CHARITABLE COACHING CENTRE

## Class X

## Sample Paper-4

## Time allowed: 3 hours

Maximum marks: 80

**General Instructions** 

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

#### Section A

Section A consists of 20 questions of 1 mark each

Question 1. When NaOH and HCI are mixed in equal molar quantities, the result is

- (a) the formation of salt + H<sub>2</sub>O
- (b) the formation of salt +  $H_2$  (g)
- (c) the formation of salt +  $O_2$  (g)
- (d) the formation of salt +  $N_2$
- Answer: (a) the formation of salt +  $H_2O$

When NaOH and HCl are mixed in equal molar quantities, the acid-base reaction takes place and we get salt (NaCl) and water.

## NaOH + HCI $\rightarrow$ NaCl (Salt) + H<sub>2</sub>O

Question 2. A light ray enters from medium A to medium B as shown in the figure. The refractive index of medium B relative to A will be:

Medium A

- (a) greater than unity(b) less than unity
- (c) equal to unity

### (d) zero

Answer: (a) greater than unity

Explanation: As the light rays travel from medium A to medium B, then they bend towards the normal which means that medium B has a higher refractive index and less speed of light concerning medium A., So, the refractive index of medium B w.r.t. medium A will be greater than unity.

Question 3. Four metals Zn, Fe, Cu, and Al are taken and added to the following solutions one by one. The results obtained are tabulated as given below. Based on the data given which of the following elements is most reactive?

	Metal	ZnSO <sub>4</sub> (aq)	FeSO <sub>4</sub>	CuSO <sub>4</sub> (aq)	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>
(a)	Zn	-	Displaced	Displaced	No reaction
(b)	Fe	No reaction	-	Displaced	No reaction
(C)	Cu	No reaction	No reaction	-	No reaction
(d)	Al	Displaced	Displaced	Displaced	-
Ans	wer:				
	Meta	ZnSO <sub>4</sub>	FeSO <sub>4</sub>	CuSO (aq)	4 Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>
(d)	Al	Displaced	d Displace	d Displace	ed _

From the results given in the table, AI is the most reactive among others because it shows displacement reactions in three solutions, Zn shows, displacement reactions in two solutions and iron shows displacement in one solution. The least reactive metal is copper as it does not react with any solution.

Question 4. In which of the following aspects does multiple fission differ from binary fission? (i) Number of offspring produced.

(ii) Level of genetic variation in offspring.

(iii) Number of parents involved.

(iv) Multiple fission occurs in Plasmodium, whereas binary fission occurs in Leishmania.

(a) Only (i) is correct

(b) Both (i) and (iv) are correct

(c) (iii) is correct

(d) (ii) is correct

Answer: (b) Both (i) and (iv) are correct

Explanation: Multiple fission produces many offspring whereas binary fission produces only two. Off-spring produced through multiple fission as well as binary fission are genetically identical to each other and to their parents. Both multiple fission and binary fission require only one parent. Plasmodium, the protozoan that causes malaria reproduces through multiple fission. Leishmania causes Kala-azar and it reproduces through binary fission.

Question 5. Which of the following is not an heteroatom CH<sub>2</sub>—O—CH<sub>2</sub>—CH<sub>2</sub>(Br) are

(a) oxygen

(b) carbon

(c) hydrogen

(d) bromine

Answer: (b) carbon

Question 6. If a person has five resistors, each of value [Math Processing Error]  $\Omega$ , then the maximum resistance he can obtain by connecting them is:

(a) 1 Ω

(b) 5 Ω

(c) 10 Ω

(d) 25 Ω

Answer: (a) 1 Ω

Question 7.Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, e.g. hydrogen. After the formation of four bonds, carbon attains the electronic configuration of

(a) helium

(b) neon

(c) argon

(d) krypton

Answer: (b) neon

The compound formed is methane (CH<sub>4</sub>). In this, the carbon atom has a complete octet and configuration of neon which is a noble gas element.

Question 8. A plant is grown in a sealed container with a controlled environment containing carbon dioxide, water, and sunlight. After some time, the plant starts to show growth and produces oxygen. Which of the following statements is most likely true?

(a) The plant is undergoing photosynthesis, a form of autotrophic nutrition.

(b) The plant is obtaining nutrients from the surrounding soil, a form of heterotrophic nutrition.

(c) The plant is undergoing cellular respiration, a form of heterotrophic nutrition.

(d) The plant is absorbing nutrients directly from the air, a form of autotrophic nutrition.

Answer: (a) The plant is undergoing photosynthesis, a form of autotrophic nutrition.

Explanation: Autotrophic nutrition is the process by which organisms produce their food using simple inorganic substances, such as carbon dioxide, water, and sunlight, to synthesize organic compounds, like glucose. In the given scenario, the plant is grown in a sealed container with carbon dioxide, water, and sunlight, and it produces oxygen. This is a classic indication of photosynthesis, j where plants use sunlight energy to convert carbon dioxide and water into glucose and release oxygen as a byproduct.

Question 9. Consider the following diagram that represents the reproductive system in the human male.



The blockages shown at A and B would most likely interfere with the ability to (a) transport gametes

(b) produce mature gametes

## (c) eliminate waste products through the urethra

## (d) express secondary sex characters

Answer: (a) transport gametes

The blockages shown at A and B would likely interfere with the ability to transport gametes. Figure A shows the vasectomy in which vas deferens are removed or tied up through a small incision on the scrotum. Figure (B) shows tubectomy, in which a small part of the Fallopian tube is removed or tied up through a small incision in the abdomen or through the vagina. Question 10. The equivalent resistance of a series combination of two resistances is X ohm. If the resistances are of 10  $\Omega$  and 40  $\Omega$  respectively, the value of X will be:

(a) 10 Ω

(b) 20 Ω

(c) 50 Ω

(d) 40 Ω

Answer: (c) 50  $\Omega$ 

Explanation: We know that Total Resistance

 $\mathsf{R} = \mathsf{R}_1 + \mathsf{R}_2$ 

= 10 + 40

= 50 Ω

Hence, the value of X is 50  $\Omega.$ 

Question 11. Which one of the following sets of options correctly depicts reproduction in Amoeba and yeast, respectively?

(a) Budding and binary fission

- (b) Binary fission and budding
- (c) Multiple fission and binary fission

## (d) Fragmentation and grafting

Answer: (b) Binary fission and budding

Binary fission in Amoeba and budding in yeast.

Question 12. If we place the magnetic compass near the north pole of the magnet, which pole of the needle will point towards it?



(a) North pole

(b) South pole

(c) Keep deflecting (d) None of these

## Answer: (b) South pole

Explanation: As like poles repel each other and unlike poles attract each other. Therefore when the North pole of a bar magnet is brought near the compass, it gets deflected in the south direction.

## Question 13. In circuit

(a) ammeter and voltmeter both are connected in series.

(b) ammeter is connected in parallel and the voltmeter in series.

(c) ammeter is connected in series and voltmeter in parallel.

## (d) ammeter and voltmeter both are connected in parallel.

Answer: (c) ammeter is connected in series and voltmeter in parallel.

In any circuit, the ammeter should be connected in series and the voltmeter should be connected in parallel.

Question 14. A patient was diagnosed with a condition that resulted in the obstruction of the bile duct. As a result, the patient experienced symptoms such as jaundice and fatty stools. Which of the following is the primary function of bile juice that is impaired in the patient with a blocked bile duct?

(a) Emulsification of fats

- (b) Neutralization of stomach acid
- (c) Activation of digestive enzymes

## (d) Absorption of water and electrolytes

Answer: (a) Emulsification of fats

Explanation: The primary function of bile juice is the emulsification of fats. Bile is produced by the liver and stored in the gallbladder. It is released into the small intestine to aid in the digestion and absorption of dietary fats.

Bile contains bile salts, which act as emulsifiers. Emulsification is the process of breaking down large fat globules into smaller droplets.

In the case of a blocked bile duct,, the patient experiences symptoms such as jaundice (due to the accumulation of bilirubin, a bile pigment) and fatty stools (due to the malabsorption of dietary fats).

Question 15. At the time of puberty, both boys and girls show lots of changes in appearance. Select the hormone responsible for these changes in boys.

(a) Oestrogen

(b) Adrenaline

(c) Testosterone

(d) Thyroxine

Answer: (c) Testosterone

Testosterone is responsible for changes in boys during puberty.

Question 16. The opening and closing of stomatal pores depends upon :

(a) Oxygen

(b) Water in guard cells

(c) Concentration of carbon dioxide in stomata

(d) Temperature

Answer: (b) Water in guard cells

Explanation: The entry of water into guard cells aids in the opening of guard cells, the guard cell I becomes turgid because of this. Water going out from guard cells aids in the closing of guard cells, because of this the guard cells become flaccid. Direction (Q. Nos. 17-20) consists of two statements – Assertion (A) and Reason (R). Answer these questions by

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, 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.

Question 17. Assertion (A): Tungsten metal is selected for making filaments of incandescent lamps.

Reason (R): Tungsten has a high melting point.

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

Tungsten has a high melting point. Therefore, it is used for making filament of bulbs.

Question 18. Assertion: Silver articles become black after sometime when exposed to sunlight.

## Reason: It is because silver reacts with carbonates present in the air.

Answer: (c) A is true but R is false

Explanation: Silver reacts with sulphur present in the air and forms a layer of silver sulphide, therefore, silver articles get tarnished or becomes black after sometime when exposed to sunlight.

Question 19. Assertion (A): In woody plants, gaseous exchange occurs through lenticels.

Reason (R): Lenticels are specialized cells found along with stomata on the stem of woody plants.

Answer: (c) (A) is true, but (R) is false.

In woody plants, gaseous exchange occurs through the small pores found on stems called lenticels. Stomata on the stem aid in gaseous exchange, in herbaceous plants.

Question 20. Assertion: Electric current flowing through a metallic wire is directly proportional to the potential difference across its ends.

Reason: Ohm's law expression V = IR, where R (resistance) of the wire is always varying.

Answer: (c) A is true but R is false

## Section B

## Questions No. 21 to 26 are Very Short Answer Questions.

Question 21. Plaster of Paris is used to make sculptures and metal casting is used as decorative material in buildings. It should be generally stored in moisture-proof containers. Explain, why support your response with the help of a chemical equation.

Answer: Plaster of Paris (POP) is chemically calcium sulphate hemihydrate (CaSO<sub>4</sub> . [Math Processing Error]H<sub>2</sub>O). when it comes in contact with water it sets into a hard solid mass, called gypsum.

$$CaSO_{4} \cdot \frac{1}{2}H_{2}O + 1\frac{1}{2}H_{2}O \longrightarrow CaSO_{4} \cdot 2H_{2}O$$
Gypsum
Gypsum

Plaster of Paris

To prevent this, POP must be stored in moisture-proof containers. (2)

Question 22. What is the importance of photosynthesis in the life of the following :

## (i) Green plants

## (ii) Non-green plants

## (iii) Animals

Answer: (i) Green plants can build up complex energy-rich molecules of carbohydrates which are further used for different metabolic activities of cells.

(ii) non-green plants such as saprophytes and parasites use the food prepared by green plants during photosynthesis as a source of their own nutrition.

(iii) Animals eat green plants or eat animals that feed on green plants.

Question 23. In the food chain given below, which organisms will be the least in numbers? Algae – Protozoan – Small fish – Large fish

Or

#### elds known as artificial ecosystems?

Answer: In the given food chain, i.e,

Algae  $\rightarrow$  Protozoans  $\rightarrow$  Small fish  $\rightarrow$  Large fish

The large fish (tertiary consumer/top carnivore) will have the least number of organisms. In any food chain, there are generally a greater number of organisms at the lower trophic levels. Thus, the producers have the greatest numbers and top carnivores have the least numbers. (2)

Or

Artificial ecosystems are those ecosystems that are modified and managed by human beings. Crop fields are man-made. Here plants do not grow naturally rather most of the plants are grown by humans according to the season, type of soil, etc. Crop fields are not like wild forest area, which is left to the care of nature and can sustain themselves. In crop fields, the land is managed, the soil is prepared for sowing seeds, then irrigated, and further progress is also kept under observation to get a good yield. This is why crop fields are known as artificial ecosystems. (2)

Question 24. What is a parasitic mode of nutrition? Give examples of both plants and animals that are parasites. Answer: There are different strategies adopted by the organism for nutrition depending on how the food is available. Some organisms break down food outside the body and then absorb it. Others take in food into the body and then digest it. Some organisms get their nutrition from plants and animals without killing them. These organisms are called parasites and the organism from which they derive their food is called host. Some of the parasites are lice, ticks, mites, leeches, and tapeworms among animals and orchids and Cuscuta among plants.

Question 25. The voltage-current (V-I) graph of a metallic circuit at two different temperatures  $T_1$  and  $T_2$  is shown in the figure. Which of the two temperatures is higher and why?



Air warmer near ground

Or



cold air? Answer: Resistance is equal to the slope of the V-I graph. Here, slope of graph for temperature  $T_2$  is higher, so resistance for temperature T2 is higher, As  $R \propto T$ ,  $T_2 > T_1$  (2)

Or

The phenomenon observed in the given figure is a mirage. A mirage is formed due to the bending of light because of the temperature difference between different layers of air. Due to this the refractive index changes with height. When light travels from hot air (rarer) to cold air (denser), then it bends towards the normal. (2)

## Question 26. While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

Answer: The process of dissolving an acid or a base in water is highly exothermic. The acid must always be added slowly to water with constant stirring. If water is added to a concentrated acid, the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive local heating. Hence, it is recommended that the acid should be added to water and not water to the acid.

## Section C

Questions No. 27 to 33 are Short Answer Questions.

Question 27. What is a homologous series of substances? Explain, why carbon forms compounds mainly by covalent bonds.

#### Or

## Name the type of carbon compounds that can be hydrogenated. With the help of a suitable example explain the process of hydrogenation.

Answer: A series of similarly constituted compounds in which the members present have the same functional group and similar chemical properties and any two successive members in a particular series differ in their molecular formula by (—  $CH_2$ ) unit is called a homologous series, e.g.  $CH_4$ ,  $C_2H_8$ ,  $C_3H_8$  are the members of alkane family. (2) Carbon has 4 electrons in its outermost shell and needs to gain or lose 4 electrons to attain a noble gas configuration. Losing

or gaining 4 electrons is not possible due to energy considerations, hence it shares electrons to form covalent bonds. (1)

Only unsaturated hydrocarbons, i.e. alkenes and alkynes can be hydrogenated. e.g. In the presence of a catalyst Ni/Pd, ethyne is hydrogenated into ethane.



## $CaCO_3(s) \xrightarrow{On heating} CaO(s) + CO_2(g)$

The expected product of the decomposition reaction of white lead nitrate [Pb(NO<sub>3</sub>)<sub>2</sub>] is lead(II) oxide (PbO), yellow in colour, along with the emission of nitrogen dioxide (NO<sub>2</sub>) gas, which appears as brown fumes. Here in the presence of heat decomposition is taking place, so, it is known as thermal decomposition.  $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$ 

Question 29. Mention the pathway of urine starting from the organ of its formation. Name four substances that are reabsorbed from the initial filtrate in the tubular part of the nephron.

Answer: The pathway of urine starting from the organ of its formation is as follows:

 $\mathsf{Kidneys} \to \mathsf{Ureters} \to \mathsf{Urinary} \ \mathsf{bladder} \to \mathsf{Urethra}$ 

- Kidney: It contains millions of complex nephrons and filters about 170 to 200 liters of blood. It produces 1-1.8 liters of urine daily.
- Ureters: These carry urine from the kidneys to the urinary bladder.
- Urinary bladder: This is a muscular sac-like structure where urine is stored until released.
- Urethra: This is a short muscular tube that carries urine from the urinary bladder to the outside of the body. (2) The four substances reabsorbed from the initial filtrate are
- Amino acid
- Glucose
- Salts
- Major amount of water

Question 30. Write the molecular formula of the following compound and draw their electron dot structure, (i) Ethane

(1)

## (ii) Ethene

(iii) Ethyne Answer: (i) Ethane Molecular formula: C<sub>2</sub>H<sub>6</sub>



Electron dot structure

(ii) Ethene: Molecular formula: C<sub>2</sub>H<sub>4</sub>



Electron dot structure

(iii) Ethyne: Molecular formula C2H2

c(ii)c (:)H (н(:)

Electron dot structure

Question 31.A solenoid is taken. It is allowed by the flow of an electric current. Raju observes the pattern of the magnetic field due to the current-carrying solenoid. Answer the following questions based on his observations.

## (a) State the factors on which the strength of an electromagnet depends.

(b) Why did the television get a dark patch when the magnet was brought near its screen?

Answer: (a) Factors affecting the strength of an electromagnet:

- The number of turns in the coil If the number of turns in the coil is increased, the strength of the electromagnet increases.
- The current flowing in the coil If the current in the coil is increased, the strength of the electromagnet increases.
- The length of the air gap between the poles If the length of the air gap between the poles of an electromagnet, decreases then its strength increases. (2)

(b) The television has an electromagnet installed in it. When a magnet is brought closer to the screen, the two magnetic field lines interfere and spoil its functioning. (1)

Question 32. (i) Write two points of difference between electrical energy and electric power. (ii) Out of 60 W and 40 W lamps, which one has a higher electrical resistance when used? (iii) What is the commercial unit of electrical energy? Convert it into joules. Answer: (i)

S. No.	Electric energy	Electric power	
1.	Electrical energy consumed by an electrical appliance is the product of its power rating and the time it is used.	Electric power is the rate at which electrical energy is consumed.	23
2.	It is measured in kWh.	It is measured in watt or kilowatt.	91

(ii) We know, Power (P) = [Math Processing Error]

Therefore, P is inversely proportional to R as voltage remains the same.

40 W lamp has a higher resistance.

(iii) The commercial unit of electrical energy is kWh.

 $\Rightarrow$  1 kWh = 1000 W × 1 hr = 1000 W × 3600s

$$\Rightarrow$$
 = 36 × 10<sup>5</sup> J

$$\Rightarrow = 3.6 \times 10^6 \text{ J}$$

# Question 33. A motorcycle rider without a helmet met with an accident and suffered a spinal cord injury. In thiscase,whichsignalswillgetdisruptedandwhy?

Answer: In case of a spinal cord injury, signals for reflex action and involuntary action will get disturbed. Reflex action is monitored and controlled through the spinal cord of the nervous system and not by the brain. Nerves from all over the body meet in a bundle in the spinal cord on their way to the brain. In case of any injury to the spinal cord, the signals coming from the nerves as well as signals coming to the receptors will be disturbed. (3)

Section D

## Questions No. 34 to 36 are Long Answer Questions.

Question 34. (i) Describe two methods for the concentration of ores. (ii) How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw a labelled diagram for electrolytic refining of copper.

OR

(i) Explain any two physical properties of ionic compounds giving reasons.

(ii) List any two metals found a free state in earth's crust.

(pi) Metals towards the top of the activity series cannot be obtained from their compounds by reducing with carbon. Why?

(iv) What will you observe when:

(a) Some zinc pieces are put in the copper sulphate solution.

(b) Some silver pieces are put into green-coloured ferrous sulphate solution.

Answer: Two methods used for the separation of ores are:

(i) Froth Flotation Method: It is generally used to remove gangue from sulphide ores. First the ore is powdered and a suspension in water is formed. To this ore Collectors and froth stabilisers were added. The collectors generally used are pine oils, fatty acids etc. The function of collectors is to increase the non-wettability of the metal part of the ore and allows it to form a froth. Froth Stabilizers (cresols, aniline etc.) sustain the froth. The oil wets the metal and the water wets the gangue. Paddles and air constantly stir up the suspension to create the froth. This frothy metal is skimmed off the top and dried to recover the metal.



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(ii) Magnetic ore Separation: This method is used in those cases where either ore or the impurities are of magnetic nature. In this method, the powdered impure ore in the form of a thin layer is allowed to fall on a rubber belt which moves horizontally over two rollers, one of which has an electromagnet attached. As the ore particles roll over the belt, the magnetic component in the ore gets attracted towards the magnet. It gets collected in a heap while the non magnetic component forms a separate heap.



(ii) Copper is extracted from sulphide ore by roasting. It is done in the presence of air:

$$2Cu_2S + 3O_2 \xrightarrow{\Delta} 2Cu_2O + 2SO_2$$
$$2Cu_2O + Cu_2S \xrightarrow{\Delta} 6Cu + SO_2$$

Electrolytic Refining of Copper.



OR

(i) The two physical properties of ionic compounds are:

1. Ionic compounds are usually crystalline solids because their oppositely charged ions attract one another strongly and forms a regular crystal structure.

2. Ionic compounds have high melting and boiling points because ionic compounds are composed of oppositely charged positive and negative ions held together by a strong electrostatic force of attraction. Therefore, a large amount of energy is required to overcome these forces.

(ii) Gold and Platinum are the two metals that are found in a free state in the earth's crust. These metals are located at the bottom of the activity series.

(iii) Metals such as sodium, magnesium, calcium, and aluminium high up in the reactivity series are very reactive and cannot be obtained from their compounds by heating with carbon. This is because these metals have more affinity for oxygen than carbon.

(iv) (a) The blue solution will become colourless, and reddish-brown copper metal will be deposited.

$$Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$$
  
Blue Colour (reddish brown)

(b) When some silver pieces are put into the green coloured ferrous sulphate solution, there will be no reaction because Ag is less reactive than the iron:

 $Ag(s) + FeSO_4(aq) \rightarrow No reaction$ 

Question 35. (a) 'Plants also perform chemical coordination'. Elaborate.

(b) Name various plant hormones. Also give their physiological effects on plant growth and development.

Or

## (a) Explain how traits are controlled by genes only.

## (b) Give an example in which both genes exist independently of each other in humans.

Answer: (a) Plants also perform chemical coordination for various activities with the help of hormones. These are the chemical compounds released by stimulated cells that diffuse to various locations in plants performing different functions. These hormones produced by plants are also called phytohormones. (2)

(b) Different types of hormones produced by plants are Auxin, Gibberellins, cytokines, Abscisic acid, and Ethylene. (3)

Plant Hormone	Physiological Effect
Auxin	Synthesized in the young tip of roots and shoots. It diffuses towards the shady side of the plant, which stimulates the cells to

	grow longer, resulting in the bending of the shoot towards the light.
	Promotes cell elongation and division.
	Plays an important role in the formation of roots and seedless fruits.
Gibberellins	Helps in the growth of the stem and flower.
	Helps in the germination of seeds.
Cutokining	Promote cell division and delay leaf aging.
Cytokinins	Also, stimulates leaf expansion.
	Growth inhibitor
Abscisic acid	Reverses the growth-promoting effects of auxins and gibberellins.
	Promotes transverse growth.
Ethylene	Essential for fruit ripening, promotes senescence and abscission of leaves.

(a) Plants have hormones that can trigger growth. If the hormone works efficiently, a lot of hormones will be made (i.e., tall plant).

If the gene for the enzyme has alteration, the enzyme will not be efficient. Hence, the amount of hormone produced will be less (i.e., small plant). This proves that the traits (characters) are controlled by genes only. (2) (b) Both genes exist independently of each other in humans can be explained by the codominance phenomenon of blood groups. There are four types of blood groups A, B, AB, or 0, and controlled by genes I<sup>A</sup>, I<sup>B</sup>, and I<sup>O</sup>. The genes I<sup>A</sup> and I<sup>B</sup> show codominance because both express themselves independently as shown.

Parents (A)	$\overline{(A)}$			
Ļ				
Progeny	IA IB	(AB Blood g	group)(3)	

Question 36. Describe the significance of spore formation in Rhizopus. OR

What is vegetative propagation in plants? Describe the process of vegetative propagation through leaves in plants? Answer:



Rhizopus is a fungus that commonly grows on bread, pickle and jam when conditions are favourable for its growth. It is a simple multicellular organism but shows specific reproductive parts. The thread like structure that can be seen on moist leftover bread pieces are the hyphae of the bread mould. They are not the reproductive parts. The tiny-round headed structures on a thin stalk are the . reproductive parts. The round blobs are the sporangia, inside which are a large number of tiny cells or spores that help in giving rise to the new Rhizopus individuals. These spores have thick walls that protect them till they find a moist surface to grow. Hence, these spores are a means of asexual reproduction in Rhizopus. OR



Leaf of Bryophyllum with buds

Vegetative propagation is a method of asexual reproduction in plants where new plants are produced from the vegetative parts of plants like root, stem and leaves. While animals cannot use this method of reproduction, plants can. This method is

used to produce new plants by layering or grafting as in rose, jasmine, sugarcane and grapes for agriculture purposes. It has both benefits and some drawbacks. Some examples of vegeta-tive propagation are shown below: (i) Propagation by buds on leaf margins in Bryophyllum leaf. The buds that develop along the leaf margin fall on the soil and develops each of them into а new plant. (ii) A small cutting of a money plant when kept in water in a glass container or in a pot with soil grows into a new plant. potatoes ginger conditions. (iii) Buds in and can grow into new plants under suitable (iv) In sweet potatoes, the roots bear adventitious buds that can grow into new plants under favourable conditions. Section E

## Questions 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.

Question 37. The table given below shows the hints given by the quiz master in a quiz.

Н	li	n	t	s	
-			•	<u> </u>	

(i) Compound 'X' is used in cough syrups and many tonics.
(ii) 'Y' is formed on heating 'A' in the presence of alk. KMnO <sub>4</sub>

(iii) 'A' is also soluble in water in all proportions.

Based on the above hints answer the following questions.

(a) Name the compound X. Write its chemical formula.

(b) Which gas is evolved when the compound X reacts with sodium? Write the chemical equation involved in the reaction of X with sodium.

Complete the following equation for X and identify Y.

$$X \xrightarrow{\text{Alk. KMnO_4}} Y$$

Answer: (a) The compound X is ethanol as it is soluble in water in all proportions and used in cough syrups. The chemical formula is  $CH_3CH_2OH$ .

(b) Hydrogen gas is evolved when ethanol reacts with sodium.

$$2C_{2}H_{5}OH + 2Na \longrightarrow 2C_{2}H_{5}ONa + H_{2} \uparrow (2)$$
  

$$Or$$
  

$$CH_{3}CH_{2}OH \xrightarrow{Alk, KMnO_{4}} CH_{3}COOH \quad (2)$$
  

$$(X) \xrightarrow{Heat} (Y)$$

The compound 'Y' is ethanoic acid.

Question 38. There are many plants in which parts like the root, stem and leaves develop into new plants under appropriate conditions. Unlike most animals, plants can indeed use such a mode for reproduction. This property of vegetative propagation is used in methods such as layering or grafting to grow many plants like sugarcane, roses, or grapes for agricultural purposes. Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds. Such methods also make possible the propagation of plants such as banana, orange, rose and jasmine that has lost the capacity to produce seeds. Another advantage of vegetative propagation is that all plants produced are genetically similar enough to the parent plant to have all its Characteristics.

1. Take a potato and observe its surface. Can notches be seen?

2. Cut the potato into small pieces such that some contain a notch or bud and some do not.

3. Spread some cotton on a tray and wet it. Place the potato pieces on this cotton. Note where the pieces with the buds are placed.

4. Observe changes in these potato pieces over the next few days. Make sure that the cotton is kept moistened.

(a) Which parts of plants are used for vegetative propagation?

(b) Give any one advantage of vegetative propagation.

(c) Give an example of a plant that shows vegetative propagation.

OR

## What observation can be seen in the above activity?

Answer: (a) There are many plants in which parts like the root, stem, and leaves are used for vegetable propagation. (b) The advantage of vegetative propagation is that all plants produced are genetically similar em to the parent plant to have all its characteristics.

(c) Rose shows vegetative propagation.

OR

The potato pieces having buds gradually grow and develop. But there is no growth and development in potato pieces without bud.

## Question 39.



The above figure shows a glass slab at which an incident ray falls at an angle of incidence i. The emergent ray is coming from the glass slab at an angle of emergence e. The refractive index of the glass slab is 1.5. The speed of light in air is  $3 \times 10^8$  m/s.

(a) Based on the text and data given in the above paragraph, what is the angle between incident ray and emergent ray?

(b) Which quantity remains constant when a light travels from air to a glass slab?

(c) What is the speed of light in the glass slab?

Or

### What will happen when incident light falls normally to the surface of the glass slab?

Answer: (a) As the incident ray and the emergent ray are parallel to each other. So, the angle between them is zero. (1) (b) When the light travels from one medium to another medium, then the frequency of the light remains constant. (1) (c) The speed of light is air,  $c = 3 \times 10^8$  m/s

The speed of light in the glass, v =? Refractive index of glass,  $\mu_g = 1.5$ 

As, 
$$\mu_g = \frac{\text{Speed of light in } \operatorname{cir}(c)}{\text{Speed of light in glass}(v)}$$
  
 $\therefore \qquad v = \frac{3 \times 10^8}{1.5} = 2 \times 10^8 \text{ m/s}$ 

Or

When the incident ray falls normally to the surface of the glass slab, there is no bending of the ray of light, it goes straight without any deviation. (2)

