SECTION A

MCQ

Q: 1 **A balanced chemical reaction is given below.**

$$3Fe + 4H_2O \text{ ---> } Fe_3O_4 + 4H_2$$

Which of the following is indicated by this balanced chemical reaction?
P) Atoms are formed.
Q) Atoms are broken down.
R) Molecules are formed.
S) Molecules are broken down.

1 only P **2** only R **3** only P and Q **4** only R and S

Q: 2 **The general formula of an alcohol is $C_nH_{2n+1}OH$. Which of the following could be the molecular formula of an alcohol?**

1 C_4H_8O
2 $C_3H_7O_2$
3 C_3H_8O
4 $C_4H_{10}O_2$

Q: 3 **Which of the following is an example of an exothermic change?**

P) steam condensing on a steel vessel
Q) water becoming cooler on glucose dissolving in it
R) wax melting when it is heated

1 only P **2** only P and Q **3** only P and R **4** all - P, Q and R

Q: 4 **Roasting is a process in the treatment of a metal ore that is used for the extraction of the metal.**
Which of the following correctly describes the process of roasting and the type of ore that is roasted?

Option	Process of roasting	Type of ore used in process
A	heating the ore in the absence of air	metal sulphide
B	heating the ore in the presence of air	metal oxide
C	heating the ore in the absence of air	metal oxide
D	heating the ore in the presence of air	metal sulphide

1 A **2** B **3** C **4** D

Q: 5 **Two statements are given below- one labeled Assertion (A) and the other labeled Reason (R).**

Assertion (A): Zinc reacts with sodium hydroxide to form sodium zincate and hydrogen gas.
Reason (R): In a displacement reaction the metal reacts with an acid to form salt and hydrogen gas.

Zn + NaOH → NaZn

Which of the following is correct?

1. Both A and R are true, and R is the correct explanation of A.
2. Both A and R are true, but R is not the correct explanation of A.
3. A is true, but R is false.
4. A is false, but R is true.

Q: 6 **Which of the following is NOT a difference between saturated and unsaturated hydrocarbons?**

S. No	Saturated hydrocarbons	Unsaturated hydrocarbons
P	Contain C-C single bonds only	Contain C- C double and triple bond
Q	Are more reactive than unsaturated hydrocarbons	Are less reactive than saturated hydrocarbons
R	Do not undergo hydrogenation reaction	Can undergo hydrogenation reactions

1. only P
2. only Q
3. only R
4. All- P, Q and R

Q: 7 **Sodium hydrogen carbonate known as baking soda is used in baking cakes to make them rise and become fluffy and light.**

Which of the following is/are true about how this happens?

i) It reacts with acidic substances in the cake mixture to release carbon dioxide gas making the cake rise
ii) It decomposes on heating to release carbon dioxide gas in the cake mixture being baked, making it rise
iii) It lightens the cake mixture by drying it

1. only i
2. only ii
3. only i and ii
4. all - i, ii and iii

Q: 8 **When you hear someone calling you, you turn and look at who is calling. A lot of things happen very quickly in the muscles, nerves and organs of your body that help you perform the action. Which is the correct route by which messages travel through the body enabling this action?**

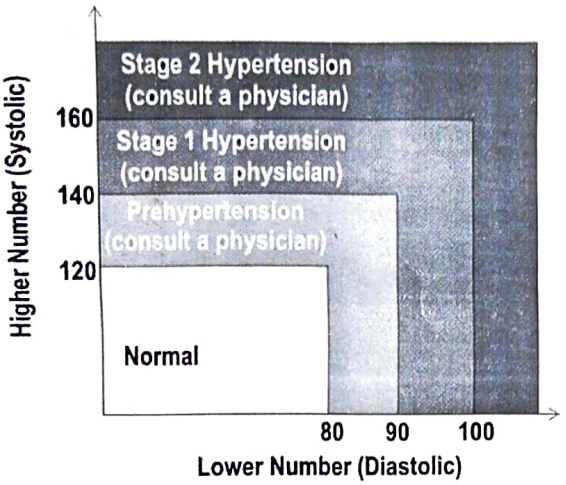
1. Effector Muscle -> Motor Neuron -> Central Nervous System -> Sensory Neuron -> Receptor
2. Receptor -> Sensory Neuron -> Central Nervous System -> Motor Neuron -> Effector Muscle
3. Receptor -> Motor Neuron -> Central Nervous System -> Sensory Neuron -> Effector Muscle
4. Effector Muscle ->Sensory Neuron -> Central Nervous System -> Motor Neuron -> Receptor

Q: 9 **Directional responses are those in which an organism's response is affected by the direction of the stimulus. Non-directional responses are those in which the organism's response is not affected by the direction of the stimulus.**

Given below are two types of movements in plants. Which of them is a directional response?
P. Nastic movement - closing and drooping of leaves when the leaves are touched.
Q. Tropic movement - roots of a plant growing towards water

1. only P
2. only Q
3. both P and Q
4. neither P nor Q

Q: 10 **When a person's blood pressure is measured, two readings are obtained - the Systolic and the Diastolic. These two numbers are used to determine if the person has high blood pressure (hypertension).**



The blood pressure readings of 4 patients is given below. Which of them is suffering from Stage 1 Hypertension?

	Systolic	Diastolic
P	120	80
Q	130	80
R	150	95
S	145	85

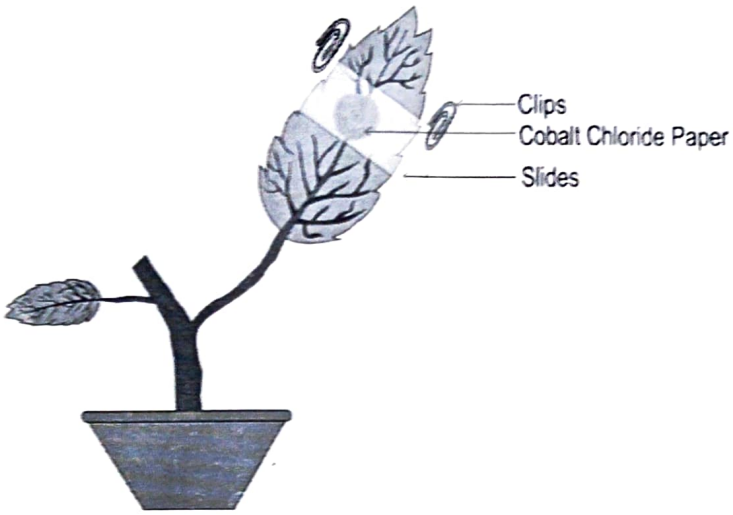
1 P **2** Q **3** R **4** S

Q: 11 **Two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements A and R.**

Assertion (A): The human sperm requires a lot of energy to propel itself towards the ovum.
Reason (R): The tail of the sperm helps in propelling the sperm towards the ovum.

1 Both A and R are true and R is the correct explanation for A.
2 Both A and R are true but R is not the correct explanation for A
3 A is true but R is false.
4 A is false but R is true.

Q: 12 **A student sets up an experiment to measure the rate of transpiration. He attached pieces of dry cobalt chloride paper to the two surfaces of a dicot leaf, held in position with dry glass slides as shown in the figure below. He knew that cobalt chloride is blue in colour when dry and changes to pink when it comes in contact with water. The change of colour from blue to pink of the paper indicates transpiration. Which of the following is likely to be the outcome of the experiment?**



1. Both pieces of paper turn pink at the same time.
2. The piece on the lower surface of the leaf remains blue.
3. The piece on the lower surface of the leaf turns pink first.
4. The piece on the upper surface of the leaf turns pink first.

Q: 13 **Every part of a plant requires food, which is transported by the phloem. To be able to carry out its function, the phloem carries food_____.**

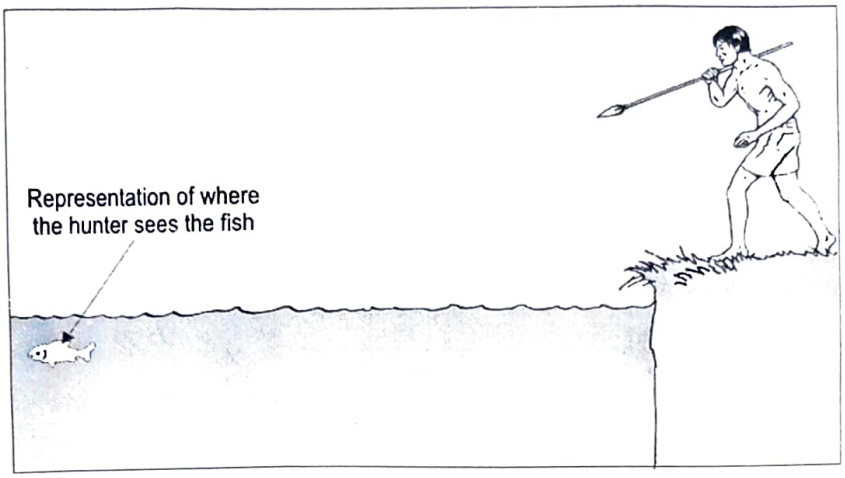
1. only downwards
2. only upwards
3. only sideways
4. in all directions

Q: 14 **Two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements A and R.**

Assertion (A): Stars would not twinkle if we viewed them from the moon.
Reason (R): Stars appear to twinkle due to atmospheric refraction of starlight.

1. Both A and R are true and R is the correct explanation for A.
2. Both A and R are true but R is not the correct explanation for A.
3. A is true but R is false.
4. A is false but R is true.

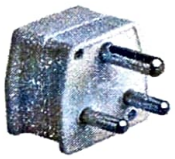
Q: 15 A hunter sees a fish which is swimming in clear water as shown in the figure.



To hit the fish, he should take aim adjusting for the fish's motion and _____.

1. exactly at the depth where the fish appears to be
2. a little below where the fish appears to be
3. a little above where the fish appears to be
4. at the fish's eye, exactly where it appears to be

Q: 16 Ketan was on tour and he carried an electric iron with a 3-pin plug with him.



In a hotel room where he was staying, he found that there was no 3-pin socket. So, he removed the bigger and longer pin of the 3-pin plug and plugged it into the socket. Will he be able to use the iron?

1. Yes, but it may not be safe to use it without the bigger and longer pin.
2. No, because the iron will not work unless all the three pins are plugged in.
3. Yes, because the third bigger pin that he removed is just to make the plug look good.
4. No, because the bigger pin that he removed is the one that supplies electricity. The remaining two just provide support.

Q: 17 Which of the following is true about resistors in parallel combination?

P. The potential difference across the resistors is the same.

Q. The equivalent resistance is less than the smallest of the resistances.

R. The current flowing through the resistors is the same.

1. only P
2. only Q
3. only P and Q
4. all - P, Q and R

Q: 18 **What does the thumb in the right-hand thumb rule indicate for current passing through a straight wire?**

1. the direction of current
2. the direction of the magnetic field
3. the direction of flow of electrons
4. both the direction of current and the magnetic field

Q: 19 **Two statements are given - one labelled Assertion (A) and the other labelled Reason (R).**

Assertion (A): Carnivores have a greater chemical accumulation in their bodies as compared to herbivores.
Reason (R): As the trophic levels increase, the chemical accumulation in the body also increases.

Which of the following is correct?

1. Both A and R are true, and R is the correct explanation for A.
2. Both A and R are true, but R is not the correct explanation for A.
3. A is true, but R is false.
4. A is false, but R is true.

Q: 20 **Which of the following reduces waste and is good for the environment?**

1. sweeping old leaves from the roadside and burning them
2. using old plastic sheets to cover books in the library
3. using a new plastic bag each day to carry your lunch box
4. cleaning a mirror with old newspapers instead of a cloth

SECTION B

Q: 21 $H_2S + Cl_2 \longrightarrow 2HCl + S$ [2]

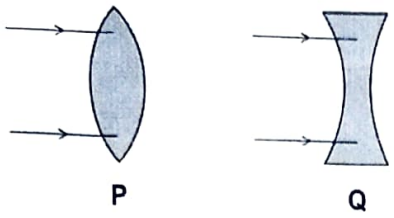
In the above reaction:

(a) Identify the substance that was oxidized and the substance that was reduced. (1)
(b) Mention the oxidizing agent and the reducing agent. (1)

Q: 22 **While driving on a highway, another car swerves into your lane unexpectedly. Your body produces the hormone adrenaline which sharpens your reflexes allowing you to quickly steer out of harm's way. State two responses that adrenaline causes to enable your body to be ready to deal with the situation.** [2]

Q: 23 **(a) State the role of the glomerulus and the collecting ducts in a nephron.** [2]
(b) What is ONE function of the nephron that cannot be done by an artificial kidney?

Q: 24 **Parallel rays of light are shown falling on two types of lenses P and Q in the picture below.** **[2]**



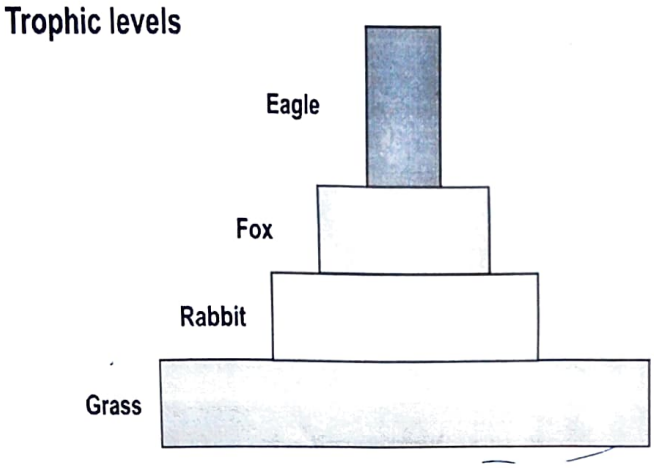
Draw the rays of light that will emerge from the lenses.

Q: 25 **Ahmed connected 3 resistors, wires, a switch, an ammeter and a 120 V battery in two different ways - Design 1 and Design 2. For a net resistance 'R', he measured the net current across the two designs to be 2 A and 22 A respectively.** **[2]**
Which of the two designs did he connect the resistors in parallel? Justify your answer.

Q: 26 **A bulb with a filament of resistance 960 ohms is connected to the 240 V electric mains. The bulb is now replaced with an electric hot plate having a resistance of 1500 ohms.** **[2]**

State if the following will increase, decrease or remain the same when the hot plate is connected as compared to when the bulb is connected to the electric mains:
(i) voltage
(ii) current

Q: 27 Shown below is the representation of the energy transfer in a common grassland ecosystem: **[2]**



(a) In a grassland ecosystem, grass captures solar energy and produces 10,000 joules of energy. This energy is transferred through the trophic levels. If a rabbit eats the grass, calculate the amount of energy available to the rabbit.
(b) Explain how the energy transfer limits the number of trophic levels in this ecosystem.

SECTION C

Q: 28 The handle of an old iron chest broke off from the main body when Ali tried to open it forcefully. He noticed a fine reddish-brown powder on his hands. Curious, Ali wondered what caused this powder to form on the chest and its handle. **[3]**

(a) What is the reddish-brown powder on the handle? Name the process responsible for its formation.
(b) List the two essential conditions required for this process to occur.
(c) State the economic implication of this process in our daily lives.

Q: 29 On a rainy day, Mrs. Guharoy conducted a chemistry lab session with her students. During the session, she placed a small amount of pure common salt in a clean, dry test tube and added concentrated sulphuric acid to it. **[3]**

(a) What would happen if moist blue litmus paper is brought near the product formed?
(b) A student suggested using calcium oxide to dry the gas produced. Would you agree with this suggestion? Explain.
(b) Why can calcium chloride be used as a drying agent for the gas?

Q: 30 Some higher plants multiply using their vegetative parts like roots, stems and leaves. **[3]**
(a) Mention TWO similarities between vegetative propagation and asexual reproductive processes like fragmentation and budding. (1)
(b) Illustrate the process of binary fission in amoeba. (2)

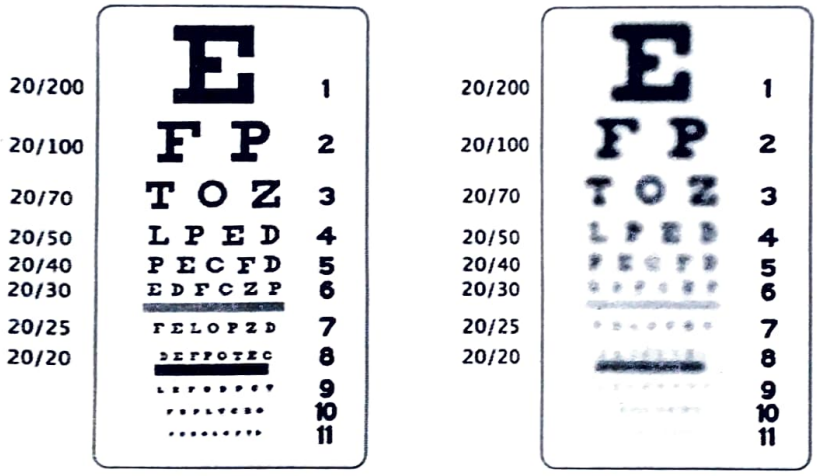
Q: 31 The human circulatory system has three kinds of blood vessels - arteries, veins and capillaries. [3]

(a) Which type of blood vessels has the thickest walls? Explain why.

(b) What function do valves play in the flow of blood?

(c) Why do arteries divide into capillaries?

Q: 32 Jatin was having some vision problems so he visited an ophthalmologist. His vision was tested using the Snellen chart. The image below shows Jatin's vision compared to that of a person with normal vision. [3]



Normal vision Jatin's vision

(a) What vision problem Jatin is most likely to have?
(b) After analyzing Jatin's Snellen test results, the ophthalmologist prescribed corrective lenses. Describe the nature of the lens.
(c) Draw a labelled ray diagram to show how the prescribed lens corrects the defect.

Q: 33 (a) Why does light behave differently when travelling through a prism and a rectangular glass slab, with the same refractive index? (1) [3]
(b) Draw a ray diagram of Newton's experimental setup, which helped him realise that white light is made of multiple colours. (2)

Q: 34 How does decreasing the curvature of the spherical mirror (concave and convex) affect [3]
(a) the focal length
(b) magnification
(c) the position of the pole

Q: 35 (a) Define the potential difference between two points in a circuit. [3]
(b) Determine the amount of work done to move a 300 micro Coulomb charge through a potential difference of 10 V.

SECTION D

Q: 36 An alcohol with the molecular formula C_2H_6O when treated with conc. sulphuric acid forms a compound 'U'. When hydrogen is added to 'U' in the presence of a Ni catalyst compound 'V' is formed. 'V' reacts with chorine in the presence of sunlight to form compound 'W'. [5]

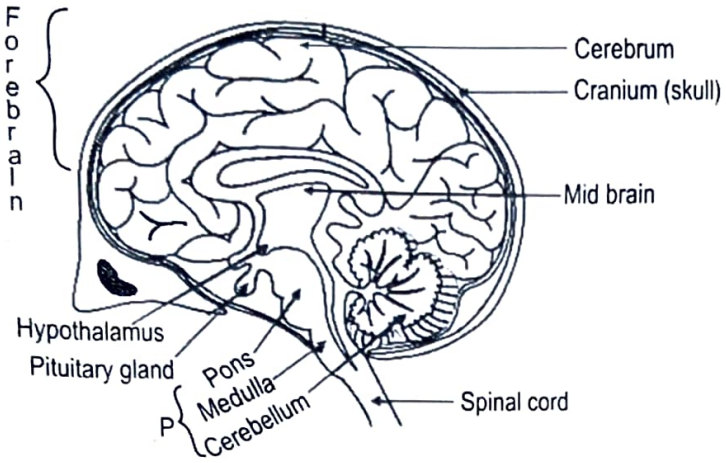
(a) State the type of reaction occurring during the formation of U, V, and W and identify them. (3)
(b) The alcohol is oxidised in the presence of alkaline $KMnO_4$ to form a compound 'X'. Identify 'X' and write a reaction between the alcohol and 'X'. (1)
(c) What happens to the pure compound 'X' at 290K? What is the name given to it at this temperature? (1)

Q: 37 An element 'Y' reacts with 'Z' to form a compound 'X'. [5]
(a) Draw the electron dot diagram showing the formation of compound 'X', if the atomic number of 'Y' is 19 and that of 'Z' is 17. (2)

(b) The compound 'X' got mixed up with sand. How can you separate it from the mixture? Give a reason for your answer. (2)

(c) An electrical circuit with a bulb is created with the solid form of compound 'X' and aq. form of the same compound. What will be your observation in both cases? (1)

Q: 38 [5]



(a) What are the parts labelled P collectively known as? Write any one of its function. (2)

(b) Mention any TWO important functions of the forebrain. (2)

(c) What is the function of pituitary gland in humans? (1)

Q: 39 **A botanist was studying flower production and leaf shapes in pea plants. So, he crossed two random pea plants artificially. He obtained purple flowers and white flowers in the offspring in a ratio of 1:1. He, however, did not know the composition of the parents that he had crossed.** [5]

(a) Are the parents in this case - PP, Pp or pp? Use a Punnett square to justify your answer. (2)

(b) While observing the flowers, he observed that a worm had eaten some of the leaves of the plant and created holes in them. Will the offspring from the plants, that have holes in their leaves, also have holes in their leaves? Why or why not? (2)

(c) Mendel had founded three laws of inheritance which are as follows:

(i) Out of the two copies of a trait, one dominates the expression of the other.
(ii) Each gamete consists of only one copy of the trait.
(iii) In the case of multiple traits, each trait can be inherited separately.

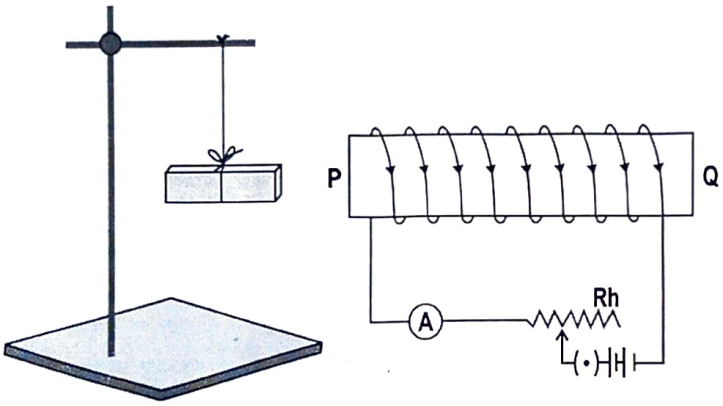
Which of these laws can be proved only using the information provided above? (1)

Q: 40 A dental mirror is a device used by a dentist to examine teeth. [5]
The tooth is situated 5 cm away from the mirror. The image of the tooth is formed 10 cm away from the mirror.

(a) What is the focal length of the mirror? (2)
(b) What is the magnification? What does the value indicate? (2)

(c) If the dentist moves the dental mirror closer to the tooth, how will it affect the image of the tooth? (1)

Q: 41 Uzma carried out the following experiment to determine the nature of three bars - X, Y, and Z. She suspended each of the three bars from a string and brought a current-carrying solenoid near each of them as shown in the figure. [5]



She noticed that Bar X moved towards the solenoid, Bar Y moved away from the solenoid and Bar Z did not change its position.
(a) Which among the three bars is definitely a magnet? Justify your answer (2)

(b) What could be the possible reason why Bar Z did not change its position at all? (1)

(c) Name any two materials that would behave the same way as Bar Z when brought near the solenoid. (1)

(d) Mention any two ways in which Uzma can vary the strength of the magnetic field around the solenoid. (1)

SECTION E

Q: 42 A compound 'L' on electrolysis produces two products 'M' and 'N'. 'N' on reaction with slaked lime forms a compound 'O' that helps to make drinking water free from germs. Compound 'L' in reaction with ammonia, water, and carbon dioxide forms a compound 'P'. 'P' on heating forms compound 'Q'. [4]

(a). Identify the process and give a reason why is it named so. (1)

(b). What will be your observation if crystals of Q are heated in a clean, dry test tube? (1)

(c). Identify compounds O and L. (2)

OR

Give one use of 'P' and 'Q'.(2)

Q: 43 Plants produce several hormones, some of them promote their growth while others restrict their growth. When the source of light is on one side of the plant, the plant appears to bend towards the light. This process is due to auxin, a hormone produced mainly at the tip of the shoot, which is also responsible for the dormancy of axillary buds from where new branches arise. Gibberellins are responsible for seed germination, shoot growth as well as flowering in plants whereas abscisic acid (ABA) is responsible for the inhibition of growth and wilting of leaves. [4]

(a) What is one conclusion that can be drawn on the relationship between auxin and light?

(b) In the lifetime of a plant, when will gibberellin be produced?

(c) A plant had been found to grow very few branches making it difficult for it to survive. State TWO cost-effective way in which branching can be promoted in a plant. Justify.

OR

c) State TWO environmental condition that can trigger excessive production of ABA.

Q. 44 (a) Draw a simple circuit diagram to show how the electrical appliances like a fan, bulb, refrigerator and mixer are connected to the main power supply of the house so as to protect electrical appliances from damage in case of an electrical surge. (1) [4]

(b) How much power is consumed by an electric cooker in the circuit if it consumes electrical energy of 8 kWh when kept running for 5 hours? (1)
(c) Sunny had a wire of length 1 m and diameter 0.3 mm. If the resistance of the wire is 30 ohm at 25°C, what will be the resistivity of the material of the wire at that temperature? (2)

or

(c) P and Q are two electric stoves whose heating elements have different resistances RP and RQ respectively. If RP > RQ then, compare the time taken to boil 500 mL of water on both stoves when connected to a power supply of 220 V? Justify your answer. (2)

End of Questions in Paper