Science

Time: 3 Hours **Max. Marks: 80**

S. No.	Typology of Question	Very Short Answer (VSA) 1 Mark	Short Answer– I (SA I) 2 Marks	Short Answer– II (SA II) 2 Marks	Long Answer (LA) 5 Marks	Total Marks	% Weightage
1.	**Remembering**	2	-	1	1	10	15%
2.	**Understanding**	-	1	4	2	24	35%
3.	**Application**	-	1	2	2	18	26%
4.	**High Order Thinking Skills**	-	-	1	1	8	12%
5.	**Inferential and Evaluative**	-	1	1 + 1**	-	8	12%
	Total (Theory Based Questions)	2 × 1 = 2	3 × 2 = 6	10 × 3 = 30	6 × 5 = 30	68(21)	100%
	Practical Based Questions		6 × 2 = 12	-	-	12(6)	
	Total	2 × 1 = 2	9 × 2 = 18	10 × 3 = 30	6 × 5 = 30	80(27)	

1. Question paper will consist of 27 questions

2. All questions would be compulsory. However, an internal choice will be provided in two questions of 3 marks each and one question of 5 marks.

** One Question of 3 marks will be included to assess the values inherent in the texts.

SCIENCE

Time allowed: 3 hours **Maximum marks: 80**

General Instructions:

($\boldsymbol{i}$) The question paper comprises two sections, A and B. You are to attempt both the sections.
($\boldsymbol{ii}$) All questions are compulsory.
($\boldsymbol{iii}$) All questions of Section-A and B are to be attempted separately
($\boldsymbol{iv}$) There is an internal choice in three questions of three marks each, two questions of five marks each and one question of two marks each (practical skills).
($\boldsymbol{v}$) Question numbers 1 and 2 in Section-A are one-mark questions. They are to be answered in one word or in one sentence.
($\boldsymbol{vi}$) Question numbers 3 to 5 in Section-A are two marks questions. These are to be answered in 30 words each.
($\boldsymbol{vii}$) Question numbers 6 to 15 in Section-A are three marks questions. These are to be answered in about 50 words each.

($\boldsymbol{vii}$) Question numbers 16 to 21 in Section-A are five marks questions. These are to be answered in 70 words each.
($\boldsymbol{ix}$) Question numbers 22 to 27 in Section-B are based on practical skills. Each question is a two marks question.

These are to be answered in brief.

SECTION – A

1. What changes occur in the flower after fertilisation? 1

2. What is gametogenesis? 1

3. Why is it necessary to conserve our environment? 2

4. Write the respective chemical equations to show what happens when
   (i) ethanol is heated with concentrated sulphuric acid at 443 K ?
   (ii) ethanol reacts with ethanoic acid in the presence of an acid acting as a catalyst? 2

5. Why does a compass needle get deflected when brought near a magnet? 2

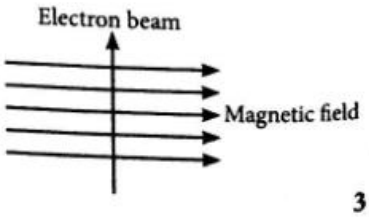
6. Explain how the energy of flowing water is related to solar energy. 3

   OR

   Describe the steps involved in obtaining biogas and explain what is meant by anaerobic decomposition. 3

7. What are the problems caused by the non-biodegradable waste that we generate? 3

8. An electron beam enters a uniform magnetic field at right angles to it as shown in figure. State the direction in which this electron beam will deflect. Name and state the principle we use to determine the direction of force experienced by the electron beam. What would happen if instead of electron beam, alpha particles enter the magnetic field with same velocity?



3

9. 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 light? Draw the diagram. 3

10. Two coils of resistance 3 Ω and 6 Ω are connected across battery of emf 12 V. Find the electrical energy consumed in 1 minute is each resistance when they are connected in series. Draw the circuit diagram. 3

    OR

    Draw the diagram of electric circuit containing a cell, a key, an ammeter, a resistor of 2 Ω in series with a combination of two resistors (4 Ω each) in parallel and a voltmeter across the parallel combination. Will the potential difference across the 2 Ω resistor be the same as that across the parallel combination of 4 Ω resistors? Give reason. 3

11. Elements have been arranged in the following sequence on the basis of their increasing atomic masses.

F, Na, Mg, Al, Si, P, S, Cl, Ar, K

(a) Pick two sets of elements which have similar properties.

(b) The given sequence represents which law of classification of elements? **3**

12. (a) What happens when a mixture of Cu_2O and Cu_2S is heated?

(b) Give the reactions involved during extraction of zinc from its ore by

(i) roasting of zinc ore

(ii) calcination of zinc ore. **3**

13. Geetika told some facts to her friend Ajeet regarding chemical reactions taking place in their surroundings like rusting of bicycle kept outside in rainy season and in human body like respiration, digestion, etc. She also asked Ajeet to observe few more changes taking place around him and to classify them into different types of changes.

Now, answer the following questions :

(i) Write the reactions involved during respiration and digestion in our body and identify the type of reactions.

(ii) Rusting of iron is a redox reaction. Explain and also write the chemical equation involved.

(iii) What are the values that Geetika showed? **3**

14. How is reflex arc formed? **3**

15. "An individual cannot pass on to its progeny the experiences of its life-time". Justify the statement with the help of an example and also give reason for the same. **3**

OR

With the help of suitable examples explain natural selection. **3**

16. (a) A myopic person has been using spectacles of power –1.0 diopter for distant vision. During old age he also needs to use separate reading glass of power +2.0 diopters. Explain what may have happened.

(b) A man with normal near point (25 cm) reads a book with small print using a magnifying glass, a thin convex lens of focal length 5 cm. What is the closest and farthest distance at which he can read the book when viewing through the magnifying glass. **5**

17. What is Joule's heating effect? How can it be demonstrated experimentally? List its four applications in daily life. 5

18. (a) What happens when

(i) slaked lime reacts with chlorine.

(ii) sodium hydrogen carbonate is heated.

(iii) gypsum is heated.

(b) Tooth enamel is one of the hardest substances in our body. How does it get damaged due to eating chocolates and sweets? What should we do to prevent it? 5

OR

A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identity X, Y, G and Z. 5

19. Name any five hormones secreted by human beings with its glands and functions. 5

20. Consider an element, ${}^{31}_{15}X$ and answer the following questions :

(i) What is its electronic configuration?

(ii) To which group does it belong?

(iii) To which period does it belong?

(iv) How many electrons are there in its valence shell?

(v) What is its valency?

(vi) Is it a metal or a non-metal? 5

21. (a) Draw a diagram of the human respiratory system and label on it: alveolar sac, bronchioles, larynx and trachea.

(b) How are the lungs designed in human beings to maximise the area of exchange of gases? 5

OR

Explain the mechanism of photosynthesis. 5

SECTION - B

22. A student took four test tubes I, II, III and IV containing aluminium sulphate, copper sulphate, ferrous sulphate and zinc sulphate solutions, respectively. He placed an iron strip in each of them. In which test tube, a brown deposit is formed? **2**

23. While studying saponification reaction for the preparation of soap, a teacher suggested to a student to add a small quantity of common salt to the reaction mixture. Write the function of common salt in this reaction. **2**

24. Name the type of asexual reproduction in which two individuals are formed from a single parent and the parental identity is lost. Draw the initial and the final stages of this type of reproduction. State the event with which this reproduction starts. **2**

25. Differentiate between binary fission and multiple fission. **2**

26. If the resistor of a known resistance value is replaced with a nichrome wire of 10 cm in length, how do the values of current through the nichrome wire and potential difference across the two ends of it change? How the values will change if the replaced wire is of manganin in place of nichrome? **2**

OR

In an electric circuit, a resistor of 5 Ω resistance is connected to a battery of 5 V through an ammeter and a plug key. Now, in this circuit, an another resistor of 10 Ω resistance is connected in series with 5 Ω resistor. Will there be any change in the ammeter reading? Find the change in the reading. **2**

27. While doing experiment to trace the path of a ray of light through a rectangular glass prism a student is not getting emergent ray in straight line. Suggest probable reasons for it. **2**

SOLUTION

1. After fertilisation the flower withers. The sepals and the petals dry up, the ovary converts into fruit, the ovule forms the seed and the zygote forms the embryo which is enclosed in the seed.

2. Formation of sperms in testes and ova in ovary is called gametogenesis.

3. It is necessary to conserve our environment in order to maintain ecological balance.

4. (i) $\underset{\text{Ethanol}}{C_2H_5OH} \xrightarrow[443\ K]{\text{Conc. } H_2SO_4} \underset{\text{Ethene}}{CH_2=CH_2} + H_2O$

(ii)

$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{C_2H_5OH} \xrightarrow[H_2SO_4]{\text{Conc.}} \underset{\substack{\text{Ethyl ethanoate}\\ \text{(ester, fruity smell)}}}{CH_3COOC_2H_5} + H_2O$$

This reaction is called esterification reaction.

5. A compass needle gets deflected when brought near a bar magnet because magnetic force is exerted by the bar magnet on the compass needle, which is itself a tiny pivoted magnet.

6. When solar energy falls on the water surface then evaporation of water from water surface like oceans, rivers and other water bodies takes place to form clouds. The clouds are then taken to distant places by air currents, and ultimately water comes back to the surface in the form of rain and snow. During evaporation, a part of solar energy gets converted into potential energy of water molecules. The potential energy of water molecules gets converted into kinetic energy during rain and snowfall. Thus, energy of water flowing in a river is considered to be an indirect form of solar energy.

OR

Following steps are involved in obtaining biogas:

(i) Mixing (slurry of cattle-dung and water)

(ii) Digesting (cattle-dung undergoing decomposition by anaerobic bacteria)

(iii) Formation of biogas (mixture of methane, CO_2, H_2 and H_2S)

(iv) Spent slurry (residue left after the formation of biogas)

The process by which the biomass changes into biogas in the absence of air due to an anaerobic microorganisms is termed as an anaerobic decomposition.

7. Non-biodegradable waste does not decompose under the action of bacteria and other microorganisms.

- When these substances, *e.g.*, polythene, plastics are buried under soil render that area barren and leads to soil pollutions.
- These wastes do not burn completely in presence of oxygen and release toxic gases which causes air pollution.
- The substances may be harmful on accumulating in food chain like DDT due to biomagnification.

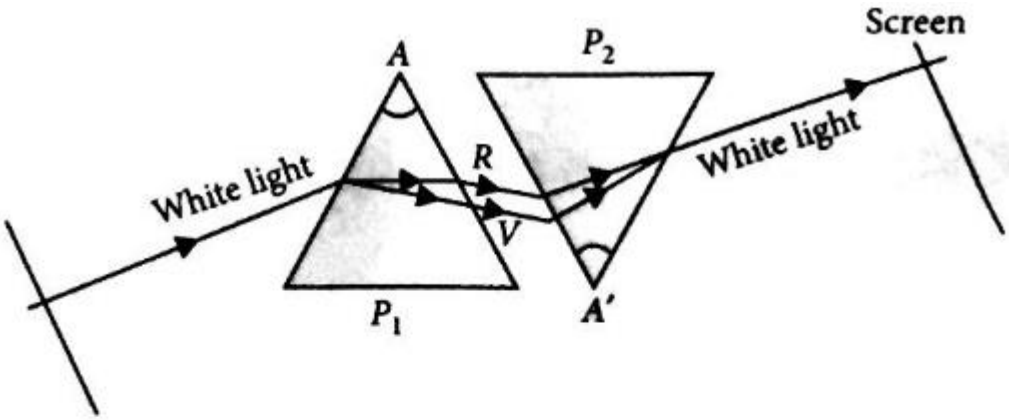
8. The electron beam will deflect in a direction perpendicular to the plane of paper, directed upwards.

Principle : Fleming left hand rule

Statement of the rule : Stretch the forefinger, the middle finger and the thumb of your left hand mutually perpendicular to each other. If the forefinger shows the direction of the magnetic field and the middle finger that of the current, then the thumb will point towards the direction of force experienced by the current carrying conductor.

If instead of an electron beam alpha particles enter, with the same velocity and in the same direction, they will deflect in the direction opposite to that of the electron beam, *i.e.*, in a direction perpendicular to the plane of paper, directed inwards.

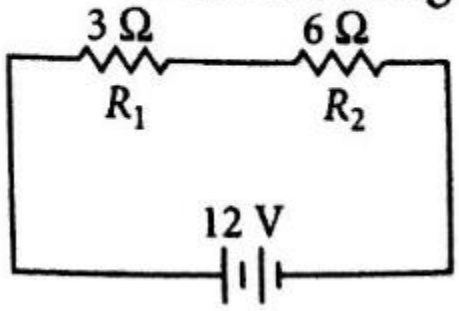
9.



Two identical prisms must be placed in such a way that the second prism in an inverted position with respect to the first prism.

When a narrow beam of white light is incident on first prism, it gets dispersed into its seven colour components i.e. VIBGYOR. Now, this spectrum of colours pass through the second prism which is in inverted position and a beam of white light emerges out of the second prism.

10. The required circuit is shown in figure.



Total resistance of the circuit, $R = 3\ \Omega + 6\ \Omega = 9\ \Omega$

Current in the circuit, $I = \dfrac{12\ \text{V}}{9\ \Omega} = \dfrac{4}{3}\ \text{A}$

Since the resistance are in series, same current flows in each resistance.

Electrical energy spent in $R_1 = I^2 R_1 t$

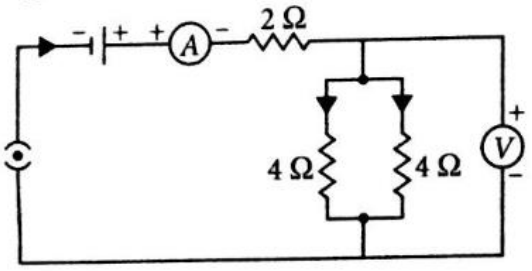
$$= \left(\frac{4}{3}\right)^2 \times 3 \times 60 = 320\ \text{J}$$

Electrical energy in $R_2 = I^2 R_2 t$

$$= \left(\frac{4}{3}\right)^2 \times 6 \times 60 = 640\ \text{J}$$

OR

Circuit Diagram



Yes, the potential difference across the 2 Ω resistor will be the same as across the parallel combination of two resistors of 4 Ω each. This is because the 2 Ω resistor and the parallel combination of 4 Ω resistors (whose equivalent resistance is also 2 Ω) are connected in series.

11. (a) Elements belong to same group have similar properties.

(i) F and Cl belong to group 17.

(ii) Na and K belong to group 1.

(b) The sequence represents Newland's law of octaves.

12. (a) $2Cu_2O + Cu_2S \xrightarrow{heat} 6Cu + SO_2$

This is known as auto-reduction of Cu_2O to give Cu.

(b) Roasting of zinc ore

$$2ZnS_{(s)} + 3O_{2(g)} \xrightarrow{heat} 2ZnO_{(s)} + 2SO_{2(g)}$$

(c) Calcination of zinc ore

$$ZnCO_{3(s)} \xrightarrow{heat} ZnO_{(s)} + CO_{2(g)}$$

13. (i) During digestion, starch present in food is broken down into a simple carbohydrate called glucose. Thus, it is a decomposition reaction.

$$\text{Starch} \xrightarrow{\text{Amylase}} n\text{Glucose}\ (C_6H_{12}O_6)$$

This glucose combines with oxygen in the cells of our body and provides energy and the reaction is called respiration.

$$\underset{\text{Glucose}}{C_6H_{12}O_6} + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{energy}$$

Respiration is highly exothermic reaction as a large amount of energy is released during this process.

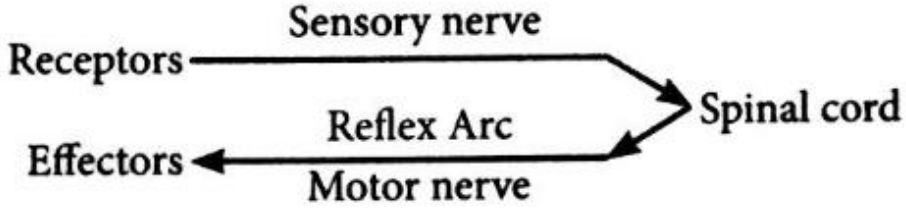
(ii) During rusting of iron, following reaction takes place :

$$\underset{\text{Iron}}{4Fe} + \underset{\text{Oxygen}}{3O_2} + \underset{\text{Water}}{2xH_2O} \longrightarrow \underset{\substack{\text{Hydrated} \\ \text{iron (III) oxide (rust)}}}{2Fe_2O_3.xH_2O}$$

It is a redox reaction as Fe^0 is getting oxidised to Fe^{3+} (loss of electrons) and O_2^0 is getting reduced to O^{2-} (gain of electrons).

(iii) Knowledge, self awareness and encourage others to explore.

14. A message or stimulus from receptor is relayed by sensory nerve to the spinal cord. It sends response through motor nerve to effectors for necessary action. This pathway is the reflex arc.



15. If we breed a group of mice, all the progeny of mice will have tails just like their parents. Now, if we remove the tails surgically and again breed them, we still get new mice with tails. This is because cutting the tails of mice does not change the genes of their reproductive cells (or gametes). And since the acquired trait of 'cut tails' does not bring about a change in the genes of mice, this trait cannot be passed on to their next generations. From this, we conclude that the experiences acquired by an individual during his lifetime (called acquired traits) cannot be passed on to its progeny, and hence cannot lead to evolution because they are not caused by the change in genes.

OR

Natural selection is the process by which organisms which are well adapted to the environment survive and reproduce and pass their successful characters to the next generation, while, organisms less adapted to the environment either fail to reproduce or die.

(i) When animals produce their progeny by sexual reproduction, some changes always appear in the progeny *i.e.*, one of the progeny may be tall (having long legs) than the other one. When there is no food (grass, short plants, etc.) available on the ground, the progeny having long legs can easily reach the leaves on tall trees, eat them as food and survive. While the progeny having short legs cannot reach the leaves on tall trees, do not get any food, starve and hence

die. Therefore, nature has selected the long-legged animals that will live enough to produce their offsprings. In course of evolution, the short legged animals evolved into long-legged animals due to favourable variations.

(ii) Birds evolved feathers as a means of providing insulation to their bodies in cold weather but later on these feathers became more useful for the purpose of flying. Hence, sometimes an evolutionary change produced in an organism for one purpose becomes more useful for an entirely different functions later.

16. (a) The given person is suffering from both myopia and hypermetropia due to the old age defect of eye called presbyopia. In this situation ciliary muscles become weak and are not able to carry out accommodation of eye lens properly.

(b) (i) For closest distance, image of book by the magnifying glass (convex lens) must be formed at 25 cm.

$\therefore \quad v = -25 \text{ cm}, f = +5 \text{ cm (convex)}$

So $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ or $\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = -\frac{1}{25} - \frac{1}{5} = \frac{-6}{25}$

$\therefore \quad u = -\frac{25}{6} = -4.2 \text{ cm}$

(ii) For farthest distance, image of book by the convex lens must be formed at infinity.

$\therefore \quad v = -\infty, f = +5 \text{ cm}$

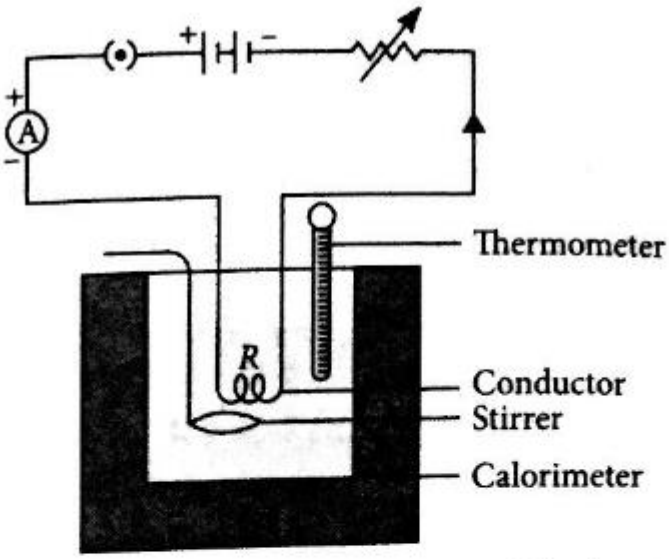
So $\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = -\frac{1}{\infty} - \frac{1}{5} = 0 - \frac{1}{5}$ or $u = -5 \text{ cm}$

17. Joule's heating effect: When an electric current is passed through a conductor, it becomes hot. This phenomenon is called heating effect of electric current. The amount of heat, H, produced in a conductor of resistance R, on passing a current I, for a time t, is given as :

$$H = I^2Rt$$

This is known as Joule's law of heating.

Experimental demonstration of Joule's heating effect : Adjust the apparatus as shown in diagram. In this a conductor of resistance, R is immersed in water filled in the calorimeter. The two ends of the conductor are connected to a plug key, battery, an ammeter and a rheostat. When the plug key is closed, adjust the rheostat allowing current I to flow through the conductor of resistance R, for a time t. Unplug the key and note the rise in temperature.



Here, the electrical energy consumed by heat = I^2Rt

Heat developed by the conductor, H, is given by the sum of the heat gained by the calorimeter with stirrer and water.

It is found that $H = I^2Rt$.

Thus, the Joule's law of heating is verified.

Applications of Joule's heating effect : Electric heater, electric geyser, electric oven, electric toaster, etc.

18. (i) Bleaching powder is formed.

$$\underset{\text{Slaked lime}}{Ca(OH)_2} + \underset{\text{Chlorine}}{Cl_2} \longrightarrow \underset{\text{Bleaching powder}}{CaOCl_2} + \underset{\text{Water}}{H_2O}$$

(ii) Sodium carbonate is formed.

$$\underset{\text{Sodium bicarbonate}}{2NaHCO_3} \xrightarrow{\text{Heat}} \underset{\text{Plaster of Paris}}{Na_2CO_3} + \underset{\text{Water}}{H_2O} + CO_2$$

(iii) Plaster of Paris is formed.

$$\underset{\text{Gypsum}}{CaSO_4 \cdot 2H_2O} \xrightarrow{\text{Heat}} \underset{\text{Plaster of Paris}}{CaSO_4 \cdot \frac{1}{2}H_2O} + \underset{\text{Water}}{\frac{3}{2}H_2O}$$

Tooth enamel is made up of calcium phosphate, $Ca_3(PO_4)_2$, which gets corroded when the pH in the mouth becomes lower than 5.5, when we eat chocolates and sweets and results in tooth decay.

This can be prevented by cleaning the mouth after eating sugary foods. We can also use toothpastes which are alkaline and neutralise the excess acid and hence prevent tooth decay.

The gas evolved at anode during electrolysis of brine is chlorine. When Cl_2 is passed through dry $Ca(OH)_2$, bleaching powder is produced which is used for disinfecting drinking water.

$$\underset{(Y)}{Ca(OH)_2} + \underset{(G)}{Cl_2} \longrightarrow \underset{(Z)}{CaOCl_2} + H_2O$$

Since Y and Z are calcium salts, X is also a calcium salt and is calcium carbonate.

$$\underset{(X)}{CaCO_3} + 2HCl \longrightarrow CaCl_2 + CO_2 + H_2O$$

$$\underset{(Y)}{Ca(OH)_2} + CO_2 \longrightarrow \underset{(X)}{CaCO_3} + H_2O$$

19. The hormones with its glands and functions secreted by human beings are listed below :

(i) Growth hormones : Secreted by pituitary gland. It promotes the growth of long bones and muscles. Excess creation of hormones leads to gigantism, insufficient secretion leads to dwarfism.

(ii) Thyroxine : Secreted by thyroid gland.

Function : It regulates carbohydrates, proteins and fat metabolism, accelerates energy production, stimulates absorption of glucose.

(iii) Insulin : Secreted by pancreas.

Function : It controls the rate of oxidation of glucose. If insulin is not present, blood glucose level will keep rising.

(iv) Adrenaline : Secreted by adrenal gland.

Function : It is released at the time of stress and emotional disturbance. Excitement stimulates adrenaline secretion which increases heart beat, blood pressure and rate of respiration. It is called emergency hormone or fight hormone.

(v) Testesterone : Secreted by testis.

Function : It helps in the development of secondary sexual characters, *e.g.*, moustache, beard, etc.

20. (i) Atomic number of X is 15. Hence, its electronic configuration is 2, 8, 5.

(ii) It has 5 electrons in its valence shell hence, it belongs to group 15.

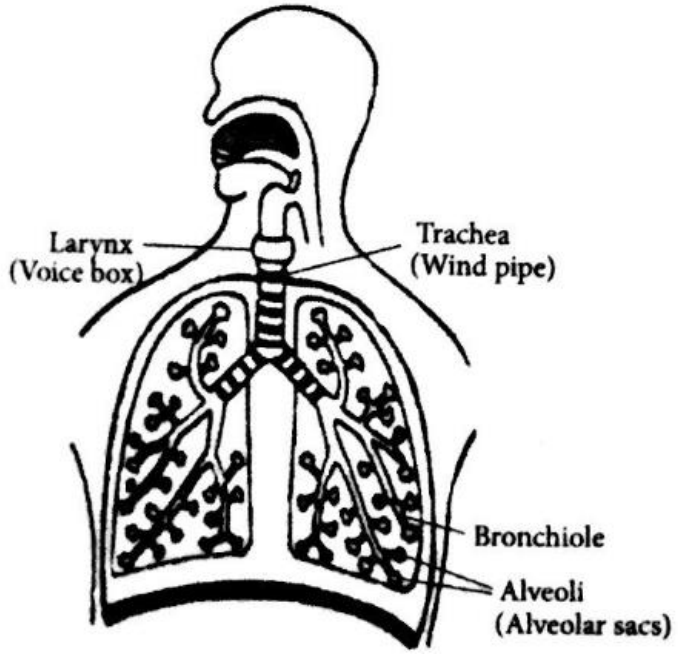
(iii) It has 3 electron shells, hence it belongs to 3rd period.

(iv) It has 5 valence electrons.

(v) Its valency is 3 $(8 - 5 = 3)$.

(vi) It is a non-metal because it has more than 3 electrons in its valence shell.

21. (a) The labelled diagram of human respiratory system is as follows:



(b) In gaseous exchange, the blood takes up oxygen from the alveolar air and releases CO_2 to the alveolar air. Such an exchange occurs because the concentration of O_2 is more in alveolar air and O_2 moves from higher concentration to lower concentration due to the process of diffusion. The blood has more concentration of CO_2 as compared to alveolar air. Thus, the CO_2 moves from blood to alveolar air due to simple diffusion. This exchange of gases results in the oxygenation of blood.

In times, the exchange of gases occurs between the oxygenated blood and the tissue cells. The concentration of O_2 is more in the blood and less in the tissue cells. So, the O_2 moves from blood to the tissues and CO_2 moves from tissues to the blood. The blood now becomes deoxygenated.

Heart receives this oxygen rich blood from lungs through pulmonary vein and distributes it to all body parts through arteries and collect carbon dioxide rich blood from all body parts through veins and takes it to lungs through pulmonary artery for oxygenation. Deoxygenated carbon dioxide rich air moves out from blood capillaries into the alveoli and is finally breathed out. Human lungs have a highly branched network of respiratory tubes. A primary bronchus divides into secondary bronchus, which in turn forms tertiary bronchus. Tertiary bronchus divides repeatedly into bronchioles which finally terminate into alveoli. Alveoli are small, rounded polyhedral pouches which are extremely thin-walled and possess a network of capillaries. Exchange of gases takes place in alveoli and hence an alveolus is called a miniature lung.

The alveoli provide a vast surface area where exchange of gases can take place. Oxygen diffuses from alveoli into pulmonary blood capillaries and CO_2 diffuses out from capillaries into alveoli.

OR

Photosynthesis is the chemical process by which green plants synthesise organic compounds from carbon dioxide and water in the presence of sunlight.

Mechanism of photosynthesis : The process of photosynthesis involves two sets of reactions: (a) Light reactions and (b) Dark reactions

(a) Light reactions : These are light dependent reactions and take place in the grana part of chloroplast.

(i) The pigment chlorophyll absorbs light energy, which in turn is used in splitting of water molecule into hydrogen, proton (H^+) and electron (e^-), molecular oxygen is evolved. This is called photolysis of water.

(ii) The electrons, protons and hydrogen released above are used up in production of NADPH and ATP.
(iii) NADPH and ATP are together known as assimilatory powers.

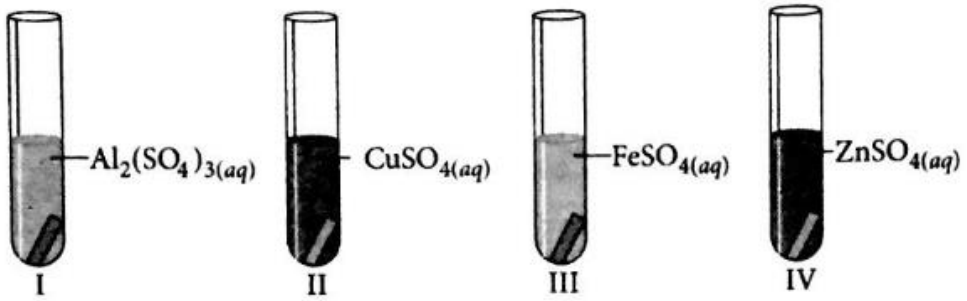
(b) Dark reactions : This set of reactions takes place in the stroma part of chloroplast in the presence of light as well as in dark. Light is not essential for this phase.

(i) CO_2 reacts with 6-RuBP (Ribulose biphosphate) utilising ATP and NADPH (assimilatory powers) and they undergo cyclic changes.

(ii) As a result, glucose ($C_6H_{12}O_6$) is produced and RuBP is regenerated.

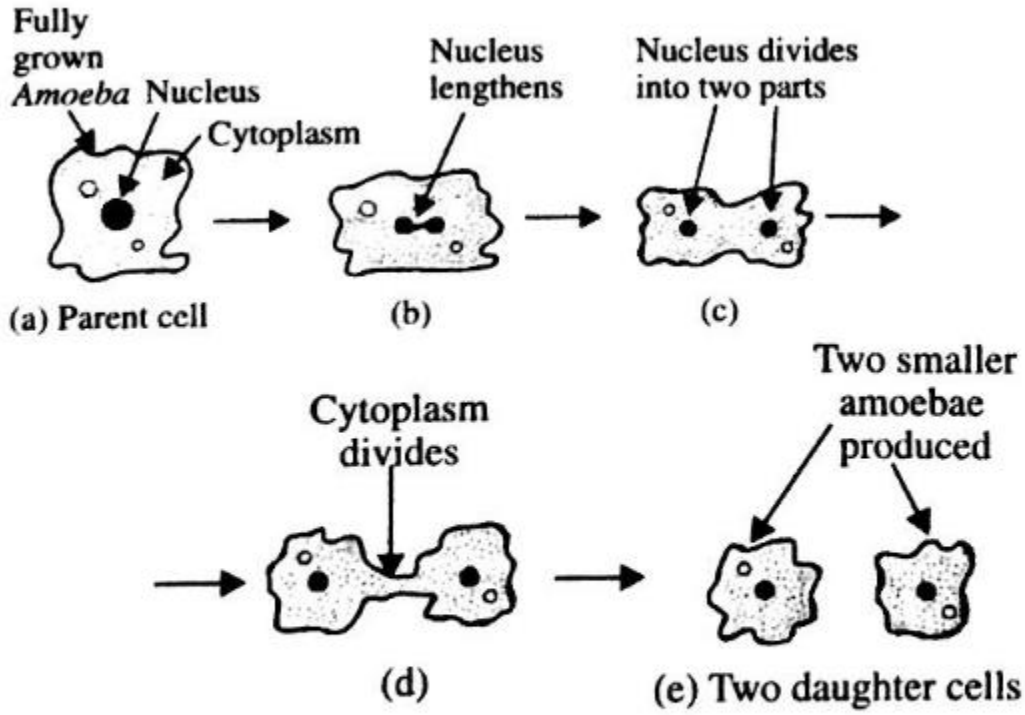
(iii) Excess glucose molecules which are not used up in energy production, at the time are stored in the form of starch.

22. A brown deposit is formed in test tube II because iron being less reactive does not displace metals from the solutions of $Al_2(SO_4)_3$ and $ZnSO_4$ but it is more reactive than Cu. So, it displaces copper from $CuSO_4$ solution and forms $FeSO_4$ which is green in colour and a brown deposit of copper metal is obtained.



23. Common salt is added in saponification reaction, as it helps in the precipitation of soap by decreasing the solubility of soap.

24. Binary fission is the type of asexual reproduction where two individuals are formed from a single parent and parental identity is lost. The unicellular organisms like, *Amoeba*, *Paramecium*, etc., reproduce through binary fission. This process starts with karyokinesis. When the *Amoeba* cell grows fully and reaches its maximum size, then first the nucleus of *Amoeba* lengthens and divides into two parts.



25. The differences between binary fission and multiple fission are as follows :

Binary fission	Multiple fission
One parent cell divides into two equal sized daughter individuals. Examples : *Amoeba* and *Paramecium*	Parent cell divides into several equal sized daughter individuals. Example : *Plasmodium*

26. The resistivity of an alloy is generally higher than that of metals. Therefore, by replacing the known resistance value resistor with nichrome wire, the value of current through nichrome wire will decrease and potential difference across its two ends will increase. The resistivity of manganin wire is 44×10^{-8} Ω m while that of nichrome wire is 100×10^{-8} Ω m. So, manganin wire offers less resistance as compared to the nichrome wire for the same length and same area of cross-section. Hence, the value of current through the manganin wire will increase and the potential difference across its ends will decrease as compare to nichrome wire.

OR

The reading of ammeter when 5 Ω resistor is connected in the electric circuit is

$$I_1 = \frac{V}{R_1} = \frac{5}{5} = 1\ \text{A} \qquad (\because\ V = 5\ \text{V}, R_1 = 5\ \Omega)$$

When 10 Ω resistor is connected in series with 5 Ω resistor, the equivalent resistance in series will be,

$$\therefore \quad R = R_1 + R_2 = 5\ \Omega + 10\ \Omega = 15\ \Omega$$

In this situation, ammeter reading is

$$I_2 = \frac{V}{R} = \frac{5}{15} = \frac{1}{3}\ \text{A}$$

Therefore, there will be change in the ammeter reading which is $I_1 - I_2 = 1 - \frac{1}{3} = \frac{2}{3}\ \text{A}$

Therefore, there will be change in the ammeter reading which is $I_1 - I_2 = 1 - \frac{1}{3} = \frac{2}{3}\ \text{A}$

27. Probable reasons for not getting emergent ray in straight line are as follows :

(i) pins used to trace the path were not exactly vertical.

(ii) pins used to trace the path were not in straight line.