

Class- X Session - 2022-23

Subject - Science (086)

Sample Question Paper - 25

with Solution

Max. Marks: 80

Time Allowed: 3 hours

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 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 in the range of 50 to 80 words
- vi. **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.
- vii. **Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

Section A

1. In which of the following groups of organisms, food material is broken down outside the body and absorbed? [1]
a) Paramecium, Amoeba, Cuscuta b) Mushroom, Green plants, Amoeba
c) Cuscuta, Lice, Tapeworm d) Yeast, Mushroom, Bread mould
2. What does the tangent at any point on magnetic field lines indicate? [1]
a) direction of magnetic field b) direction of the force
c) direction of current d) direction of induced current
3. Which of the following is not a character selected by Mendel? [1]
A. Flower shape
B. Pod colour
C. Pod position
D. Branch length
a) A and C b) A, B and D
c) A and D d) B and C
4. If the resistance of a certain copper wire is 1Ω , then the resistance of a similar nichrome wire will be about: [1]
a) 45Ω b) 60Ω

c) $30\ \Omega$

d) $25\ \Omega$

5. The chemical compound present in a fruit is: [1]

a) $\text{CH}_3\text{COOC}_2\text{H}_5$

b) $\text{C}_2\text{H}_5\text{COOH}$

c) $\text{C}_2\text{H}_5\text{OH}$

d) All of these

6. Generally, metals are solid in nature. Which one of the following metals is found in liquid state at room temperature? [1]

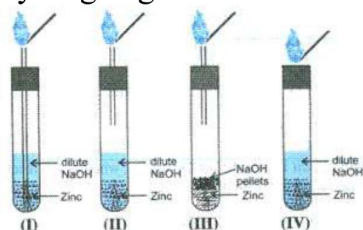
a) Hg

b) Fe

c) Na

d) Cr

7. Which one of the following set ups is the most appropriate for the evolution of hydrogen gas and its identification? [1]



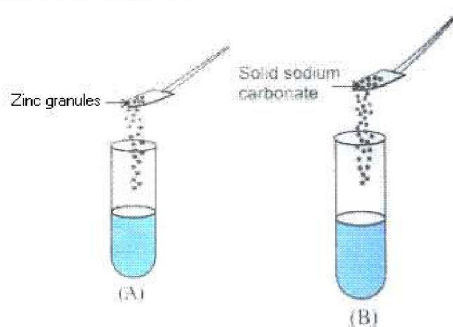
a) III

b) I

c) IV

d) II

8. A student took two test tubes containing 2 ml of dilute hydrochloric acid and added zinc granules to test tube (A) and solid sodium carbonate to test tube (B) as shown below: [1]



The correct observation would be

a) Rapid reaction in both the test tubes

b) No reaction in any of the test tubes.

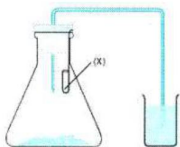
c) Slow reaction in (A) and rapid reaction in (B)

d) Rapid reaction in (A) but a slow reaction in (B)

9. In Rhizopus, tubular thread-like structures bearing sporangia at their tips are called [1]

a) filaments

b) roots

- c) rhizoids d) hyphae
10. Length of pollen tube depends on the distance between [1]
- a) pollen grain and upper surface of stigma b) upper surface of stigma and lower part of style
- c) pollen grain in anther and upper surface of stigma d) pollen grain on upper surface of stigma and ovule
11. Which of the following statement is correct? [1]
- A. For every hormone there is a gene
B. For every protein there is a gene
C. For every enzyme there is a gene
D. For every fat molecule there is gene
- a) A and C b) B and C
- c) A, B and C d) A, B and D
12. Which of the following terms does not represent electrical power in a circuit? [1]
- a) $\frac{V^2}{R}$ b) VI
- c) IR^2 d) I^2R
13. Magnesium imparts: [1]
- a) Dazzling white colour flame b) Yellowish orange colour flame
- c) None of these d) Brick red colour flame
14. The diagram below is the experimental set-up to show that carbon dioxide is given out during respiration. In this set-up what does the test tube marked (X) contain ? [1]
- 
- a) Water b) Lime water
- c) Hydrochloric acid d) Potassium hydroxide
15. Refractive indices of water, sulphuric acid, glass, and carbon disulphide are 1.33, 1.43, 1.53, 1.63 respectively. The light travels slowest in: [1]
- a) sulphuric acid b) water
- c) glass d) carbon disulphide

16. Offspring formed by the asexual method of reproduction have greater similarity among themselves because [1]
- i. asexual reproduction involves only one parent
 - ii. asexual reproduction does not involve gametes
 - iii. asexual reproduction occurs before sexual reproduction
 - iv. asexual reproduction occurs after sexual reproduction
- a) (ii) and (iv) b) (i) and (iii)
- c) (iii) and (iv) d) (i) and (ii)
17. **Assertion (A):** H_2CO_3 is a strong acid. [1]
Reason (R): A strong acid dissociates completely or almost completely in water.
- 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):** Unlike cabbage, sunflower plant has long internode with leaves that are far apart. [1]
Reason (R): Sunflower produces sufficient amounts of Gibberellins during its growing period.
- 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 magnetic field produced by a current-carrying solenoid is independent of its length and cross-section area. [1]
Reason (R): The magnetic field inside the solenoid is uniform.
- 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):** Green plants of the ecosystem are the transducers. [1]
Reason (R): Producers trap the radiant energy of the sun and change it into chemical energy.
- 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

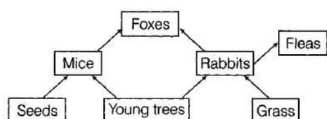
21. What is gland? Name the two types of glands. [2]

22. With the help of an example, explain the process of hydrogenation. Mention the essential condition for the reaction and state the change in physical property with the formation of the product. [2]

OR

List any two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed?

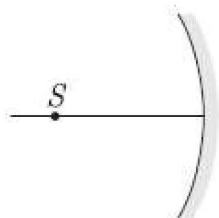
23. A food web is given below, observe the figure and answer the questions given below. [2]



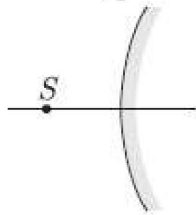
- Identify the primary consumer in the food web.
 - If all the foxes are killed due to a disease, what will your observations about food web be?
24. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image. [2]

OR

An optical component and an object S is placed along its optic axis. The distance between the object and the component can be vary.



- What types of image can be formed in the above diagram?

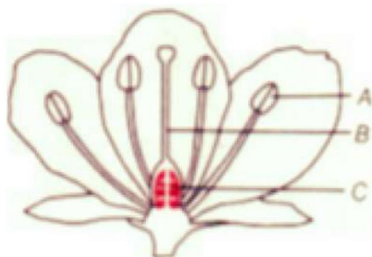


- What type of images can be formed in the above diagram?
 - Draw the ray diagram for the image formation by a concave mirror when the object is placed at the focus.
25. What is meant by trophic level in a food chain? Construct a terrestrial food chain with four trophic levels. The energy flow in a food chain is always unidirectional. Why? [2]

26. Write the two possible compounds of molecular formula C_3H_6O . [2]

Section C

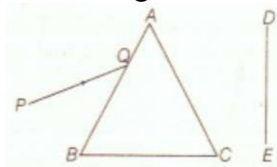
27. A pencil when dipped in water in a glass tumbler appears to be bent at the interface of air and water. Will the pencil to be bent to the same extent, if instead of water we use liquids like, kerosene or turpentine? Support your answer with reasons. [3]
28. A brown substance X on heating in air forms a substance Y. When hydrogen gas is passed over heated Y, it again changes back into X. Name the substances X and Y. [3]
29. Name the parts A, B and C shown in the following diagram and state one function of each. [3]



OR

Answer the following:

- With the help of a diagram demonstrate the process of regeneration as seen in Planaria?
 - Which type of cells are used by such multicellular organisms to regenerate?
30. 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.

- Write the name and cause of the phenomenon observed.
 - Where else in nature is this phenomenon observed?
 - Based on this observation, state the conclusion which can be drawn about the constituents of white light.
31. Outline a project which aims to find the dominant coat colour in dogs. [3]

OR

Two plants, A with white flowers and B with red flowers were crossed. The F_1 progeny shows all red flowers and F_2 has three red and one white. Categorise the trait as dominant and recessive.

32. A metal salt MX when exposed to light, split up to form metal M and a gas X_2 . [3]
Metal M is used in making ornaments whereas gas X_2 is used in making bleaching powder. The salt MX is itself used in black and white photography.
i. Identify metal M and gas X_2 .
ii. Mention the type of chemical reaction involved when salt MX is exposed to light.
33. How can changes of size of eyeball be one of the reason for [3]
i. myopic and
ii. hypermetropic eye?
Compare the size of eyeball with that of a normal eye in each case. How does this changes of size affect the position of image in each case?

Section D

34. A non-metal A which is the largest constituent of air, when heated with H_2 in 1:3 ratio in the presence of a catalyst (Fe) gives a gas B. On heating with O_2 , it gives an oxide C. If this oxide is passed into the water in the presence of air it gives an acid D which acts as a strong oxidizing agent. [5]
a. Identify A, B, C, and D
b. To which group of periodic table does this non-metal belong?

OR

What happens when:

- i. $ZnCO_3$ is heated in the absence of oxygen?
ii. a mixture of Cu_2O and Cu_2S is heated?

35. With the help of a labeled circuit diagram illustrating the pattern of field lines of the magnetic field around a current-carrying straight long conducting wire. How is the right-hand thumb rule useful to find the direction of the magnetic field associated with a current-carrying conductor? [5]
36. Write the summary of oxygen transport in the body. [5]

OR

Draw the diagram of part of leaf from which transpiration takes place. Explain stomatal or foliar transpiration.

Section E

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

We know that a battery or a cell is a source of electrical energy. The chemical reaction within the cell generates the potential difference between its two terminals that sets the electrons in motion to flow the current through a resistor or a system of resistors connected to the battery. To maintain the current, the source has to keep expanding its energy. Where does this energy go? A part of the source energy in maintaining the current may be consumed for useful work (like in rotating the blades of an electric fan). The rest of the source energy may be expended in heat to raise the temperature of the gadget. We often observe this in our everyday life. For example, an electric fan becomes warm if used continuously for a long time, etc. On the other hand, if the electric circuit is purely resistive, that is, a configuration of resistors only connected to a battery; the source energy continually gets dissipated entirely in the form of heat. This is known as the heating effect of electric current. This effect is utilized in devices such as an electric heater, electric iron, etc.



- (i) Explain Joule's heating law.
- (ii) In practical situations, when an electric appliance is connected to a known voltage source, then how does the heating effect of electric current can be calculated?

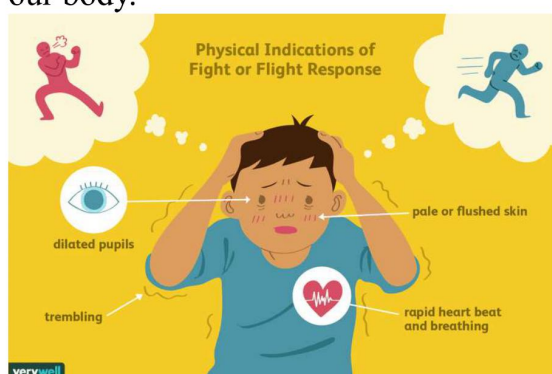
OR

Write the relation between heat energy produced in a conductor when a potential difference V is applied across its terminals and a current I flows through for t .

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

[4]

Adrenaline is secreted directly into the blood and carried to different parts of the body. The target organs or the specific tissues on which it acts include the heart. As a result, the heart beats faster, resulting in the supply of more oxygen to our muscles. The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. This diverts the blood to our skeletal muscles. The breathing rate also increases because of the contractions of the diaphragm and the rib muscles. All these responses together enable the animal body to be ready to deal with the situation. Such animal hormones are part of the endocrine system which constitutes the second way of control and coordination in our body.



- (i) How does chemical coordination take place in animals ?
- (ii) Which hormone is called an emergency hormone?
- (iii) Where are the adrenal gland present in our body?

OR

How does our body respond when adrenaline is secreted into the blood ?

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

Section A

1. (d) Yeast, Mushroom, Bread mould

Explanation: Yeast, mushroom, and bread mould are saprophytes. Saprophytes break the food material outside their body and absorbed.

2. (a) direction of magnetic field

Explanation: Tangent indicates the direction of the magnetic field. It just an alternative used when compass is not available.

3. (a) A and C

Explanation: Mendel selected seven pairs of contrasting characters. Plant Height, Pod Shape, Pod Color, Seed Shape, Seed Color and Flower Position. So flower shape and pod position not included here.

4. (b) $60\ \Omega$

Explanation: The resistance of nichrome is $60\ \Omega$ when the resistance of a copper wire is $1\ \Omega$.

5. (a) $\text{CH}_3\text{COOC}_2\text{H}_5$

Explanation: The esters are found naturally in fruits like apples, pears, bananas, pineapples, and strawberries. Fruits exhibit their aroma due to the presence of esters. Hence, it is said that esters have a fruity smell. Esters are also present in vegetables. $\text{CH}_3\text{COOC}_2\text{H}_5$ is an ester.

6. (a) Hg

Explanation: All metals are solid at room temperature except for mercury. Mercury metal exists as a liquid at room temperature.

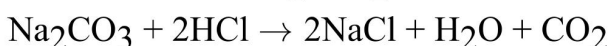
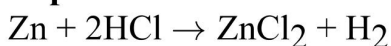
7. (d) II

Explanation: $\text{Zn} + 2\text{NaOH} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$

The gas evolved is tested properly such that delivery tube does not dip in the solution.

8. (a) Rapid reaction in both the test tubes

Explanation: Reaction will be rapid in both test tubes



9. (d) hyphae

Explanation: Rhizopus is a saprobic fungus that feeds on the dead decaying organic matter. Its body is made up of branching mycelia composed of three types of hyphae-rhizoids, stolons, and unbranched sporangiophores. Rhizoids are root-like hyphae that grow downward into the soil and help in the absorption of water. A stolon is a special slender horizontal hypha that helps in the propagation of an organism. Sporangiophores are straight, unbranched tubular thread-like hyphae which bear rounded sporangia at its tips. sporangia produce non-motile multinucleate spores for asexual reproduction.

10. (d) pollen grain on upper surface of stigma and ovule

Explanation: The **length of the pollen tube depends on the distance between the upper surface of the stigma and the ovule.**

11. (c) A, B and C

Explanation: Hormones, proteins and enzymes are the result of specific gene sequences and different type of hormones, proteins and enzymes are secreted by varying gene codings.

Fats are combination of fatty acids and glycerol and is completely not a gene based secretion.

12. (c) IR^2

Explanation:

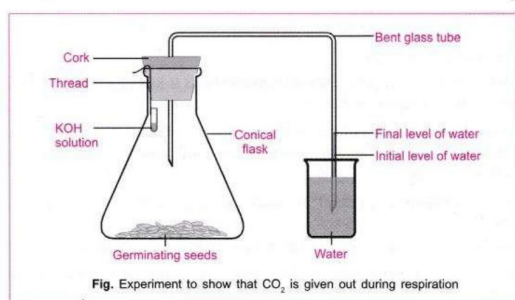
Electrical power (P) is the rate at which electric energy is lost (dissipated) or consumed in an electrical device due to resistance (R). $P = V \times I = I^2 \times R = \frac{V^2}{R}$ where V is the potential difference across the resistor and I is the current passing through the resistor.

13. (a) Dazzling white colour flame

Explanation: Magnesium burns in air with a dazzling white flame.

14. (d) Potassium hydroxide

Explanation: KOH absorbs the CO_2 produced.



15. (d) carbon disulphide

Explanation: carbon disulphide

16. (d) (i) and (ii)

Explanation: In asexual reproduction, the only single parent is involved and progeny develops directly from its parent by cell division, fragmentation, budding, etc. passing the same genes from generation to generation. Thus offspring formed by the asexual reproduction have similarities among themselves.

17. (d) A is false but R is true.

Explanation: H_2CO_3 carbonic acid is a weak acid.

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

Explanation: The magnetic field is independent of length and area. It is uniform inside the solenoid.

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.

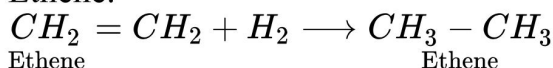
Section B

21. A cell, a tissue, or an organ which secretes certain useful chemical compounds required for particular function is called a **gland**.

Types:

Animals have two types of glands : exocrine and endocrine.

22. Hydrogenation is the chemical process in which hydrogen molecule is added to an unsaturated hydrocarbon to make a saturated one. Example. Hydrogenation of Ethene.



Conditions Required: This reaction takes place in the presence of catalyst like Ni or Pt.

Change in Physical Properties:

- i. **Physical State:** Liquid to Solid
- ii. **Density:** Increases
- iii. **Melting Point:** Increases

OR

- i. **Litmus test:** Take 2 strips of litmus paper. Place a drop of each of alcohol and carboxylic acid on these strips separately. The blue litmus paper turns red in case of carboxylic acid and remains unaffected in case of alcohol.
 - ii. **Sodium hydrogen carbonate test:** A pinch of sodium hydrogen carbonate is added to both alcohol and carboxylic acid separately. If brisk effervescence is observed with the evolution of a colourless gas, it indicates the presence of carboxylic acid. If no effervescence is observed, alcohol is present.
23. i. The primary consumers are the organisms who directly feed on the producers. In the given food web, rabbits and mice are the primary consumers.
- ii. The foxes feed on the rabbits and mice. If all the foxes are killed then there will be no direct predator of rabbits and mice, hence the number of rabbits and mice will increase in the given ecosystem and with increasing number of primary consumers the producers will decline as more consumers will feed on more producers, which will disturb the ecological balance.
24. $u = -10$ cm [u is always negative]; $f = 15$ cm [convex mirror] $v = ?$

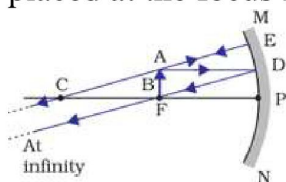
Using $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$, we have

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{15} - \frac{1}{-10} = \frac{1}{15} + \frac{1}{10} = \frac{2+3}{30} = \frac{5}{30} = \frac{1}{6}$$

So $v = 6$ cm behind the mirror or towards left of the mirror. Image is virtual and erect.

OR

- i. Real image, virtual image, magnified image, and image at infinity can be formed in the above diagram.
- ii. Only virtual image can be formed in the above diagram.
- iii. The ray diagram for the image formation by a concave mirror when the object is placed at the focus is as follows:



25. Each step in a food chain through which the transfer of food takes place constitutes a trophic level.

Grass $\rightarrow$ Insect $\rightarrow$ Frog $\rightarrow$ Snake

The flow of energy in food chains is unidirectional. The energy which passes to the

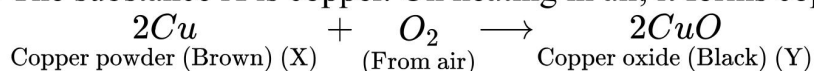
herbivores does not come back to the autotrophs. The energy that is captured by the autotrophs does not revert back to the Sun. Therefore, in the food chain, the energy moves progressively through various trophic levels. This energy is no longer available to the previous trophic level. Thus, the flow of energy in a food chain is unidirectional.

26. $\text{CH}_3\text{CH}_2\text{CHO}$: Propanal
 CH_3COCH_3 : Propanone

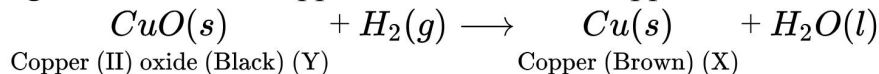
Section C

27. We know that pencil appears to be bent at the interface of air and water because of refraction of light. The degree of refraction depends on refractive index of a given liquid. Refraction indices of kerosene, water and other liquids would be different. Hence, degree of bend would be different in case of different liquids.

28. The substance X is copper. On heating in air, it forms copper oxide, Y.



When hydrogen gas is passed over black copper oxide, hydrogen acts as a reducing agent and it turns copper oxide back into copper.

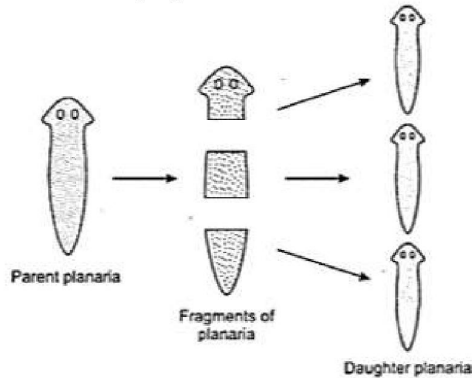


29.

Part	Function
A- Anther	Formation of pollen grains and storing it till pollination starts.
Part	Function
B- style	Connecting stigma to ovary. Where pollen grains stuck to stigma, grows it's 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.

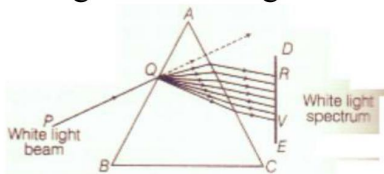
OR

- i. Regeneration is the process by which an organism has the ability to regenerate its lost parts of the body that might have been removed by injury or by some other methods. Planaria have the ability to give rise to new individuals from their body parts. When Planaria is cut into many pieces, each piece grows into a complete organism. Regeneration is carried out by specialized cells which have the capacity to develop, proliferate and differentiate into various cell types and tissues.



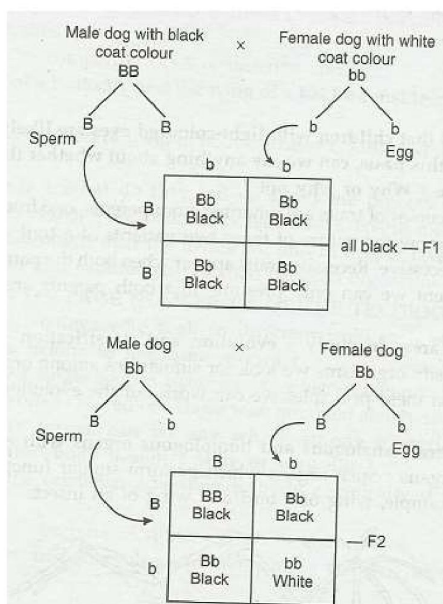
- ii. A single pluripotent adult stem cell type (neoblasts) is used by such multicellular organisms to regenerate.

30.



- 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.

31.



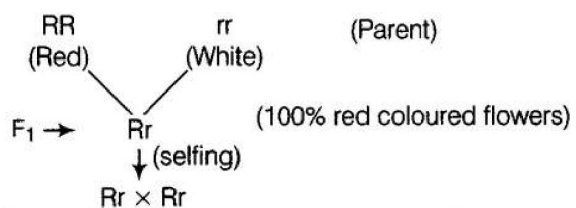
- i. Select two varieties of dogs one with white coat colour, the other with black coat colour.
- ii. Crossbreed them taking male dog from one variety and bitch (female dog) from the other variety.
- iii. Observe the colour of offsprings of F₁ generation. (iv) Now, bring about breeding among the organisms of F₁ generation.
- iv. Observe the coat colour of organisms (pups) of F₂ generation and note the variations in coat colour.
- v. Draw conclusions on the basis of your study. One of the probable inheritance pattern may be as given below. Phenotypic ratio = 3 : 1, Black coat colour (3) : White coat colour (1)

OR

When two plants, A with white flowers and B with red flowers were crossed, In F₁ generation all the plants have red coloured flowers and in F₂ generation the ratio of red : white is 3 : 1.

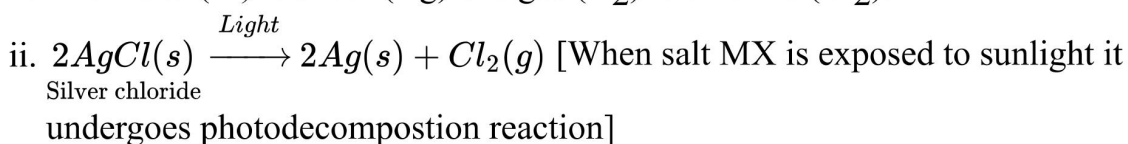
The dominant trait is red colour in flowers.

The recessive trait is white colour in flowers.



Gametes	R	r
R	RR(red)	Rr(red)
r	Rr(red)	rr(red)

32. i. The metal (M) is silver (Ag) and gas (X₂) is chlorine (Cl₂).



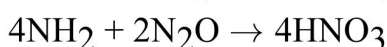
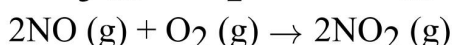
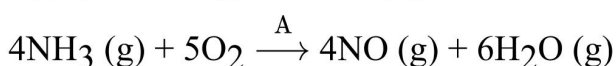
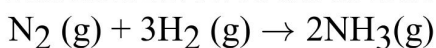
33. i. The eye suffering from myopia or short-sightedness, has long eyeball than that of normal eye due to which the retina is at a larger distance from the eye lens thus image formation occurs before retina rather than onto it.
- ii. The eye suffering from hypermetropia or long-sightedness has short eyeball than that of normal eye due to which the retina is at smaller distance from the eye lens thus, the formation of the image occurs behind the retina and not on retina.

Section D

34. a. The **non-metal A** is **nitrogen (N₂)**. It forms the largest constituent of air, i.e., 78%. When N₂ is heated with H₂ in 1 : 3 ratio in the presence of iron (Fe) as a catalyst, it forms ammonia gas (NH₃). This is known as the Haber process. Thus the **gas B is ammonia**. When ammonia is heated with O₂, it forms nitric oxide (NO). NO further gets oxidized to NO₂ by O₂. Thus, **oxide C is NO₂ (nitrogen dioxide)**.

When this oxide reacts with water in the presence of air (O₂), it gives nitric acid.

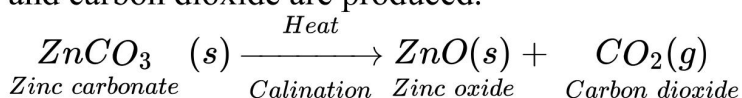
Thus **acid D is nitric acid** which is a strong oxidizing agent. The chemical reactions involved are as follows:



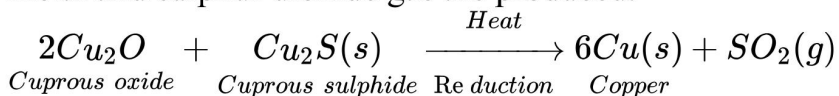
- b. Nitrogen belongs to Group 15 of the periodic table because nitrogen has 5 valence electrons (electronic configuration is of N is 2, 5).

OR

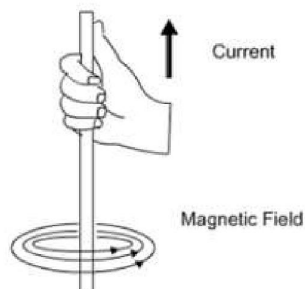
- i. When zinc carbonate is heated in the absence of oxygen (**calcination**), zinc oxide and carbon dioxide are produced.



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



35. The pattern of the magnetic field lines of the magnetic field around a current-carrying straight long conducting wire are in a circular pattern in the form of concentric circles as shown in the below diagram:



As depicted in the diagram, the direction of the magnetic field can find out by using the right-hand thumb rule which says that if we are holding a current-carrying conductor in the right hand such that the thumb will point towards the direction of the current. The fingers will wrap around the conductor in the direction of the field lines of the magnetic field.

36. Summary of oxygen (O_2) transport

Inspired air (in lungs) $\rightarrow O_2$ (in alveoli of lungs)

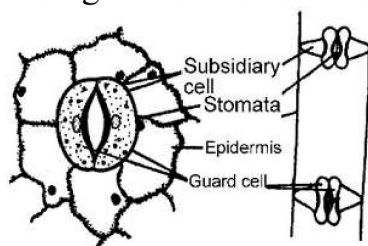
Oxyhaemoglobin (in RBC of tissue capillaries)	$\leftarrow$ Oxyhaemoglobin (in RBC of lung capillaries)	$\leftarrow$ Dissolved O_2 (in plasma of lung capillaries)
Dissolved O_2 (in plasma of tissue capillaries)	$\rightarrow$ Dissolved O_2 (in cells)	$\rightarrow O_2$ consumption (in cells)

OR

Stomatal transpiration: The epidermis has minute pores called stomata. Each stoma is surrounded by two specialised epidermal cells called guard cells. The guard cells are kidney-shaped, possess chloroplasts and less elasticity. Adjacent to the epidermal cells, their walls are thin and elastic. They are thickened near the openings. The stomata remain open in light and close in darkness. Guard cells control the opening or closing of stomata.

The stomata form the chief pathway of transpiration. Though the relative total area of the stomatal pore is 1-2% of the total area of the leaf, more transpiration takes place

through these stomata only.



Section E

37. Read the text carefully and answer the questions:

We know that a battery or a cell is a source of electrical energy. The chemical reaction within the cell generates the potential difference between its two terminals that sets the electrons in motion to flow the current through a resistor or a system of resistors connected to the battery. To maintain the current, the source has to keep expanding its energy. Where does this energy go? A part of the source energy in maintaining the current may be consumed for useful work (like in rotating the blades of an electric fan). The rest of the source energy may be expended in heat to raise the temperature of the gadget. We often observe this in our everyday life. For example, an electric fan becomes warm if used continuously for a long time, etc. On the other hand, if the electric circuit is purely resistive, that is, a configuration of resistors only connected to a battery; the source energy continually gets dissipated entirely in the form of heat. This is known as the heating effect of electric current. This effect is utilized in devices such as an electric heater, electric iron, etc.



- (i) The law implies that heat produced in a resistor is
 - a. directly proportional to the square of current for a given resistance,
 - b. directly proportional to resistance for a given current, and
 - c. directly proportional to the time for which the current flows through the resistor.
- (ii) Firstly, we calculate the current flowing through it, using the relation $I = \frac{V}{R}$. Then we apply the formula $H = I^2 R t$ to calculate the heating effect.

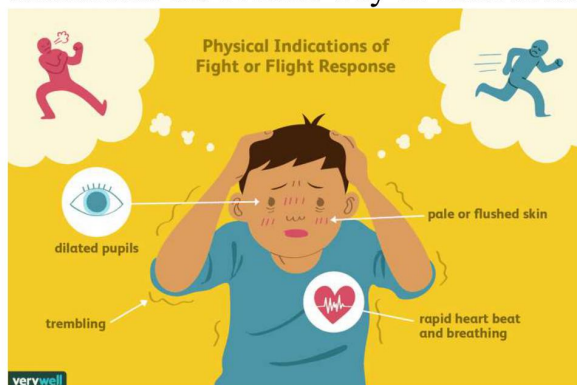
OR

Heat produced, $H = VIt$

38. Read the text carefully and answer the questions:

Adrenaline is secreted directly into the blood and carried to different parts of the body. The target organs or the specific tissues on which it acts include the heart. As a result, the heart beats faster, resulting in the supply of more oxygen to our muscles. The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. This diverts the blood to our skeletal muscles. The breathing rate also increases because of the contractions of the diaphragm and the rib muscles. All these responses together enable the animal body to be ready to deal with the situation. Such animal hormones are part of the endocrine system which

constitutes the second way of control and coordination in our body.



- (i) In animals, chemical coordination is achieved through the agency of hormones which function as chemical messengers. Different plant hormones help to coordinate growth, development, and responses to the environment.
- (ii) Adrenaline hormone is called an emergency hormone. Adrenaline hormone is released into the blood from the adrenal gland during stimulation of the nervous system.
- (iii) The adrenal gland is present on the upper side of each kidney in our body.

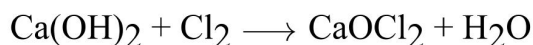
OR

Adrenaline hormone is secreted in small amounts all the time. But in large amounts, it is secreted when a person is frightened. It increases the rate of heartbeat and breathing, raises blood pressure and allows more glucose go into the blood to give us a lot of energy so as to quickly fight or run away from the frightening situation.

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 NaHCO_3 .
- (iii) Ca(OH)_2 treatment with chlorine to obtain bleaching powder.



OR

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