Class-X Session 2022-23
Subject - Science (086)
Sample Question Paper - **41**
With Solution

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S. No.	Chapter Name	Section-A (MCQs & A/R) 1 Mark	Section-B (VSAQs) 2 Marks	Section-C (SAQs) 3 Marks	Section-D (LAQs) 5 Marks	Section-E (Case Study) 4 Marks	Total Marks
		Q. No.	Q. No.	Q. No.	Q. No.	Q. No.	
1	Chemical Reactions and Equations	2(Q1,5)	1(Q21)			1(Q37)	8
2	Acids, Bases and Salts	3(Q2,7,17)		1(Q27)			6
3	Metals and Non-metals	2(Q3,6)		1(Q28)			5
4	Carbon and its Compounds	1(Q4)	1(Q 21 OR)		1(Q34)		6
5	Life Processes	3(Q9,11,20)	1(Q24)	1(Q33)			8
6	Control and Co-ordination	2(Q10,19)	1(Q23)	1(Q30)			7
7	How do Organism Reproduce		1(Q25)		1(Q36)		7
8	Heredity and Evolution	1(Q12)	1(Q26)				3
9	Light- Reflection and Refraction			2(Q29,31)			6
10	Human Eye and Colourful World		1(Q22)			1(Q38)	6
11	Electricity	3(Q14,15,18)			1(Q35)		8
12	Magnetic Effects of Electric Current	2(Q13,16)		1(Q32)			5
13	Our Environment	1(Q8)				1(Q39)	5
	*** Total Questions (Total Marks)**	**20(20)**	**6(12)**	**7(21)**	**3(15)**	**3(12)**	**80**

* The number given outside the bracket denotes number of questions asked in the sample paper, while the number given inside the bracket denotes marks.

Time Allowed : 3 Hours **Max. 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 Answer type questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
5. **Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words
6. **Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
7. **Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

SECTION-A

Select and write one most appropriate option out of the four options given for each of the Questions 1 to 20

1. White silver chloride in sunlight turns to –

(a) grey (b) yellow (c) remain white (d) red

2. Which one of the following can be used as an acid-base indicator by a visually impared student?

(a) litmus (b) Turmeric (c) Vanilla essence (d) Petunia leaves

3. Which of the following is not an allotropic form of carbon?

(a) Diamond (b) Graphite (c) Coal gas (d) None of these

4. Organic compounds will always contain –

(a) carbon (b) hydrogen (c) nitrogen (d) sulphur

5. Which of the following is not a physical change?

(a) Boiling of water to give water vapour.

(b) Melting of ice to give water.

(c) Dissolution of salt in water.

(d) Combustion of Liquefied Petroleum Gas (LPG).

6. Which of the following non-metals are not present in aqua regia?

(a) N (b) Cl (c) P (d) All of these are present

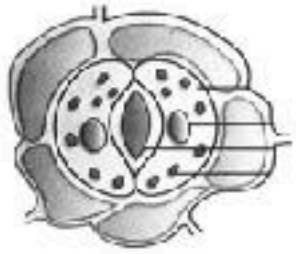
7. Which of the following substances will not give carbon dioxide on treatment with dilute acid?

(a) Marble (b) Limestone (c) Baking soda (d) Lime

8. The chemical notation of ozone is

(a) CFCs (b) O_2O (c) O_3 (d) Both (b) & (c)

9. Which of the following statement is not true for stomatal apparatus?



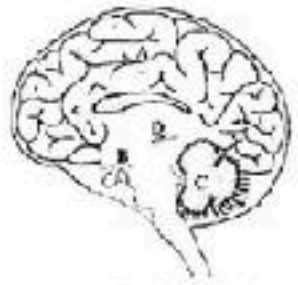
(a) Inner walls of guard cells are thick

(b) Guard walls invariably possess chloroplast and mitochondria

(c) Guard cells are always surrounded of subsidiary cells

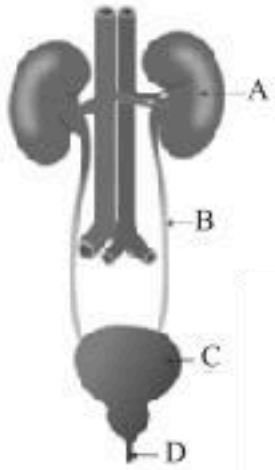
(d) Stomata are involved in gaseous exchange

10. From the given figure identify the part of human brain controlling most of the involuntary actions:



(a) A & B (b) B & C (c) C & D (d) D & A

11. In the given diagram some organs are labelled as A,B,C and D respectively. Choose the correct sequence.



(a) A: Kidney, B: Urinary bladder, C: Urethra, D: Ureter

(b) A: Kidney, B: Ureter, C: Urinary bladder, D: Urethra

(c) A: Kidney, B: Urethra, C: Collecting duet, D: Anus

(d) A: Kidney, B: Seminiferous tubules, C: Uterus, D: Ureter

12. In one of Mendel's experiments a plant heterozygous for tallness (fl) was self fertilized, resulting in 748 tall plants and 252 dwarf plants

What is the most likely expected ratios?

(a) 1 : 1 (b) 2 : 1 (c) 3 : 1 (d) 9 : 3 : 3 : 1

13. Which of the following statements is incorrect regarding magnetic field lines?

(a) The direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points.

(b) Magnetic field lines are closed curves

(c) If magnetic field lines are parallel and equidistant, they represent zero field strength

(d) Relative strength of magnetic field is shown by the degree of closeness of the field lines

14. The maximum resistance which can be made using four resistors each of resistance $\frac{1}{2}\Omega$ is

(a) 2Ω (b) $1\,\Omega$ (c) $2.5\,\Omega$ (d) $S\,\Omega$

15. The charge of 150 coulomb flows through a wire in one minute. What is the electric current flowing through it?

(a) 2.5 A (b) 3.5 A (c) 4.5 A (d) 5.5 A

16. Which of the following correctly describes the magnetic field near a long straight wire?

(a) The field consists of straight lines perpendicular to the wire.

(b) The field consists of straight lines parallel to the wire.

(c) The field consists of radial lines originating from the wire.

(d) The field consists of concentric circles centred on the wire.

Directions: Q.No. 17–20 are Assertion - Reasoning based questions: These 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 :** Aqueous solution of ammonium nitrate turns blue litmus red.
Reason : Ammonium nitrate is salt of strong acid and strong base.

18. **Assertion:** Bulbs are usually filled with chemically active gases.
Reason: Nitrogen and argon gases are filled in order to prolong the life of the filament.

19. **Assertion:** Transmission of the nerve impulse across a synapse is accomplished by neurotransmitters.
Reason: Transmission across a synapse usually requires neurotransmitters because there is small space i.e., synaptic cleft, that separates one neuron from another.

20. **Assertion:** Blood of insects is colourless.
Reason: The blood of insect does not play any role in transport of oxygen.

SECTION-B

Q. no. 21 to 26 are Very Short Answer Questions.

21. Why are unsaturated hydrocarbons more reactive than saturated hydrocarbons?

OR

State one difference between:

(i) Combination and decomposition reaction.

(ii) Displacement and double displacement reaction.

22. How will you use two identical prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white ligth? Draw the diagram.

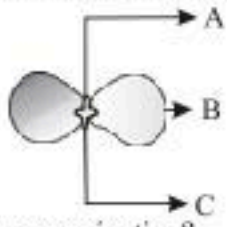
OR

What is a rainbow? Draw a labelled diagram to show the formation of a rainbow.

23. Give an example of a plant hormone that (i) promotes growth (ii) inhibits growth

24. Name the component of blood which transport:
(i) Food, carbon dioxide and nitrogenous wastes (ii) Oxygen.

25. In the following figure showing a germinating gram seed, name the parts labelled as A, B and C :



Why is part 'B' considered to be important during germination?

26. Name the part of *Bryophyllum* where the buds are produced for vegetative propagation.

SECTION-C

Q.no. 27 to 33 are Short Answer Questions.

27. Write the name of acid and base that formed the following salt.
(a) KCl (b) $Al_2(SO_4)_3$ (c) K_2SO_4

28. (a) How can you obtain pure metal from metals of high reactivity?
(b) Magnesium when reacts with hot water starts floating. Explain.

29. Mention the types of mirrors used as (i) rear view mirrors (ii) shaving mirors. List two reasons to jutify your answers in each case.

30. (a) An old man is advised by his doctor to take less sugar in his diet. Name the disease from which the man is suffering . Mention the hormone due to imbalance of which he is suffering from this hormone? Which gland secretes this hormone?
(b) Name the endocrine gland which secretes growth hormone. What will be the effect of the following on a person:
(i) Deficiency of growth hormone.
(ii) Excess secretion of growth hormone.

31. What is meant by power of a lens? What does its sign (+ ve or – ve) indicate? State its S.I. unit. How is this unit related to focal length of a lens?

32. (a) Name the poles P, Q, R and S of the magnets in the following figures 'a' and 'b' :

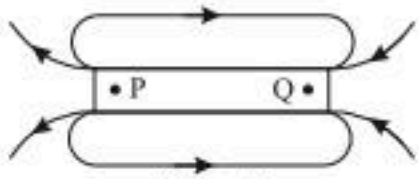


Figure 'a'

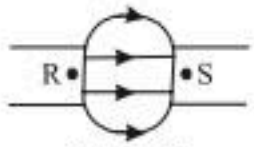


Figure 'b'

(b) State the inference drawn about the direction of the magnetic field lines on the basis of these diagrams.

OR

When is the force experienced by a current - carrying straight conductor placed in a uniform magnetic field.

(i) Maximum; (ii) Minimum?

33. State the difference between transport of materials in xylem and phloem.

OR

Explain how water and minerals are transported in plants?

SECTION-D

Q.no. 34 to 36 are Long Answer Questions.

34. The molecules of alkene family are represented by a general formula C_nH_{2n}. Now answer the following :

(a) What do 'n' and '$2n$' signify?

(b) What is the molecular formula of alkene when n = 6?

(c) What is the molecular formula of the alkene if there are six H atoms in it?

(d) What is the molecular formula and structural formula of the first member of the alkene family?

(e) Write the molecular formulae of lower and higher homologues of an alkene which contains four carbon atoms.

OR

Give two differences between soap and synthetic detergents? Give the name of the by product of soap industry? How is it formed?

35. What does an electric circuit mean? Name a device that helps to maintain a potential difference across a conductor in a circuit. When do we say that the potential difference across a conductor is 1 volt? Calculate the amount of work done in shifting a charge of 2 coulombs from a point A to B having potentials 110 V and 25 V respectively.

36. Differentiate between the following :

(i) Pollen tube and style.

(ii) Fission in *Amobea* and *Plasmodium*

(iii) Fragmentation and regeneration

(iv) Bud of *Hydra* and bud of *Bryophyllum*

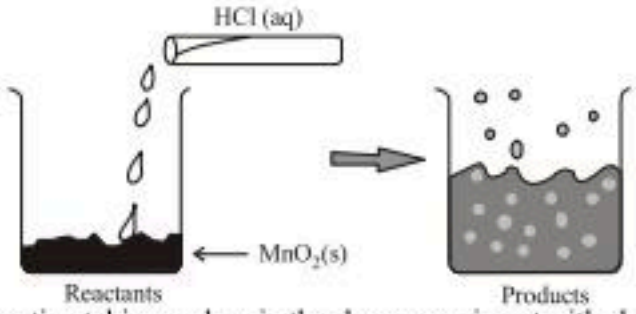
(v) Vegetative propagation and spore formation

SECTION-E

Q.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. Read the following case/passage and answer the questions.

The reaction between MnO_2 with HCl is depicted in the following diagram. It was observed that a gas with bleaching abilities was released.



(a) Mention the name of the reaction takimng place in the above experiment with chemical reaction.

(b) What is the special use of the gas produced in the reaction? Write the chemical reaction involved in the usage.

OR

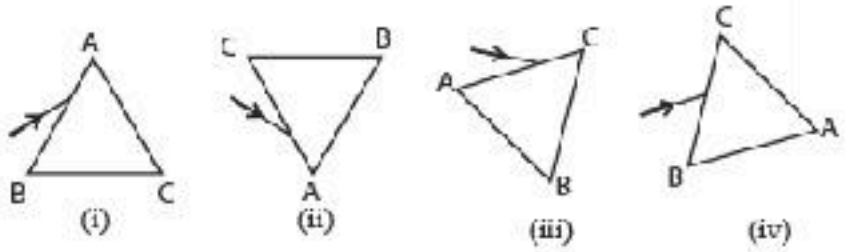
MnO_2 and HCl both are getting reduced – justify this statement.

38. Read the following case/passage and answer the questions.

The phenomenon of decomposition of the white light into its seven component colours when passing through a prism or through a transparent object delimited by non parallel surfaces is called dispersion of light. A beam of light containing all the visible spectrum of the light is white, because the sum of all the colors generates the white color. The light is decomposed in all the component colours, Violet, Indigo, Blue, Green, Yellow, Orange and Red, called as VIBGYOR. The band of the coloured components of a light beam is called its spectrum. The phenomenon can be explained by thinking that light of different colours (different wavelengths) has different velocities while travelling in a medium $v_m = f\lambda_m$.

Hence, the change in velocity of light observed when the light passes from the air to the glass, depends on the wavelength.

(a) A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in figure. In which of the following cases, after dispersion, the third colour from the top corresponds to the colour of the sky?



(b) When white light is allowed to pass through a glass prism, which colour deviates the least?

(c) When white light is allowed to pass through a glass prism, which colour deviates the most?

OR

Why does the sun appear white at noon?

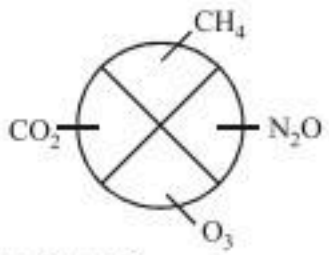
39. Read the following case/passage and answer the questions.

Nature provided us well-balanced environment in which there was a perfect harmony among the living organism in regard to food chain and the ecosystem was so well regulated that every organism was enjoying its full quota of a biotic factors with the advancement of mental ability, man become most dominant form of life or Earth to fulfill the requirement of ever increasing human population, man began to exploit natural resources through deforestation unplanned, profit oriented, capitalism and technological advancement. This led to the degradation of environment and appearance of different problems eg-solid waste, disposal, ozone depletion and other pollution related problems.

(i) The ozone layer absorbs what range of wavelength of the sun's radiation?

(ii) Now-a-days, which type of cups are being generally used in trains for serving tea/coffee/ soup etc. on daily basis?

(iii) Carefully observe the diagram(s) given below-



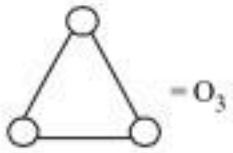
% concentration of which greenhouse gas is maximum?

(iv) Mention a prime health risk associated with greater UV radiation through the atmosphere due to the depletion of the ozone layer?

Solution

SAMPLE PAPER-2

1. **(a)** White silver chloride in sunlight turns to grey.
2. **(c)** Vanilla essence is an olfactory indicator. So, its smell is different in acid and basic media which can be detected easily by a visually impared student.
3. **(c)** Coal gas is obtained from destructive distillation of coal. Coal is allotropic form of carbon but not coal gas.
4. **(a)**
5. **(d)** Combustion of liquefied petroleum gas is a chemical change. As it is an irreversible reaction and new products (carbon dioxide and water vapours) are formed during the change. Also, a lot of heat is released during this reaction.
6. **(c)** Aqua regia is a 3:1 mixture of Conc. HCl and Conc. HNO_3.
7. **(d)** Calcium oxide (Lime, CaO) does not produce CO_2 gas when reacted with dilute acid while other given compounds are carbonates and hydrogen carbonates which can evolve CO_2 with dilute acids.
8. **(c)** Ozone is composed of three atoms of oxygen.



9. **(c)** Sometimes a few eipdermal cells in the vicinity of the gurad cells become specialised in their shape and size are known as subsididary cells or accessory cells.
10. **(c)** Involuntary activities such as breathing blinking, yawning, heart beat, digestion etc are controlled by mid brain and hind brain. (c) is hind brain and (d) is mid brain.
11. **(b)**
12. **(c)** Its phenotypic ratio will be 3:1
13. **(c)** If magnetic field lines are parallel and equidistant then it represents uniform magnetic field.
14. **(a)** To get the maximum resistance, all four resistors should be connected in series,

$$\therefore R = \frac{1}{2}\Omega + \frac{1}{2}\Omega + \frac{1}{2}\Omega + \frac{1}{2}\Omega = 2\Omega$$

15. **(a)** $Q = 150\ C, t = 60$ sec so, $I = \frac{Q}{t} = \frac{150}{60} = 2.5\ A$

16. **(d)** The field consists of concentric circles centred on the wire according to Maxwell's Right Hand Grip Rule.

17. **(c)** Ammonium nitrate is salt of strong acid and weak base.
18. **(d)** The bulbs are usually filled with chemically inactive gases. Nitrogen and oxygen gases are inactive and are filled in order to prolong the life of the filament. Thus, in this case, assertion is incorrect but the reason is correct.
19. **(a)** The receptors receive the neurotransmitters. These neurotransmitters stimulate action potential in the postsynaptic cell. Thus, transmission of nerve impulses across a synapse is through the release of neurotransmitters by the axon.
20. **(b)** Both Assertion and Reason are correct but Reason is not a correct explanation of Assertion.
The blood of an insect functions differently than the blood of a human. Insect blood, however, does not carry gases and has no haemoglobin which gives red colour to the blood.
21. Unsaturated hydrocarbons are more reactive due to the presence of C = C and C ≡ C bonds. These are the reactive sites in the unsaturated hydrocarbons. (2 marks)

OR

(i) Combination reaction are generally exothermic whereas decomposition reactions are endothermic. (1 mark)

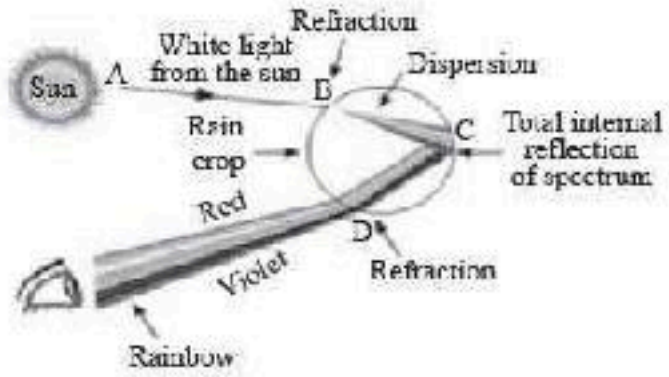
(ii) In a displacement reaction one element displaces another element from its compound, whereas in double displacement reaction two different atoms or group of atoms are exchanged. (1 mark)

22. By using two identical prisms, one placed inverted with respect to the other. (1 mark)

(1 mark)

OR

A rainbow is a band of seven colours extending from violet to red. It is formed by the combined effect of dispersion, reflection and refraction of the sunrays through raindrops. A rainbow is always formed in a direction opposite to that of the Sun, the water droplets act as a small prisms,they refract and disperse the sunlight, then reflect it internally and finally refract it again when it comes out of the raindrop. Due to dispersion of light and internal reflction, different colors reach the observer's eye. (2 marks)

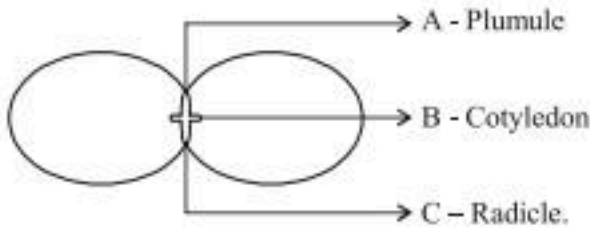


23. (i) Auxin (ii) Abscisic acid (1 + 1 marks)

24. (i) Plasma (1 + 1 marks)

(ii) Haemoglobin present in RBCs.

25.



(½ + ½ + ½ marks)

Cotyledons store food reserves in the seed. Hence it supply nutrition to the developing embryo. (½ mark)

26. Leaf notches.

27. (a) $KOH + HCl \longrightarrow KCl + H_2O$

(b) $2Al(OH)_3 + 3H_2SO_4 \longrightarrow Al_2(SO_4)_3 + 6H_2O$

(c) $2KOH + H_2SO_4 \longrightarrow K_2SO_4 + 2H_2O$

(1 × 3 = 3 marks)

28. (a) To obtain pure metal from an ore of high reactivity, following steps are involved :

(i) Concentration of ore for removal of impurities.

(ii) Electrolysis of molten ore, metal is obtained at cathode of the electrolytic cell. This metal obtained is pure metal e.g., Na, K, Mg, Ca. (2 marks)

(b) Magnesium reacts with hot water to form magnesium oxide and hydrogen gas is evolved. As the bubbles of hydrogen gas stick to pieces of magnesium and become lighter which makes them float. (1 mark)

29. (i) A convex mirror forms an erect, virtual and diminished image of an object placed anywhere in front of it. Thus, convex mirrors enable the driver to view much larger traffic behind him that would not be possible by a plane mirror. (1½ marks)

(ii) A concave mirror is used as a shaving or make-up mirror because it forms an erect andenlarged image of the face when it is held closer to the face. (1½ marks)

30. (a) The man is suffering from diabetes mellitus. The hormone is insulin. (½ + ½ marks)

Endocrine gland which secretes insulin is pancreas.

(b) The endorcrine gland that which secretes growth hormone is pituitary gland. (½ mark)

(i) Deficiency of growth hormone causes **dwarfism**.

(ii) Excess secretion of growth hormone causes **gigantism**.

31. (i) Ability of lens to converge or diverge the light rays. (1 mark)

(ii) + ve sign → converging lens/convex lens (½ mark)

– ve sign → diverging lens/concave lens (½ mark)

(iii) S.I. unit of power is dioptre

1 dioptre = 1/focal length (m) (1 mark)

32. (a) In figure (a) P – North Pole : Q – South Pole

(b) R – North Pole : S – South Pole

(2 marks)

(b) Magnetic field lines always starts from North Pole and end at South Pole. (1 mark)

OR

The force experienced by a current-carrying straight conductor placed in a uniform field is

(i) maximum when the conductor is placed perpendicular to the magnetic field. (1½ marks)

(ii) minimum when the conductor is placed parallel to the magnetic field. (1½ marks)

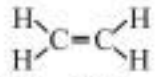
33. **Transport of materials in xylem:** The movement of water and minerals absorbed by the plants root from the soil through xylem elements-tracheids and vessels are transported to other parts of the plants. Transpiration helps in upward conduction of material. (1½ mark)

Transport of materials in phloem: Food synthesized in the leaves is transported through sieve tubes of phloem tissues to other parts both upwards and downwards. It is bidirectional. Answer is same for both options. (1½ mark)

34. (a) *n* indicates number of carbon atoms and 2*n* indicates number of hydrogen atoms.

(b) C_6H_{12}

(c) C_3H_6

(d) C_2H_4 

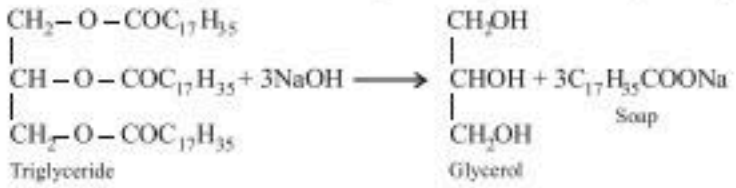
(e) Lower homologue – C_3H_6

Higher homologue – C_5H_{10} (1 × 5 = 5 marks)

OR

(i) Soaps are sodium or potassium salts of fatty acids while detergents are sodium salts of sulphonic acid. (2 marks)

(ii) Soaps do not work well with hard water, acidic and saline water while detergents work well. Glycerol is the byproduct of soap industry. (3 marks)



(2 marks)

35. Electric circuit: The closed path along which an electric current flows is called an 'electric circuit'. Electric cell, electric battery, electric generator are the devices that helps to maintain a potential difference across a conductor in a circuit are- (2 marks)

1 Volt: The potential difference between two points in an electric field is said to one volt if one joule of work has to be done in bringing a positive charge of one coulmb from one point to another. (1 mark)

$$1 \text{ volt} = \frac{1 \text{ joule}}{1 \text{ coulomb}} \quad \text{or} \quad 1\,V = \frac{1J}{1C}$$ (1 mark)

Work done $= V \times Q = 85 \times 2 = 170$ Joule. (1 mark)

36. (i) (1 marks)

Pollen Tube	Style
Pollen tube is the part of the male gametophyte in plant. It is a long tube like structure that takes the male gamete from the stigma to the ovules.	It is a part of the female reproductive organ, carpel. It connects the stigma to the ovary. It is made up of soft tissue which allows the pollen tube to grow downward towards the ovule.

(ii) **Binary fission in *Amoeba* :** A single cell divides itself into two daughter cell is known as binary fission, it can also occur in particular axis.

Multiple fission in *Plasmodium* : It is also a type of asexual reproduction in which a cell divides itself into many daughter cells simultaneously. It occurs in a definite orientation. e.g., yeast, malarial parasites. (1 mark)

(iii) **Regeneration** is of two types, in the first type, a part of the body that gets broken off or cut is regenerated. For example, lizards cast off their tails to escape predators and then regenerate them. The other type of regeneration involve to the capacity to give rise to an entire organism from a cut part. It is seen in small invertebrates such as *Planaria* and *Hydra*. (1 mark)

Fragmentation is also a type of asexual reproduction. It is the unintentional cutting up of the body of an organism in which each part grows into an organism. It is most commonly seen in some algae.

(iv) In *Hydra*, the cells divide rapidly at a specific site and develop as an outgrowth called a bud. These buds, while attached to the parent plant, develop into small individuals. When this individual becomes large enough, it detaches itself from the parent body to exist as an independent individual. (1 mark)

In the *Bryophyllum*, the leaves have small buds (as in potato). These buds are later converted into small plants which also have roots present on them. When these buds start growing further then the leaf becomes heavy and falls on the ground. Then the buds which are present on the leaf dumps into ground and form a new plant.

(v) **Vegetative propagation :** It is the ability of plants to reproduce by producing new plants from vegetative parts such as roots, stem, and leaves.

Spore formation : Spore formation is the mode of asexual reproduction in some organisms like fungi produce sporangia, which contains spores. The sporangia burst to release lots of spores and each of these spores germinates to produce a new individual. (1 mark)

37. (a) The reaction involved in the above experiement $MnO_2 + HCl \longrightarrow MnCl_2 + Cl_2\uparrow + 2H_2O$ (1 mark)

This is an example of redox reaction. (1 mark)

(b) The Cl_2 gas shows bleaching property with dry $Ca(OH)_2$. (1 mark)

$Ca(OH)_2 + Cl_2 \longrightarrow Ca(OCl)Cl + 2H_2O$ (1 mark)

Bleaching Powder.

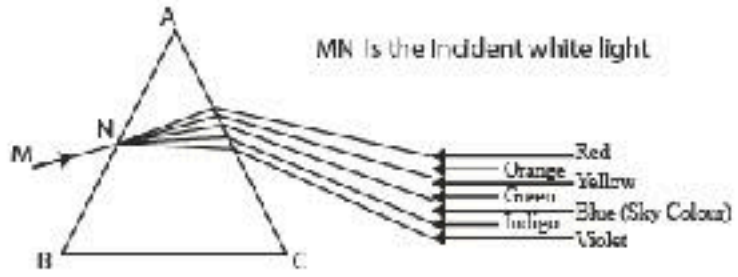
OR

$MnO_2 + GHCl \longrightarrow MnCl_2 + Cl_2 + 2H_2O$ (1 mark)

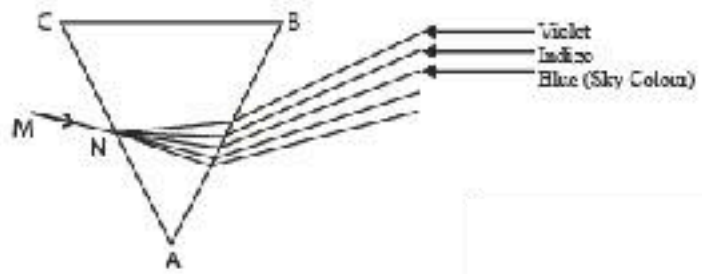
MnO_2 gets reduced and chlorine in HCl gets oxidized. So, the given statement is incorrect. (1 mark)

38. Generally, in case of a prism (i), the formation of spectrum is shown below

(a)



In the above figure, from top the third colour is yellow. But we can see that from bottom the third colour is blue (colour of sky). So, we can obtain the correct situation by inverting the prism. Thus the required orientations can be found in case (ii).



(2 marks)

(b) Red (1 mark)

(c) Violet (1 mark)

OR

At noon, light is least scattred. (1 mark)

39. (i) The ozone layer absorbs 97-99% of UV radiation in the wavelength range 200 to 315 nm. (1 mark)

(ii) Disposable paper cups are generally used in trains for serving tea or coffee on daily basis. (1 mark)

(iii) Carbon dioxide is the main long-lived greenhouse gas in the atmosphere related to human activities. (1 mark)

(iv) Due to the depletion of the ozone layer increases risk in skin cancer. (1 mark)