lens become flat.
2. 1. The objective of organising such campaigns is to guide, educate and help those people who are suffering from corneal blindness that they can be cured by corneal replacement surgery.
1. Come to participate in this campaign because, if someone get his vision through your eyes, it is an incredible help.
  2. As eye is one of the most valuable sense organs through which an individual can achieve so many things in his/her life, so try to realise the situation that these people are suffering from.
  3. The persons who actively participate and contribute in such programme are strong hearted and very much helpful for the people living in such situations.
31. i. Dissolution of ammonium chloride ( $\text{NH}_4\text{Cl}$ ) in water is an endothermic reaction where heat is absorbed from the surroundings hence making the glass apparatus cooler than before:
- $$\text{NH}_4\text{Cl}(\text{s}) + \text{H}_2\text{O}(\text{l}) \longrightarrow \text{NH}_4\text{OH}(\text{aq}) + \text{HCl}(\text{aq})$$
- Ammonium chloride                      Ammonium hydroxide      Hydrochloric acid
- ii. Silver chloride ( $\text{AgCl}$ ) undergoes a decomposition reaction in sunlight to give silver metal and chlorine gas:
- $$2\text{AgCl}(\text{s}) \xrightarrow{\text{Sunlight}} 2\text{Ag}(\text{s}) + \text{Cl}_2(\text{g})$$
- Silver chloride                      Silver metal  
(White)                                      (Grey)
- iii. Iron( $\text{Fe}$ ) displaces copper from its solution, hence the colour of copper sulphate solution becomes less blue or fades. This is an example of a displacement reaction:
- $$\text{Fe}(\text{s}) + \text{CuSO}_4(\text{aq}) \longrightarrow \text{FeSO}_4(\text{aq}) + \text{Cu}(\text{s})$$
- Copper sulphate                      Ferrous sulphate  
(Blue)
32. i. Genetics is the study of mechanism by which variations are created and inherited. These variations are far more in sexual reproduction due to crossing over in meiosis and also new diploid recombination.
- ii. Evolution is used for studying the development of new species of organisms from the existing ones through accumulation of variation.

OR

In sexual reproduction, two individuals having different variations combine their DNA to give rise to a new individual. Therefore, sexual reproduction allows more variations, whereas, in asexual reproduction, chance variations can only occur when the copying of DNA is not accurate. Additionally, asexual reproduction allows very less variations because if there are more variations, then the resultant DNA will not be able to survive inside the inherited cellular apparatus. However, in sexual reproduction, more variations are allowed and the resultant DNA is also able to survive, thus making the variations viable.

Variation and Evolution: Variants help the species to survive in all the conditions. Environmental conditions such as heat, light, pests, and food availability can change suddenly at only one place. At that time, only those variants resistant to these conditions would be able to survive. This will slowly lead to the evolution of a better-adapted species. Thus, variation helps in the evolution of sexually reproducing organisms.



- i. The phenomenon of splitting of white light into its constituent colours is called dispersion of light. It is caused due to difference in speed of constituent colours of light travel in the medium other than air/vacuum because of different speed they bend at different angles.

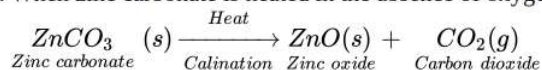
ii. In nature, this Phenomenon is observed in formation of rainbow where all the seven colours constituting white light is visible.

iii. Based on phenomenon of dispersion, we can conclude that

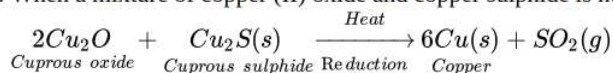
- White light consists of seven colours. Violet, indigo, blue, green, yellow, orange and red.
- Violet light suffers maximum deviation and red light suffers minimum deviation.

#### Section D

34. i. When zinc carbonate is heated in the absence of oxygen (**calcination**), zinc oxide and carbon dioxide are produced.



ii. When a mixture of copper (II) oxide and copper sulphide is heated then copper metal and sulphur dioxide gas are produced.

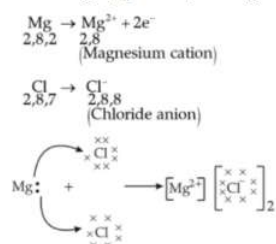


OR

i. Formation of magnesium chloride - magnesium is a metal and chlorine is a non-metal. The magnesium atom loses 2 electrons to attain a stable configuration which results in the formation of magnesium cation  $Mg^{2+}$ .

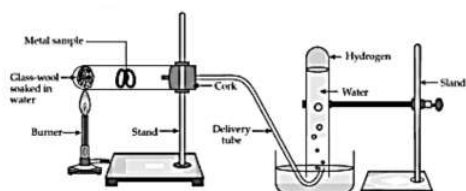
Similarly, the chlorine atom gains an electron to complete its octet and results in the formation of chloride anion  $Cl^-$ .

When magnesium reacts with chlorine, two electrons lost by magnesium atoms are gained by two chlorine atoms.  $Mg^{2+}$  and  $Cl^-$  being oppositely charged, attract each other and are held by strong electrostatic forces of attraction to exist as  $MgCl_2$ .



ii. Due to the strong force of attraction between the metal with a positive charge and metal with a negative charge, ionic compounds are solid.

iii. **Reaction with steam:** Metals like iron, zinc and aluminum react with steam to form corresponding hydroxide and hydrogen gas.



35. **Nutrition:** The sum total of processes by which living organisms obtain food materials and prepare them for use in the growth, repair and providing energy is termed nutrition.

Nutrition is of two types: 1) Autotrophic nutrition, 2) Heterotrophic nutrition.

**1) Autotrophic nutrition:** The mode of nutrition in which an organism prepares its own food is called autotrophic nutrition.

Mostly green plants have the ability to manufacture their own organic food due to the presence of chlorophyll. They take up  $CO_2$  and  $H_2O$  and manufacture carbohydrates in the presence of sunlight process called as photosynthesis. Such organisms are called autotrophs and their mode of nutrition is called autotrophic.

**2) Heterotrophic nutrition:** The mode of nutrition in which an organism takes food from another organism is called heterotrophic nutrition. In this type of nutrition, the animals derive organic food materials by consuming bodies or products of other living or dead plants or animals.

OR

Xylem transports water and minerals to the plant body. The roots of a plant have hair called root hairs. The root hairs are directly in contact with the film of water in between the soil particles. Water and minerals get into the root hair by the process of diffusion. The water and minerals absorbed by the root hair form the soil pass from cell to cell by osmosis through the epidermis root cortex, endodermis and reaches the root xylem. The xylem vessels of the root the plant are connected to the xylem vessels into stem. Therefore the water containing dissolved minerals enter the root xylem vessels into stem xylem vessels. The xylem vessels of the stem branch into the leaves of the plants. So the water & minerals carried by the xylem vessels in the stem reach the leaves through the branched xylem vessels which enter from the petiole into the leaf. Thus the water and minerals from the soil reach

through the root and stem to the leaves of the plants.

Evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots. The loss of water in the form of vapour from the aerial parts of the plants is known as transpiration.

36. i. According to this rule, stretch the thumb, forefinger and middle finger of left hand such that they are mutually perpendicular. If the middle finger points in the direction of the magnetic field, the fore finger points in the direction of the flow of current, then the thumb points in the direction of motion.
- ii. Three characteristics of electric current use in our home are as follows:
- the current supplied in our homes is alternating current.
  - the current supplied in our homes is at 220 V.
  - the neutral wire and the live wire carry the current in our homes.
- iii. Fuse is a safety device used in a circuit to prevent damage due to overloading/short-circuiting. It protects the circuit by stopping the flow of any unduly high electric current. If current larger than the specified value flows through the circuit, due to Joule's heating effect the fuse wire melts and breaks the circuit.
- iv. When live wire touches the metallic appliance then electric current flows through the casing to the earth instead of the human body and thus we prevent ourselves from getting shocked. It is necessary to earth metallic casing of the appliance because it saves electrical appliance from burning and electric shock.

#### Section E

37. **Read the text carefully and answer the questions:**

The heating effect of current is obtained by transformation of electrical energy into heat energy. Just as mechanical energy used to overcome friction is covered into heat, in the same way, electrical energy is converted into heat energy when an electric current flows through a resistance wire. The heat produced in a conductor, when a current flows through it is found to depend directly on (a) strength of current (b) resistance of the conductor (c) time for which the current flows.

The mathematical expression is given by  $H = I^2Rt$ .

The electrical fuse, electrical heater, electric iron, electric geyser etc. all are based on the heating effect of current.

(i) Low resistance, high melting point.

(ii) High resistance, low melting point

Electric Fuse is based on the principle of the heating effect of Electric current.

OR

Given:  $H = I^2Rt$

So,  $H' = (2I)^2 \cdot \frac{R}{2}t = 2H$

38. **Read the text carefully and answer the questions:**

We have seen that the different parts of our body have specific functions. Our mouth waters when we see the food we like without our meaning to. Our heart's beat without our thinking about it. In fact, we cannot control these actions easily by thinking about them even if we wanted to. So, in between the simple reflex actions like change in the size of the pupil, and the thought out actions such as moving a chair, there is another set of muscle movements over which we do not have any thinking control. Many of these involuntary actions are controlled by the mid-brain and hind-brain. All these involuntary actions including blood pressure, salivation and vomiting are controlled by the medulla in the hind-brain. Think about activities like walking in a straight line, riding a bicycle, picking up a pencil. These are possible due to a part of the hind-brain called the cerebellum. It is responsible for the precision of voluntary actions and maintaining the posture and balance of the body. Imagine what would happen if each of these events failed to take place if we were not thinking about it.



(i) Reflex Action is an unconscious, automatic and involuntary response of efforts, i.e., muscles and glands, to a stimulus, which is monitored through the spinal cord. Reflex action is controlled by the spinal cord.

(ii) Yes, reflex action involves all parts of the voluntary nervous system.

(iii) The part of the autonomic nervous system that controls involuntary actions are controlled or regulated by medulla (hindbrain).

OR

'Beating of heart muscle' is an example of involuntary action. Involuntary actions are slower than reflex actions.

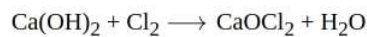
**39. Read the text carefully and answer the questions:**

Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.

(i) Carbonic acid does not form an acidic salt.

(ii) Sodium bicarbonate, commonly known as baking soda or bicarbonate of soda, is a chemical compound with the formula  $\text{NaHCO}_3$ .

(iii)  $\text{Ca}(\text{OH})_2$  treatment with chlorine to obtain bleaching powder.



OR

Washing soda is used for removing the permanent hardness of the water.