Class X Session 2024-25
Subject - Science
Sample Question Paper - 16

Time: 3 hours. **Total Marks: 80**

General Instructions:

i. *All questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be allotted to competency-based questions.*

ii. *Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.*

iii. *Section B would have 6 Short Answer (SA) type questions carrying 02 marks each.*

iv. *Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.*

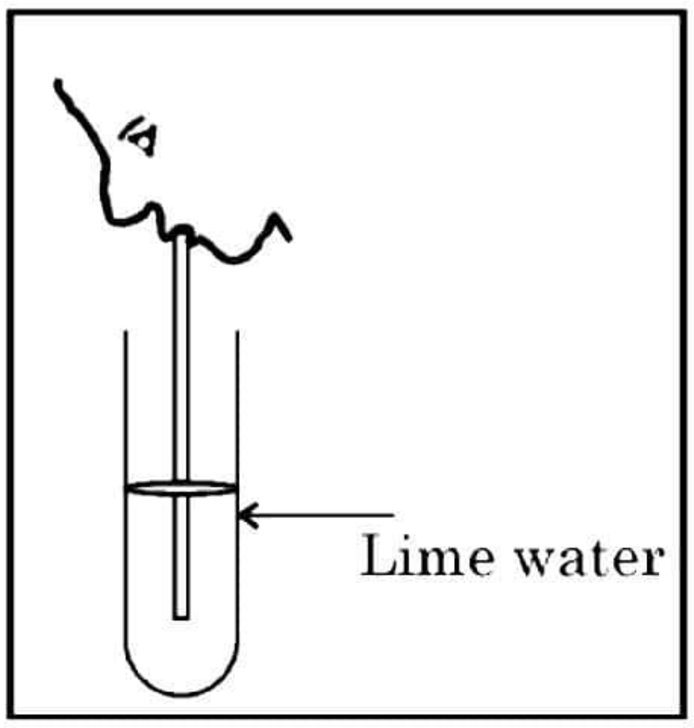
v. *Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.*

vi. *Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.*

SECTION - A

Select and write the most appropriate option out of the four options given for each of the questions 1-20. There is no negative mark for incorrect response.

1. Advait blew air in the test tube filled with limewater through a straw, as shown in the image below. What does it help to conclude when Advait exhales into the test tube? [1]



(a) The percentage of carbon dioxide is higher in inhaled air.
(b) Fermentation occurs in the presence of oxygen.
(c) The percentage of carbon dioxide is higher in the exhaled air.
(d) Fermentation occurs in the presence of carbon dioxide.

2. In a metallurgy class, Maya was learning about electrolytic refining. Her teacher asked her where the impure metal is positioned during this process. Can you help her to find the correct option from given below? [1]

(a) Electrolyte
(b) Cathode
(c) Anode
(d) Both cathode and anode

3. During a chemistry laboratory experiment, Rohit observed different processes taking place in the lab. His teacher asked him to identify which process does not involve a change in the identity of the initial substance. Can you help Rohit choose the correct option? [1]

(a) Curdling of milk
(b) Formation of crystals by the process of crystallisation
(c) Fermentation of grapes
(d) Digestion of food

4. Benzene and naphthalene are examples of: [1]

(a) Acyclic compounds
(b) Alicyclic compounds
(c) Aromatic compounds
(d) Non-aromatic compounds

5. What are the ions present in $Ca(NO_3)_2$ compound? [1]

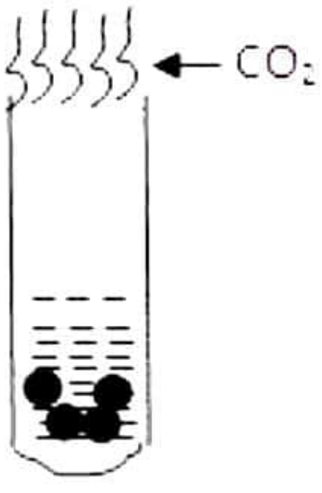
(a) Ca^{+} and NO_3^{-}
(b) Ca^{2+} and NO^{3-}
(c) Ca^{+2} and NO_3^{-}
(d) Ca^{3+} and NO_3^{-}

6. $2NO + O_2 \rightarrow 2NO_2$ is an example of: [1]

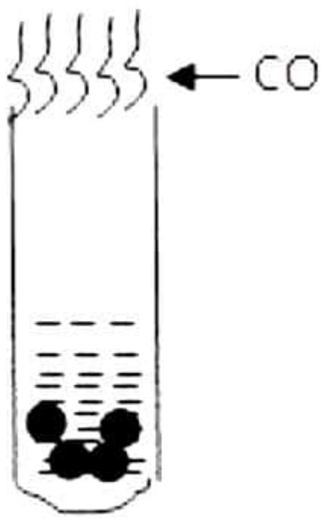
(a) Decomposition reaction
(b) Combination reaction between 2 elements
(c) Combination reaction between 2 compounds
(d) Combination reaction between an element and a compound

7. Atharva added acetic acid to zinc granules in a test tube. A pop sound is heard when a burning matchstick is brought near the test tubes. Which test tube will produce this pop sound? [1]

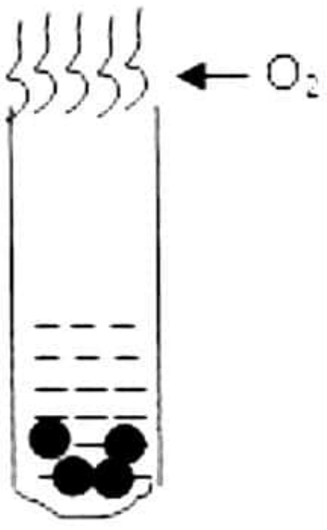
(a)



(b)

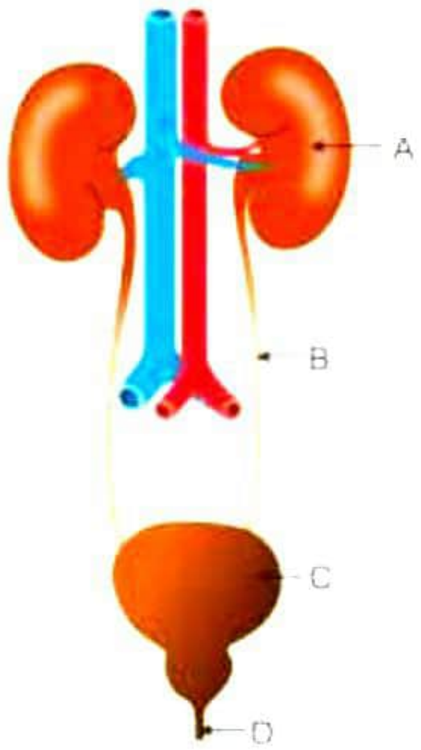


(c)



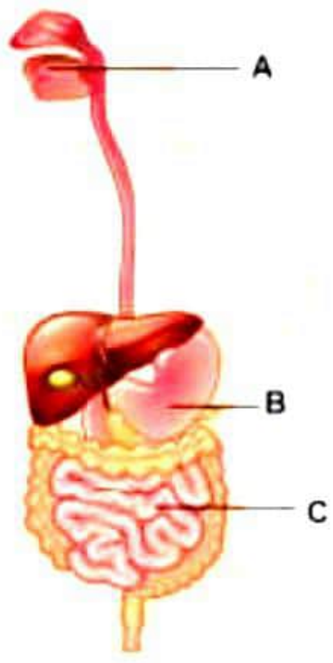
(d)

8. Carefully study the diagram of the human excretory system with organs labelled as A, B, C and D. Select the option which gives the correct match of the functions of these organs.[1]



	A	B	C	D
a)	Expels urine	Filters blood	Stores urine	Transports urine
b)	Filters blood	Transports urine	Stores urine	Expels urine
c)	Transports urine	Stores urine	Expels urine	Filters blood
d)	Stores urine	Transports urine	Filters blood	Expels urine

9. A, B and C are organs of the human digestive system. Given below are a few statements about each of these organs. Identify the false statements. [1]

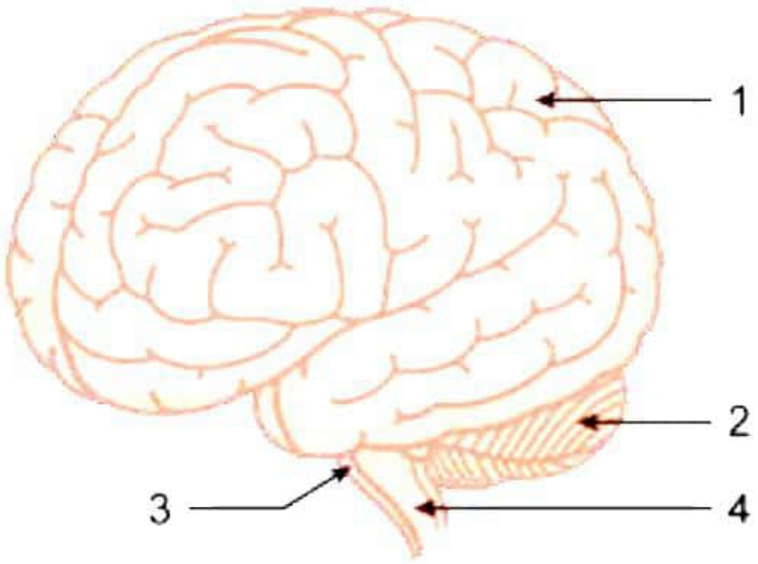


I) A produces enzyme ptyalin.
II) B produces sulphuric acid and mucus.
III) C is further divided into caecum, colon, and rectum.
a) I and II
b) II and III
c) I and III
d) I, II and III

10. If a pea plant with round seeds is crossed with a pea plant with wrinkled seeds, then what percentage of F_1 and F_2 generation respectively will bear wrinkled seeds? [1]

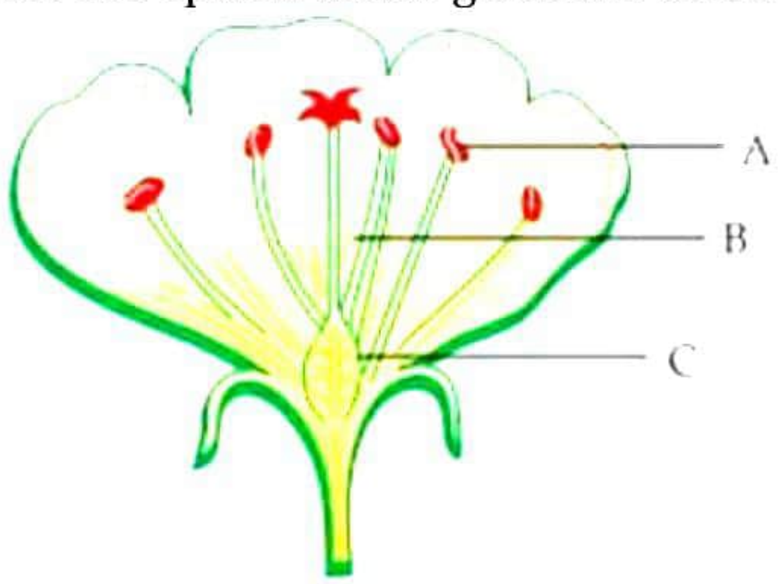
a) 25%, 25%
b) 0%, 25%
c) 75%, 100%
d) 100%, 75%

11. The given diagram represents the various parts of a human brain. A drunkard walks clumsily due to the impact on which of the following parts? [1]



a) 1
b) 2
c) 3
d) 4

12. Choose the option which gives the correct function of each of the floral parts. [1]

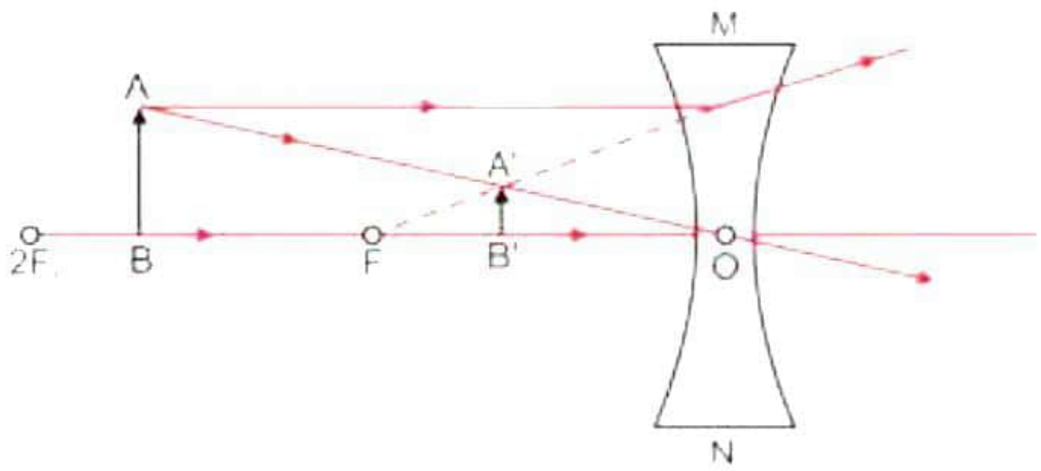


	A	B	C
a)	Produces pollen grains	Connects stigma and the ovary	Produces ovules
b)	Connects stigma and the ovary	Produces pollen grains	Produces ovules
c)	Produces ovules	Produces pollen grains	Connects stigma and the ovary
d)	Produces pollen grains	Produces ovules	Connects stigma and the ovary

13. Which of the following is not a suitable characteristic of wire used in making an electric fuse? [1]

a) Thin and short
b) Low melting point
c) Higher resistance
d) Thick and short

14. The correct labelling of the below ray diagram is given as: [1]

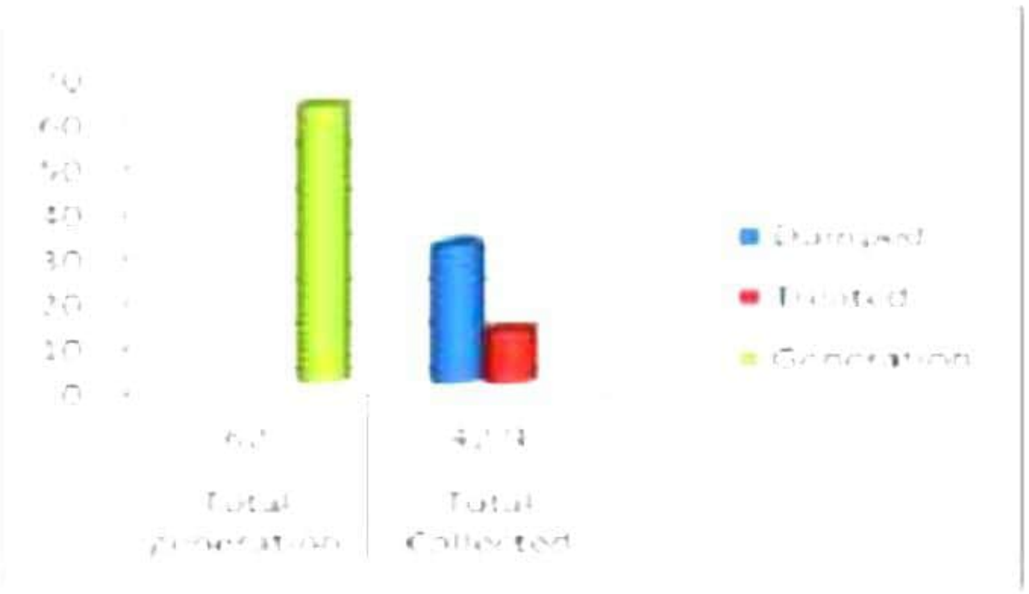


a) MN – convex lens, AB – object, A'B' – image, O – optical centre
b) MN – concave lens, AB – image, A'B' – object, O – pole
c) MN – concave lens, AB – object, A'B' – image, O – optical centre
d) MN – convex lens, AB – object, A'B' – image, O – optical centre

15. Which of the following group of organisms are not included in the ecological food chain? [1]

a) Carnivores
b) Herbivores
c) Saprophytes
d) Predators

16. The given graph shows the amount of urban waste - generated, treated, and dumped in percentage. Identify the reason for low success rate of waste management process. [1]



a) Only 15% of urban India's waste is processed.
b) Less than 60% of waste is collected from households.
c) More than 60% of waste is collected from households.
d) Both a and b

Question No. 17 to 20 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. Assertion (A): Rusting of iron metal is the most common form of corrosion. [1]

Reason (R): The rusting of iron can be reversed if they are left open in sunlight.

18. Assertion (A): A population of heat-resistant bacteria survives if the temperature of water increases by global warming, but most other bacteria would die. [1]

Reason (R): Variations are beneficial to the species but not necessarily for the individual.

19. Assertion (A): The flow of energy in a food chain operating in an ecosystem is always unidirectional. [1]

Reason (R): A huge amount of energy is lost as heat at each trophic level of a food chain.

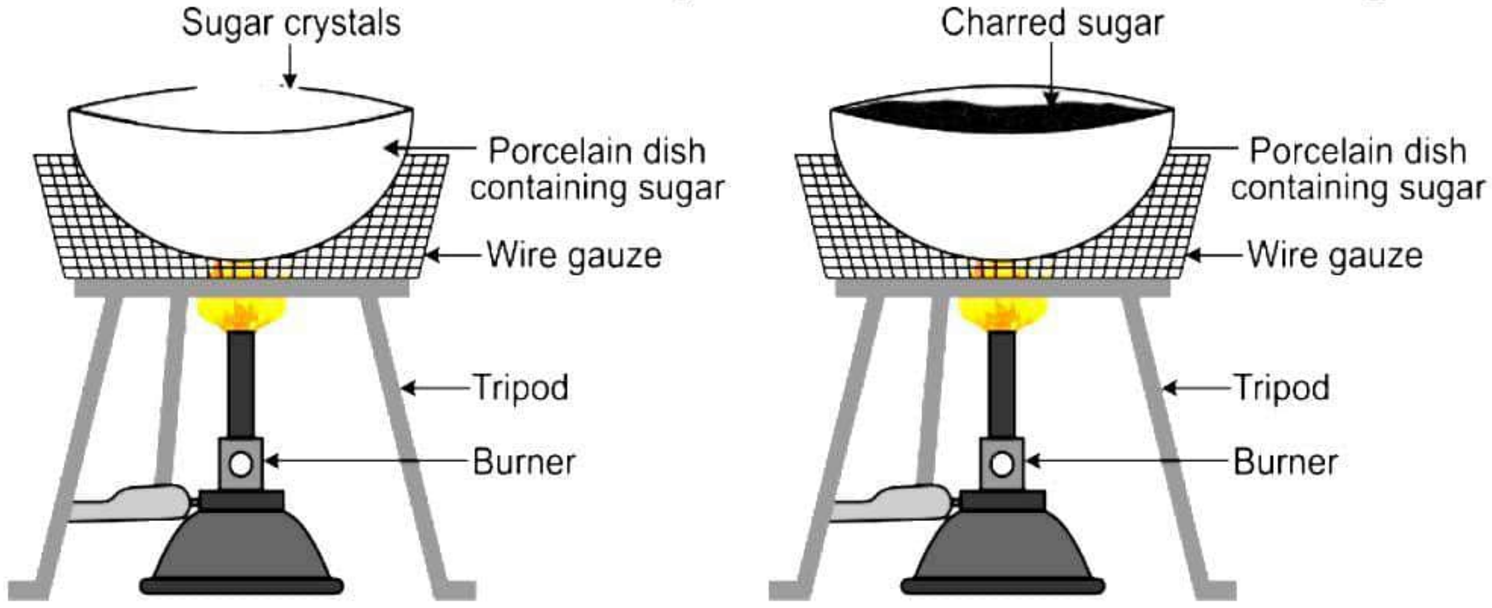
20. Assertion (A): A convex lens has a virtual focus.

Reason (R): All light rays pass through the focus of a convex lens. [1]

SECTION - B

Question No. 21 to 26 are very short answer questions.

21. Reena was asked to heat sugar in an evaporating dish, as shown in the setup below. She observed a brown mass that finally turned black on further heating.



What is that black mass? Write the reaction and type of reaction for the same. [2]

22. Compare vegetative propagation in *Bryophyllum* and money plant. [2]

23. Faiz ate butter *pav bhaji* for his dinner. Explain how the fats in the butter would be digested in his body? [2]

OR

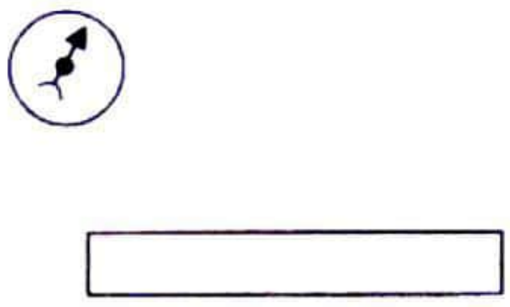
Exchange of gases occurs through stomata as well as lenticels in plants. How are stomata different from lenticels?

24. A concave mirror produces two times magnified real image of an object placed at 20 cm in front of it. What is the position of the image? [2]

25. What are the two ways in which you can trace the magnetic field pattern of a bar magnet? [2]

OR

Copy the figure below which shows a plotting compass and a magnet. Label the North pole of the magnet and draw the field line on which the compass lies.



26. Would you consider any one group of organisms in the ecosystem to be of primary importance? Why or why not? [2]

SECTION - C

Question No. 27 to 33 are short answer questions.

27. Write the isomers of a saturated hydrocarbon having 5 carbon atoms. [3]

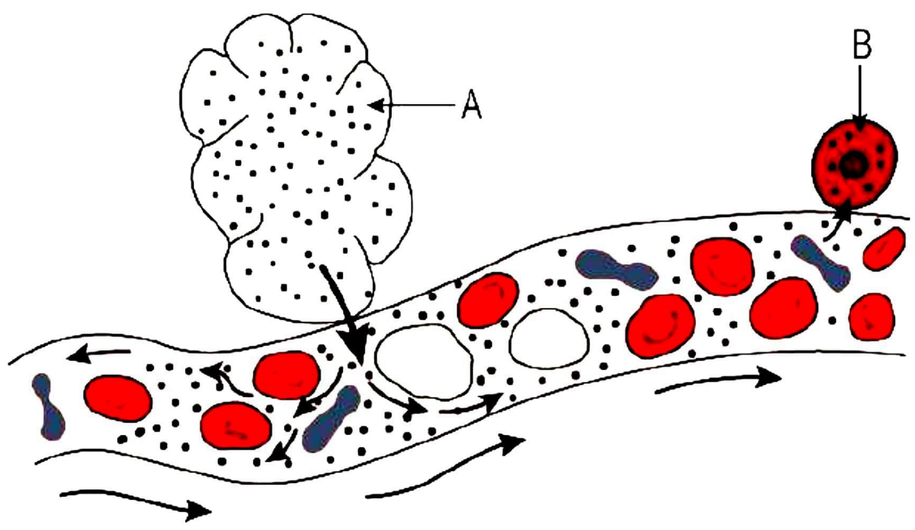
28. A neutral organic compound X of molecular formula C_2H_6O on oxidation with acidified potassium dichromate gives an acidic compound Y. Compound X reacts with Y on warming in the presence of conc. H_2SO_4 to give a sweet-smelling substance Z. Identify X, Y and Z with explanations and reactions. [3]

OR

Mahima was shown below images by her teacher and asked to name the type of reactions along with an example in terms of balanced chemical equation for each. [3]

(I) **(II)** **(III)**

29. Given alongside is a schematic representation of secretion of gland A and a blood capillary in its proximity. [3]



(a) Choose the name of gland A from the following options:
Sweat, Salivary, Pituitary

(b) If B is one of the target cells in the thyroid, name the secretion being poured out of gland A.

(c) Which mineral element assists in the production of this secretion?

30. The genotype of round seeded tomato plants is denoted as RR and that of wrinkled seeded tomato plants as rr. When these two are crossed, [3]

(a) What colour of seeds would you expect in their F_1 progeny?

(b) Give the percentage of round seeded plants in F_2 generation, if F_1 plants are self-pollinated.

(c) In what ratio would you find the genotypes RR and Rr in the F_2 progeny?

31. Mention the factors on which the direction of force experienced by a current-carrying conductor placed in a magnetic field depends. [3]

(a) Under what condition is the force experienced by a current-carrying conductor placed in a magnetic field maximum?

(b) A proton beam is moving along the direction of a magnetic field. What force is acting on the proton beam?

32. The image of an object placed at 40 cm in front of a lens is obtained on a screen at a distance of 100 cm from it. Find the focal length of the lens. What would be the height of the image if the object is 4 cm high?

33. [3]

(a) Ravi wraps a wire around an iron nail and connects it to a battery, creating an electromagnet. He then disconnects the battery. What will happen to the magnetic field around the nail once the battery is disconnected? Justify your answer.

(b) Under what conditions can Ravi permanently magnetise the iron nail? Support your answer with the help of a labelled circuit diagram.

SECTION - D

Question No. 34 to 36 are long answer questions.

34. Answer the following: [5]

a) When two atoms, P and Q, combine to produce a compound, P loses two electrons, and Q receives one.

(i) What is the nature of P and Q's bond?

(ii) Provide the formula for the compound generated by P and Q.

b) Explain the similar synthesis of the aluminium chloride molecule.

c) Give reason: Common salt conducts electricity only when it is molten.

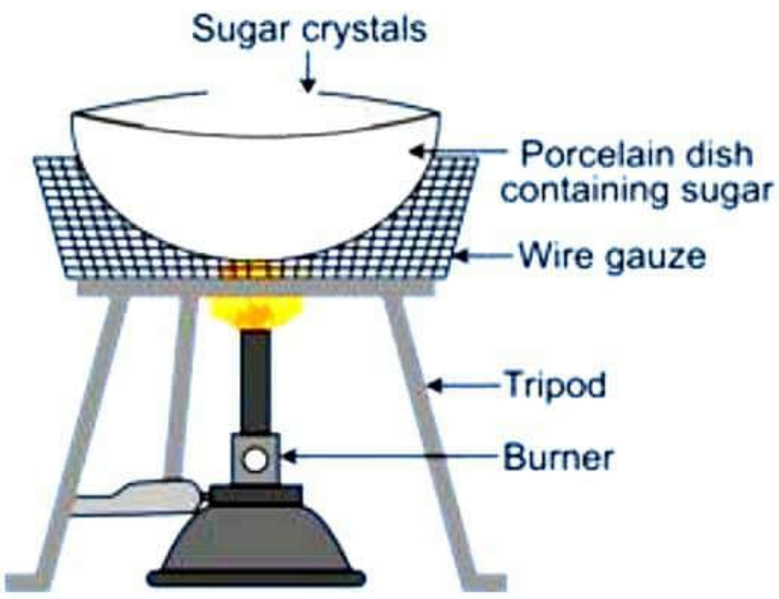
d) Comment: The melting point of NaCl is high.

OR

Answer the following: [5]

a) Jigna placed a thin zinc plate in a glass container filled with CuSO4 solution. When examined, it was seen that the blue tint of the solution was becoming lighter and lighter. She then removed the zinc plate from the solution after a few days. She discovered several small holes in it. Explain why the reaction occurred and write the chemical equation.

b) Neha arranged the experimental set-up as shown in the illustration below.
Write the balanced chemical reaction and explain the type of reaction for the same.



35. [5]

(a) Draw the diagram of the female reproductive system and match and mark the part(s):

(i) where block is created surgically to prevent fertilization

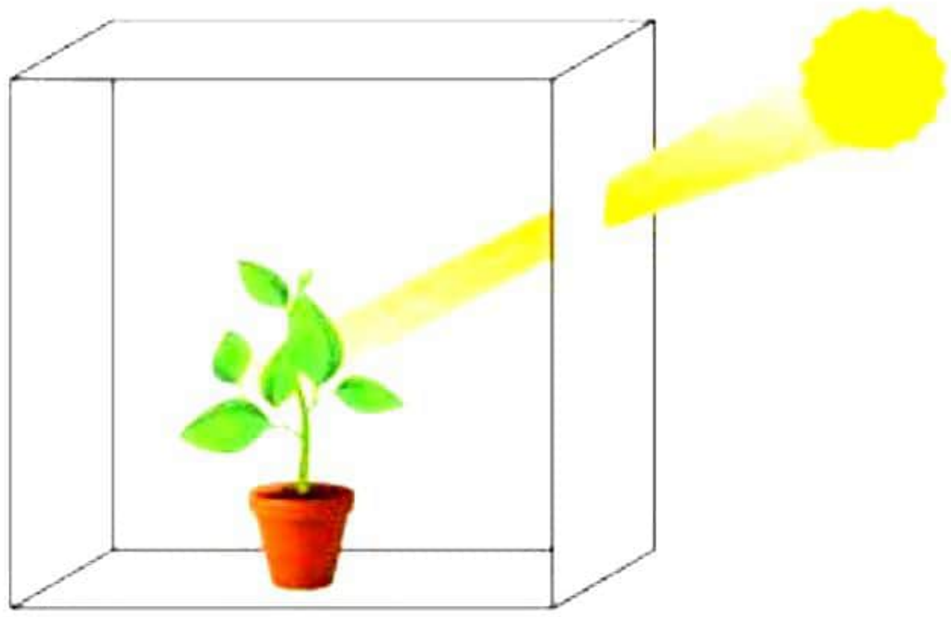
(ii) where Copper-T is inserted

(iii) inside which condom can be placed

(b) Why do more and more people prefer to use condoms? What is the principle behind the use of condoms?

OR

The figure given below depicts a kind of tropic movement in plants. Study the same and answer the following questions:



(a) What kind of movement is shown in the figure? Define it.
(b) How does this movement differ from geotropism?
(c) Name the stimulus responsible for thigmotropism. Give an example of a plant showing thigmotropism.
(d) Name one stimulus which gives a positive response for the roots but negative response for the shoot.

36. [5]

a) Draw the magnetic field pattern produced by the current-carrying solenoid.
b) On which factors do the magnitude of the magnetic field due to a circular coil depend?
c) Which rule is used to determine the direction of magnetic field due to a current-carrying circular coil? Explain the rule.

OR

A 4 kW heater is connected to a 220-V power source. Calculate
a) Electric current passing through the heater
b) Resistance of the heater
c) Electric energy consumed in a 2-hour use of the heater

SECTION - E

Question No. 37 to 39 are case - based/data -based questions with 2 to 3 short sub - parts. Internal choice is provided in one of these sub-parts.

37. Rahul was suffering from a stomach pain since last 2 days. He consulted a doctor who advised him to take two antacid tablets before each meal for about a week. Rahul followed the advice strictly and got cured.

(a) What must be the cause of stomach pain? [2]

(b) What are antacids? Name two commonly used antacids. [2]

OR

(b) What is the cause of tooth decay? How to prevent tooth decay? [2]

38. Sahil performed an experiment to study the inheritance pattern of genes. He crossed tall pea plants (TT) with short pea plants (tt) and obtained all tall plants in F_1 generation. [4]

(a) What will be the set of genes present in the F_1 generation? [1]

(b) Give reason why only tall plants are observed in F_1 progeny. [1]

(c) When F_1 plants were self-pollinated, a total of 800 plants were produced. How many of these would be tall, medium height or short plants? Give the genotype of F_2 generation. [2]

OR

(c) When F_1 plants were cross-pollinated with plants having tt genes, a total of 800 plants were produced. How many of these would be tall, medium height or short plants? Give the genotype of F_2 generation.

39. Observe the given table in which the values of current flowing through a conductor for corresponding values of potential difference across the conductor. [4]

Current (A)	Potential difference (V)
0.1	2.5
0.2	5.0
0.4	10.0
0.8	20.0
1.0	25.0

(a) Plot a graph between current and voltage. [1]

(b) What is the nature of the graph? [1]

(c) What will be the value of current when potential difference is 15 V? [2]

OR

(c) Calculate the resistance of the conductors.

Solution

SECTION - A

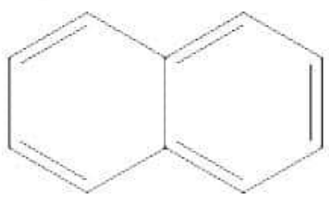
1. Correct answer – c: Percentage of carbon dioxide is higher in the exhaled air.
When we exhale air into a test tube containing limewater, the water turns milky. This shows that exhaled air contains more carbon dioxide than inhaled air.

2. Correct answer - c: Anode
In electrolytic refining, the impure metal is made as an anode and the pure metal is made as a cathode.

3. Correct answer – b: Formation of crystals by the process of crystallization.
All other options show formation of new substances while formation of crystals, no new material is produced during the crystallization process; instead, a larger substance is obtained in its crystal form.

4. Correct answer – c: Aromatic compounds
Benzene and naphthalene are examples of aromatic compounds.

Benzene

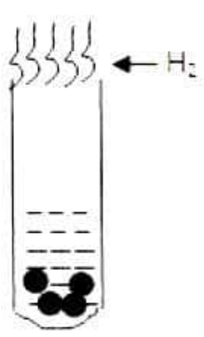


Naphthalene

5. Correct answer – c: Ca^{2+} and NO_3^-
During formation of $Ca(NO_3)_2$, Calcium donates two electrons and gets converted to Ca^{2+}, while two nitrate molecules gain one electron each and get converted to nitrate ion (NO_3^-)

6. Correct answer – d: Combination reaction between an element and a compound
The compound Nitric oxide combines with the element Oxygen to form compound NO_2.

7. Correct answer – d:



This test tube produces a pop sound on bringing a burning matchstick close to the tube since hydrogen burns in air to produce a pop sound.

8. Correct option – b:

A (Kidney)	**B (Ureter)**	**C (Urinary bladder)**	**D (Urethra)**
Filters blood	Transports urine	Stores urine	Expels urine

The kidneys filter the blood and concentrate the filtrate to make urine. The ureters transport the urine from the kidneys to the urinary bladder which stores the urine temporarily. The urethra expels the urine out of the body.

9. Correct option – b: II and III

A - Salivary glands, B - Stomach, C - Small intestine

Alpha-amylase (ptyalin) is produced by the salivary glands. Stomach produces gastric juice, mucus, and hydrochloric acid. Small intestine is divided into ileum, duodenum, and jejunum.

10. Correct option – b : 0%, 25%

In a monohybrid cross, in F_1 generation all plants bear round seeds as round seed shape is dominant over wrinkled seed shape. In F_2 generation, 75% of the plants bear round seeds while 25% bear wrinkled seeds.

11. Correct option – b : 2

1 - Cerebrum, 2 - Cerebellum, 3 - Medulla oblongata, 4 - Spinal cord

A drunkard walks clumsily because alcohol affects the cerebellum, which is the centre that controls and coordinates muscular activities.

12. Correct option – a :

	A (Anther)	**B (Style)**	**C (Ovary)**
a)	Produces pollen grains	Connects stigma and the ovary	Produces ovules

Anther is the male reproductive part of a flower which assists in the production of pollen grains. Style is a long, slender stalk that connects the stigma and the ovary. Ovary is an essential part of the pistil that holds most of the ovules or the eggs.

13. Correct option – d: Thick and short

The wire used in making an electric fuse must not be thick and short.

14. Correct option – c: MN – concave lens, AB – object, A'B' – image, O – optical centre.

From image, the appropriate labelling for the ray diagram will be as follows:

MN – concave lens, AB – object, A'B' – image, O – optical centre

15. Correct option – c: Saprophytes

Ecological pyramids begin with the producers at the bottom of the pyramid, followed by the herbivores, carnivores, and top carnivores. Saprophytes are organisms which feed on dead and decaying matter from the environment. They are placed alongside the pyramid table because they help in the breakdown of complex dead organisms into simpler substances at any trophic level. Therefore, despite their crucial role in a pyramid, saprophytes or decomposers have no place in the ecological pyramid.

16. Correct option – d: Both a and b

Only 15% of urban India's waste is processed. This indicates that still majority, i.e., 85% of the waste is not processed through proper methods and can eventually contribute to environment pollution. Also, less than 60% of waste is collected from households indicating that all the waste generated is not collected for processing or disposal. These factors contribute to the low success rate of waste management process.

17. A is true but R is false.

Rusting of iron metal is the most common form of corrosion. So, the assertion is true.
Rusting of iron metal is irreversible process. So, the reason is false.

18. Both A and R are true, and R is the correct explanation of A.

If a population of reproducing organisms were suited to a particular niche and if the niche were drastically altered, the population could be wiped out. However, if some variations were to be present in a few individuals in these populations, there would be some chance for them to survive. Thus, if there were a population of bacteria living in temperate waters, and if the water temperature were to be increased by global warming, most of these bacteria would die, but the few variants resistant to heat would survive and grow further. Variation is thus useful for the survival of species over time.

19. Both A and R are true, but R is not the correct explanation of A.

The flow of energy in a food chain is unidirectional. The energy which passes to the consumers does not come back to the producers. The energy that is captured by the producers does not revert back to the Sun. So, the assertion is true.
Organisms at each trophic level perform their life activities and release heat. A huge amount of energy is lost as heat at each trophic level of a food chain. So, the reason is also true.
Although both assertion and reason are true, the reason statement does not provide the correct explanation for the given assertion.

20. A is false, but R is true.

A convex lens has a real focus as all the light rays actually pass through the focus of the convex lens.

SECTION - B

21. Black mass is of carbon as sugar gets charred to carbon on heating.

$$C_{12}H_{22}O_{11} \xrightarrow{\text{Heat}} 12C + 11H_2O$$

Sucrose (Carbohydrate) → Carbon + Water

This is thermal decomposition reaction where sugar on heating gets decomposed into carbon and water.

22. In *Bryophyllum*, the leaf has several adventitious buds on its margins. A new plant arises from these buds when the leaf falls on moist soil. This is an example of vegetative propagation by leaves.

Money plants reproduce vegetatively from their stem cuttings. A piece of stem bearing a bud can be kept in water, which eventually forms roots at the node. After a few days, a new plant grows from the existing piece of stem.

23. Butter consists of fat, which is digested by bile released from the liver.
    - Fats are present in the intestines in the form of large globules, making it difficult for the enzymes to act on them.
    - Bile salts present in the bile break fats into smaller globules to increase the action of enzymes. This process is known as emulsification.
    - Later, lipase acts on the emulsified fats and breaks them down into fatty acids and glycerol.

OR

Differences between stomata and lenticels:

Stomata	Lenticels
1. Stomata are present in young stems and leaves.	1. Lenticels are present in older stems.
2. Guard cells are present.	2. Guard cells are absent.
3. They open during the daytime.	3. They are always open.
4. Maximum transpiration takes place through the stomata.	4. Very minimal transpiration occurs from lenticels.

24. Magnification (m) = −2 (image is real)

Object distance (u) = −10 cm (object is to the left of the mirror)

To find: Image distance (v)

Magnification of spherical mirrors is given as

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

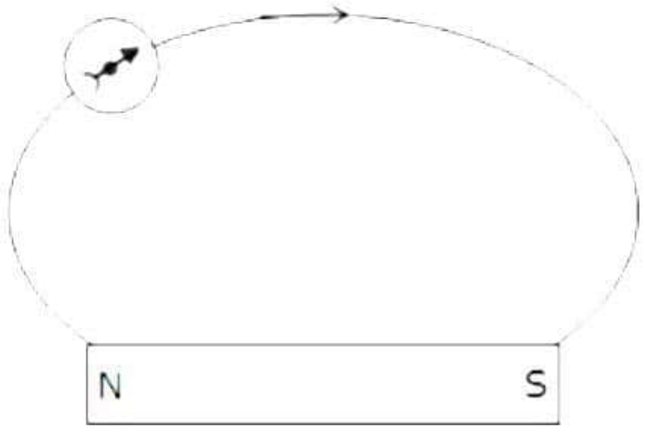
$$-2 = \frac{-v}{-10}$$

v = - 20 cm

Thus, the image is located at a distance of 20 cm in front of the mirror.

25. (i) By using iron filings
    (ii) By using compass

OR

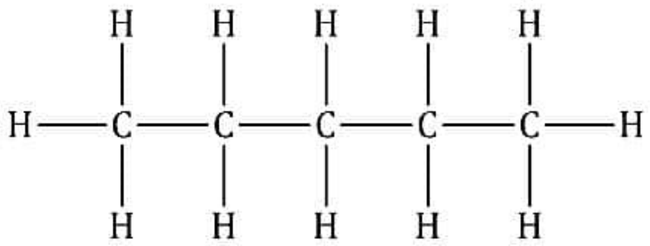


As the north pole of the magnetic needle is pointing in the opposite direction, so the nearer end of the magnet will be North Pole.

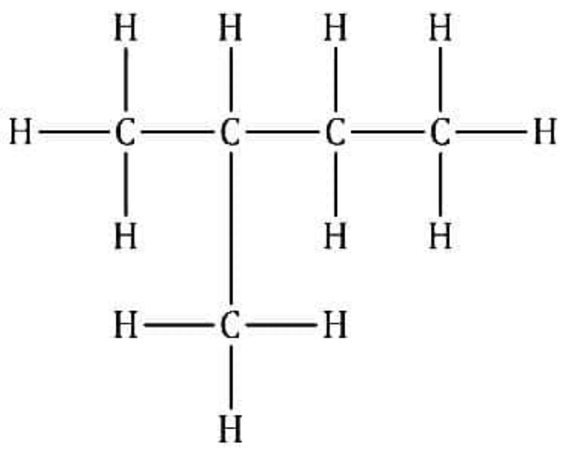
26. A group of organisms may of primary importance basis the situation or habitat. However, plants (producers) would always be of prime importance because they form the first trophic level of any food chain. They can capture and utilise solar energy and produce food for all living organisms of an ecosystem. All consumers directly or indirectly depend on plants for their food (energy) requirement. In the absence of plants, there would be no life on the Earth.

SECTION – C

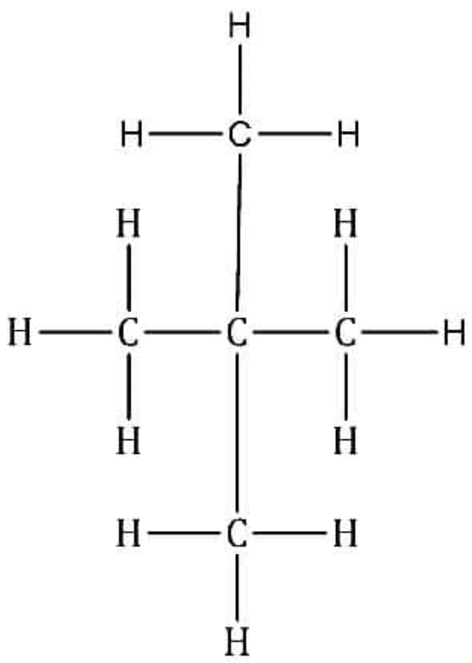
27. The saturated hydrocarbon consisting of 5 carbon atoms is termed as pentane. Pentane has 3 isomers as n-pentane, isopentane, and neopentane.



n-pentane



isopentane



neopentane

28. The molecular formula of ethanol is C_2H_6O. Ethanol on heating with alkaline potassium permanganate or acidified potassium dichromate gets oxidised to ethanoic acid.

$$\underset{\text{Ethanol}}{C_2H_5OH} + 2[O] \xrightarrow{\text{Acidified } K_2Cr_2O_7} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

Ethanoic acid reacts with alcohols in the presence of a little concentrated sulphuric acid to form ethyl methanoate which is a sweet-smelling ester. This is called as esterification reaction as shown below:

$$\underset{\text{Ethanol}}{C_2H_5OH} + \underset{\text{Ethanoic acid}}{CH_3COOH} \xrightarrow{\text{Conc. } H_2SO_4} \underset{\text{Ethyl methanoate}}{CH_3COOCH_3} + H_2O$$

Hence, X = Ethanol, Y = Ethanoic acid, Z = Ethyl methanoate

OR

The type of reactions for given images are as follows:

I = Thermal decomposition

II = Photodecomposition

III = Electrolytic decomposition

An example with balanced chemical equations for each as follows:

$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$ (Thermal decomposition)

$2AgCl \xrightarrow{light} 2Ag + Cl_2$ (Photo decomposition)

$2H_2O \xrightarrow{Electric\ energy} 2H_2 + O_2$ (Electrolytic decomposition)

29.

(a) The diagram shows that the secretions of gland A get directly mixed in the bloodstream. This means that gland A is an endocrine gland. Amongst the given choices, gland A must be pituitary gland since it is an endocrine gland.

(b) Secretions from gland A affect the target organ. If B is one of the target cells in the thyroid gland, then the secretion being poured out of gland A must be the hormone thyroxine.

(c) Iodine assists in the production of thyroxine.

30.

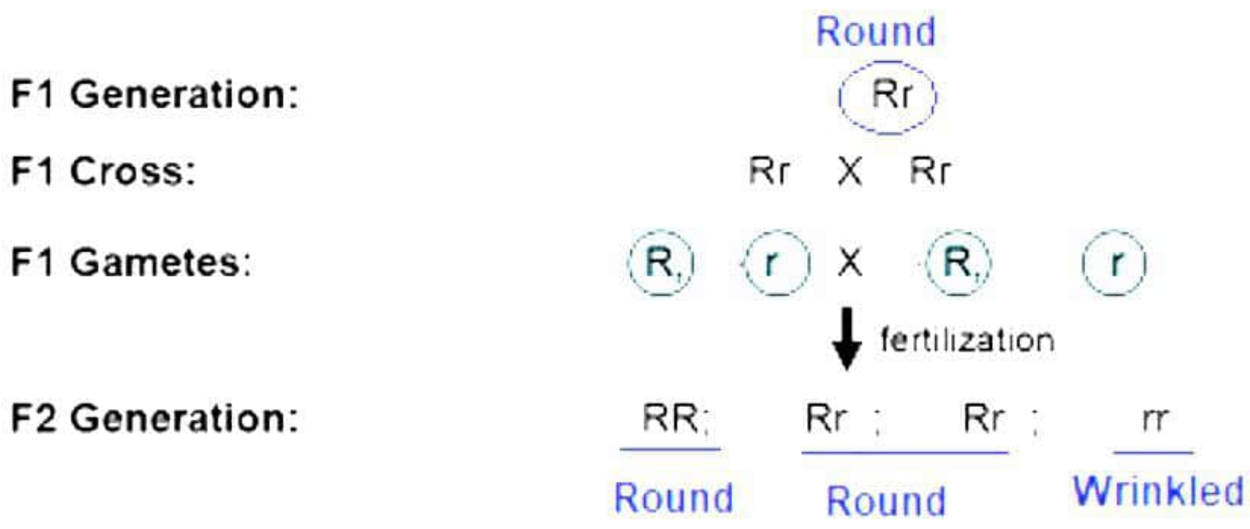
(a) Parental phenotype: round seeds and wrinkled seeds

Parental genotype: RR × rr

F_1 progeny would be round seeded tomato plants (Rr).

(b) F_1 plants are self-pollinated

Rr × Rr



Percentage of round seeded plants in F_2 generation = 75%

(c) F_2 progeny ratio of RR and Rr = 1:2

31.

(a) Factors on which the direction of force experienced by a current-carrying conductor placed in a magnetic field depend are

(i) Direction of current and (ii) direction of magnetic field

(b) The force acting on a current-carrying conductor placed in a magnetic field is maximum when the direction of the current is at right angles to the direction of the magnetic field.

(c) Because the proton beam is moving parallel to the direction of the magnetic field, no force acts on it.

32. Object distance, u = –40 cm

Image distance, v = 100 cm

From the lens formula,

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

$$\therefore \frac{1}{f}=\frac{1}{100}-\frac{1}{-40}=\frac{1}{100}+\frac{1}{40}$$

$$\therefore \frac{1}{f}=\frac{140}{4000}=0.035$$

$$\therefore f=28.57 \text{ cm}$$

Height of the object, h = 4 cm

From the magnification formula,

$$m=\frac{v}{u}=\frac{h'}{h}$$

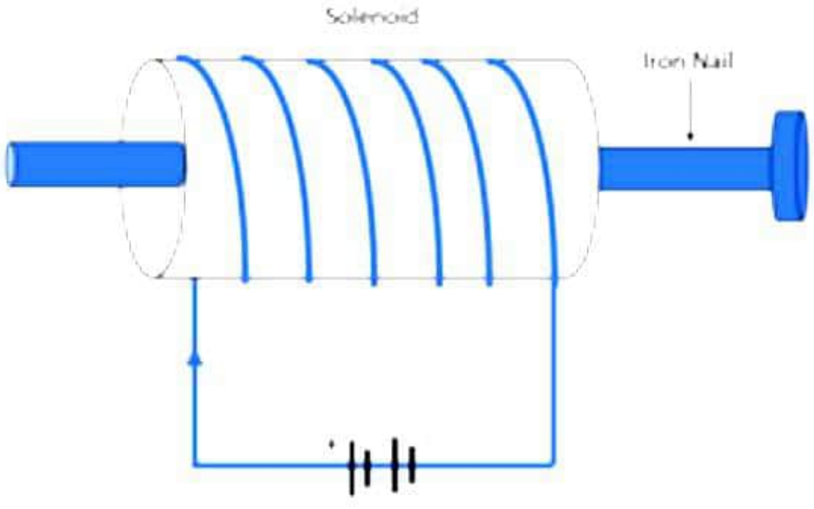
$$\therefore h'=\frac{v}{u}h=\frac{100}{-50}\times 4=-8 \text{ cm}$$

33.

(a) When the battery is disconnected, the magnetic field around the nail, created by the electric current, disappears, and the nail loses its magnetism.

(b) The following conditions must be met to magnetism the iron nail permanently:

1. The magnitude of direct current through the solenoid should be large.
2. The number of turns in the solenoid should be large and closely packed in order to produce a strong, uniform magnetic field inside it.



SECTION - D

34.

(a)

$$P \xrightarrow{-3e^-} P^{3+}$$

$$Q \xrightarrow{+2e^-} Q^{2-}$$

(i) An ionic bond is formed between P and Q.

(ii)

Elements	P	Q
Valency	3	2
Formula	P_2Q_3	

(b) Aluminium has three electrons in its valence shell, so it loses its 3 electrons to achieve the inert gas configuration of eight valence electrons and forms a positively charged ion or divalent cation. In comparison, oxygen has 5 valence electrons, requiring 2 more electrons to complete its octet.

$$Al \xrightarrow{-3e^-} Al^{3+}$$

Aluminium — Aluminium ion

K L M — K L

2, 8, 3 — 2, 8

$$O \xrightarrow{+2e^-} O^{2-}$$

Oxygen atom — Oxide ion

K L M — K L M

2, 8, 6 — 2, 8, 8

Elements	Al	O
Valency	3	2
Formula	Al_2O_3	

$Al^{3+} + O^{2-} \rightarrow Al_2O_3$

(c) Common salt (NaCl) is an ionic compound that conducts electricity only when molten because heat overcomes the electrostatic forces of attraction between oppositely charged ions (Na+ and Cl-). As a result, the ions can move freely and conduct electricity.

(d) Because NaCl is an ionic molecule, the positively charged sodium ion and negatively charged chloride ion have a strong attraction. As a result, a significant amount of

energy is required to break the strong interionic attraction. As a result, NaCl has a high melting point.

OR

(e) A strip of zinc metal is immersed in a solution of copper sulphate. The blue tint of copper sulphate solution disappears gradually as colourless zinc sulphate solution forms. Zinc displaces copper from copper sulphate solution because it is more reactive than copper. Because zinc metal is consumed, a number of tiny holes appear in the zinc strip.

(f) Complete balanced chemical reaction is as follows:

$$C_{12}H_{22}O_{11} \xrightarrow{\text{Heat}} 12C + 11H_2O$$

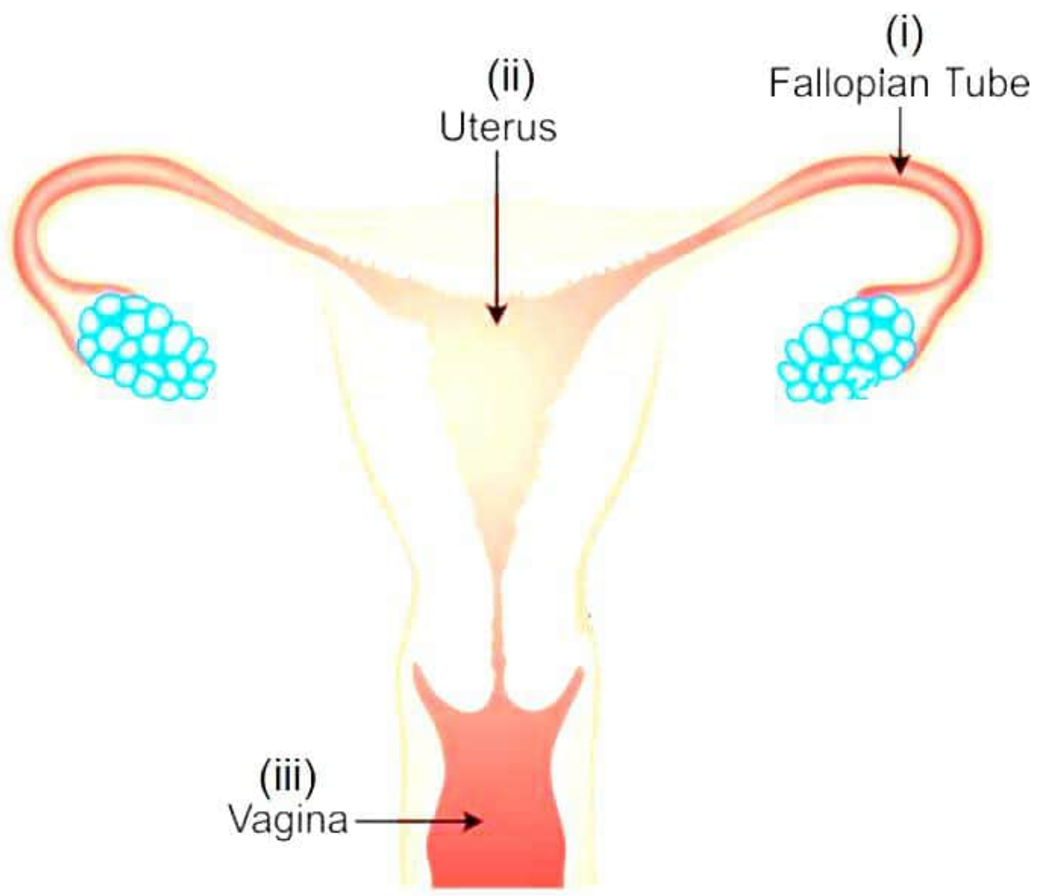
Sucrose (Carbohydrate) → Carbon + Water

A single compound decomposes or breaks down to give two products.

Sugar molecules are decomposed by the action of heat. Hence, this reaction is a thermal decomposition reaction.

35.

(a) <u>Female reproductive system</u>



(i) Fallopian tube / Oviduct

(ii) Uterus

(iii) Vagina

(b) More and more people prefer to use condoms as it prevents sexually transmitted diseases (STDs) and gives privacy to the user. Condoms help create a mechanical barrier by preventing the meeting of sperms and the ovum and thus prevent unwanted pregnancy. They also protect against cervical cancer.

OR

(a) The figure shows phototropism.

The growth movement of plant parts in the direction of light is called phototropism.

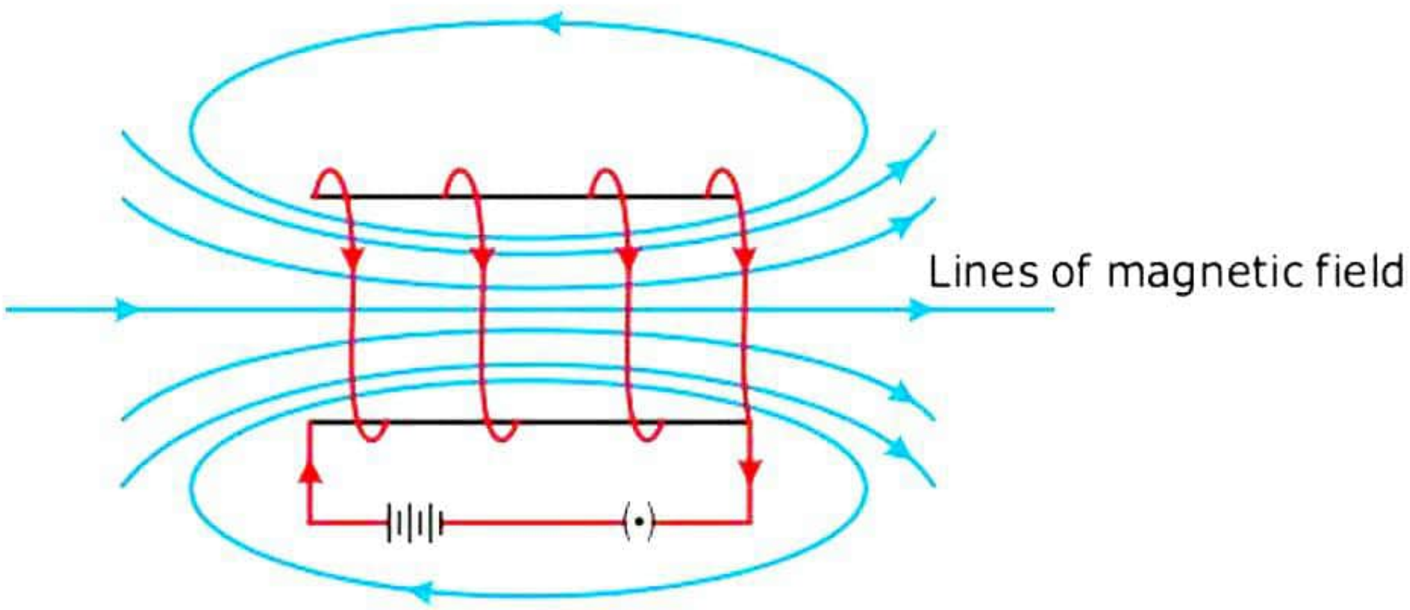
(b) Geotropism is the growth movement of plant parts towards Earth's gravity while phototropism is the growth movement of plant parts towards light.

(c) Touch is the stimulus responsible for thigmotropism.
Cuscuta shows thigmotropism.

(d) Gravity gives a positive response for the roots but a negative response for the shoot.

36.

(a)



(b)

The **magnitude of a magnetic field** at the centre of the coil is

i. Directly proportional to the current flowing through it

ii. Inversely proportional to the radius of the coil

iii. Directly proportional to the number of turns of the coil

(c) Clock face rule is used to determine the direction of magnetic field in a circular coil. Looking at a face of the coil, if the current around it is in the clockwise direction, then the face is the South Pole. If the current around it is in the anti-clockwise direction, then the face is the North Pole. This is called the **clock face rule.**

OR

Power rating of the heater, P = 4 kW = 4000 W

Potential difference of the power supply, V = 220 V

(i) Power is

$$P = VI$$

$$\therefore I = \frac{P}{V} = \frac{4000}{220} = 18.18 \text{ A}$$

(ii) Resistance and power are related as

$$P = \frac{V^2}{R}$$

$$\therefore R = \frac{V^2}{P} = \frac{220^2}{4000} = 12.1\ \Omega$$

(iii) Energy consumed by the heater is

$$E = Pt$$

$$\therefore E = 4 \text{ kW} \times 2\text{h}$$

$$\therefore E = 8 \text{ kWh}$$

SECTION - E

37.

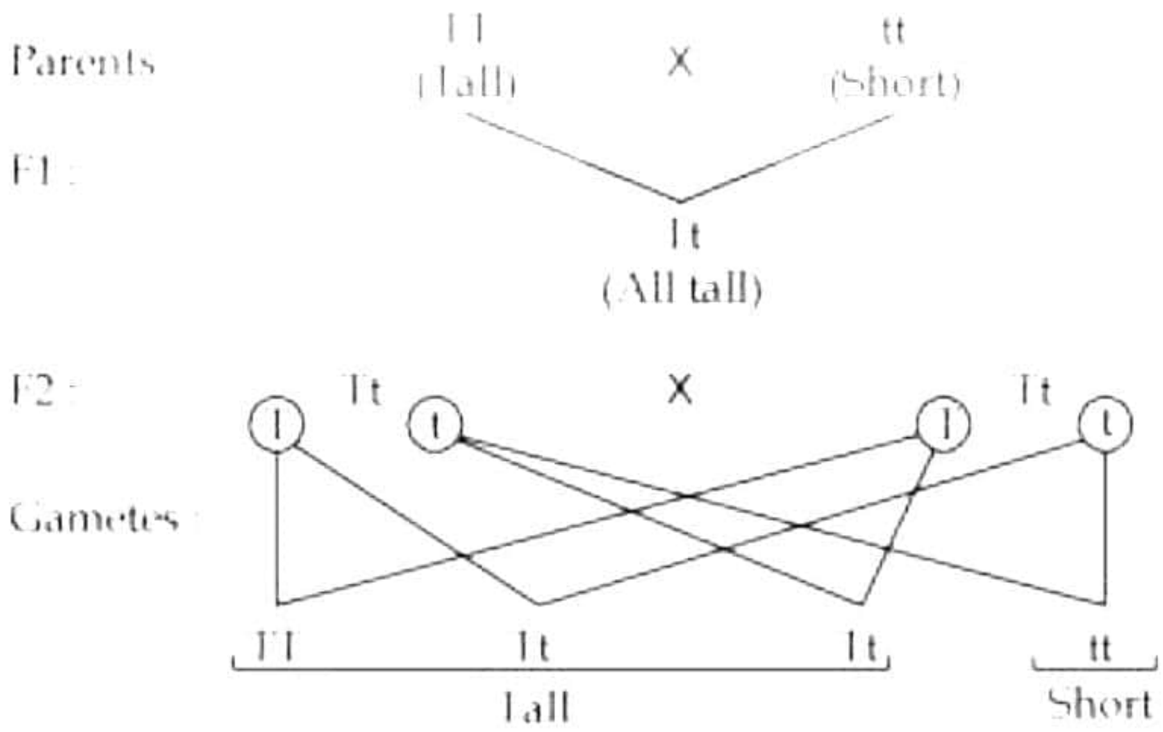
(a) Our stomach produces hydrochloric acid which helps in the digestion of food without harming the stomach. Sometimes excess acid is produced in the stomach due to different reasons such as over-eating, late night dinners, eating wrong type of food etc., and this causes indigestion which results into stomach pain.

(b) To get rid of this pain, bases called antacids are used. Antacids are a group of mild bases which react with the excess acid and neutralise it.
Commonly used antacids are magnesium hydroxide [$Mg(OH)_2$] and sodium bicarbonate [$NaHCO_3$].

OR

(c) Tooth decay starts when the pH in the mouth falls below 5.5.
Tooth enamel is the hardest substance in the human body. It is made of calcium phosphate. It is insoluble in water but gets corroded when the pH in the mouth falls below 5.5. Bacteria present in the mouth produce acids due to the degradation of sugar and food particles after eating.
Prevention of tooth decay - Clean the mouth after eating food and use toothpaste (which is basic) for cleaning teeth to neutralise the excess acid.

38. The cross can be represented as follows:



(a) Dominant trait is tallness which is represented by TT and recessive trait is dwarfness which is represented by tt. Thus, on crossing tall plants with short plants, tall plants (Tt) will be obtained. Hence, Tt will be the set of genes present in the F_1 generation.

(b) According to Mendel's experiments on monohybrid inheritance and law of dominance, if a single pair of contrasting characters are cross bred by self-pollination, then in F_1 progeny, plants with dominant traits are produced while the recessive traits are supressed. Thus, only tall plants are observed in the F_1 progeny because T constitute dominant traits and they expresses themselves.

(c) When F_1 plants are self-pollinated, we obtain the following F_2 progeny:

Phenotypic ratio – 3 Tall : 1 Short

Genotypic ratio – 1 TT (Tall) : 2 Tt (Tall) : 1 tt (short)

Thus, out of 800 plants, 600 plants will be tall, and 200 plants will be short.

No medium height plants are obtained.

OR

(c) The cross can be represented as follows:

Parents – Tt × tt

Gametes – T, t and t, t

Progeny

	T	**t**
T	Tt	Tt
t	Tt	Tt

Phenotypic ratio – 1 Tall : 1 Short

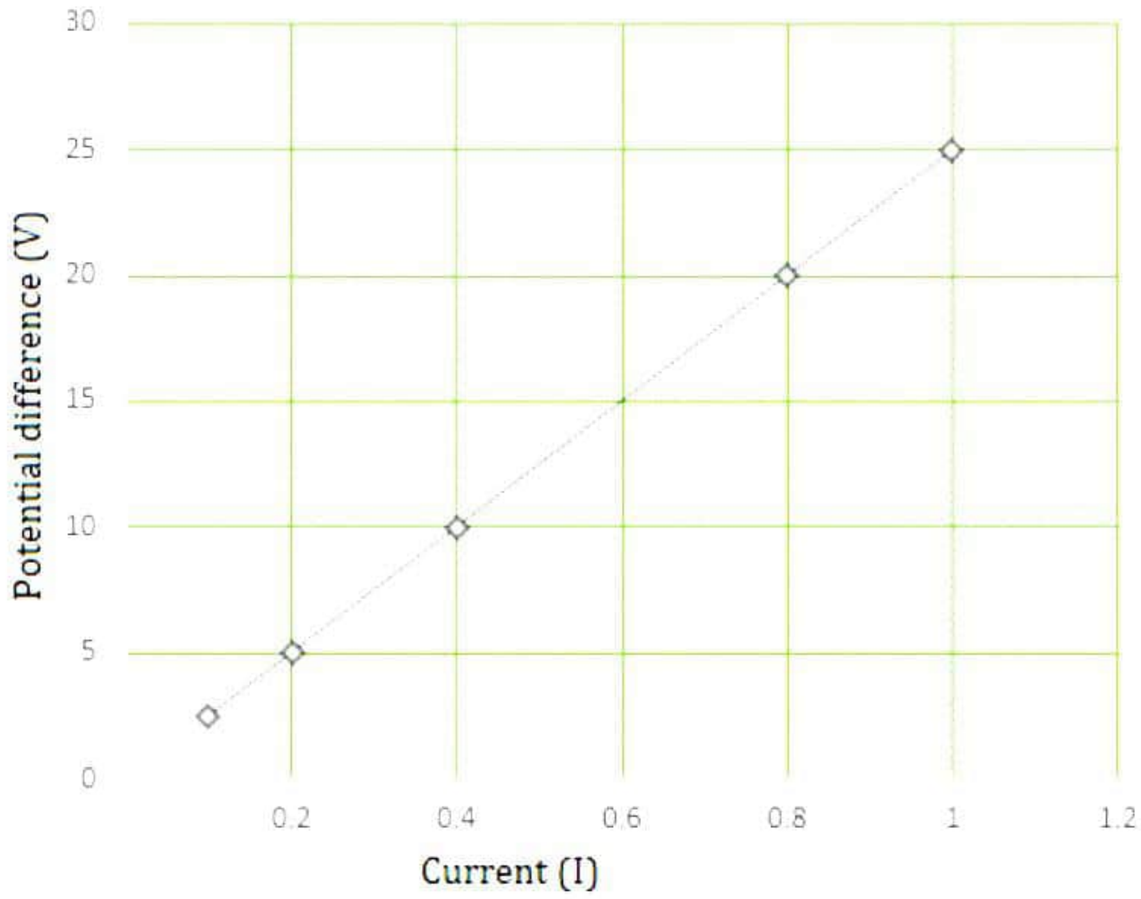
Genotypic ratio – 1 Tt (Tall) : 1 tt (short)

In the cross between Tt × tt, out of 800 plants produced, 400 plants will be tall (Tt), and 400 plants will be short (tt).

No medium height plants are obtained.

39.

(a)



(b) It is a straight-line graph.

(c) From the graph, when potential difference is 15 V, current is 0.6 A.

OR

(c) Resistance of the conductor is

$$R = \frac{V}{I} = \frac{10}{0.4} = 25\ \Omega$$