CBSE Class 10 Science(Set 31/5/2) Question Paper with Solutions

Time Allowed :3 Hours	**Maximum Marks :**70	**Total questions :**37

General Instructions

Read the following instructions very carefully and strictly follow them:

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers,
5. The paper has four Sections.
6. Section A is compulsory - All questions in Section A must be answered.
7. You must attempt one question from each of the Sections B, C and D and one other question from any Section of your choice.
8. The intended marks for questions or parts of questions are given in brackets [ ].

---

1. In human beings, the implantation of fertilised egg takes place in which part of female reproductive system?

(A) Oviduct

(B) Cervix

(C) Uterus

(D) Vagina

Correct Answer: (C) Uterus

Solution:

Concept: Implantation is the process by which a fertilised egg (zygote) attaches itself to the wall of the female reproductive organ to begin development into an embryo.

Explanation:

- Fertilisation occurs in the oviduct (fallopian tube).
- The fertilised egg divides repeatedly to form a multicellular structure called a blastocyst.
- This structure travels to the uterus.
- It gets embedded in the thick, vascular lining of the uterus (endometrium).

Why Other Options Are Incorrect:

- (A) Oviduct → Site of fertilisation, not implantation.
- (B) Cervix → Lower part of uterus, not implantation site.
- (D) Vagina → Passage for birth and intercourse.

Conclusion: Implantation of the fertilised egg takes place in the uterus, where it attaches to the uterine lining and develops into an embryo.

Quick Tip

Fertilisation → Oviduct. Implantation → Uterus.

---

2. Yeast multiplies by which of the following methods?

(A) Fragmentation

(B) Binary Fission

(C) Multiple Fission

(D) Budding

Correct Answer: (D) Budding

Solution:

Concept: Yeast is a unicellular fungus that reproduces asexually by forming a small outgrowth from the parent cell. This process is called budding.

Explanation:

- In budding, a small bulge or bud appears on the parent yeast cell.
- The nucleus divides and one daughter nucleus moves into the bud.
- The bud grows and eventually separates to form a new yeast cell.

Why Other Options Are Incorrect:

- (A) Fragmentation → Seen in organisms like *Spirogyra*.
- (B) Binary fission → Common in bacteria and amoeba.
- (C) Multiple fission → Seen in organisms like *Plasmodium*.

Conclusion: Yeast multiplies by budding, where a new individual develops as a small outgrowth from the parent cell.

Quick Tip

Yeast reproduction = Budding. Small bud forms → Grows into new cell.

---

3. Identify the part that controls the closing and opening of the stomatal pore in leaves of plants. Select the correct option.

(A) Stomata
(B) Epidermal cells
(C) Guard cells
(D) Chloroplasts

Correct Answer: (C) Guard cells

Solution:

Concept: Stomata are tiny pores present on the surface of leaves that help in gas exchange and transpiration. The opening and closing of these pores are regulated by specialized cells.

Explanation:

- Each stomatal pore is surrounded by two kidney-shaped cells called guard cells.
- Guard cells control the opening and closing of stomata by changing their turgor pressure.
- When guard cells absorb water, they swell and the pore opens.
- When they lose water, they shrink and the pore closes.

Why Other Options Are Incorrect:

- (A) Stomata $\rightarrow$ The pore itself, not the controlling structure.
- (B) Epidermal cells $\rightarrow$ General surface cells, not specialized for control.
- (D) Chloroplasts $\rightarrow$ Organelles for photosynthesis.

Conclusion: Guard cells regulate the opening and closing of stomatal pores by controlling their turgor pressure.

Quick Tip

Stomatal control = Guard cells. Turgor change $\rightarrow$ Pore opens or closes.

---

4. Choose the equation of reaction that correctly represents anaerobic respiration in muscles:

(A) Glucose $\rightarrow$ Pyruvate $\xrightarrow{\text{Absence of } O_2}$ Ethanol + CO_2 + Energy

(B) Glucose $\xrightarrow{O_2}$ Pyruvate $\xrightarrow{O_2}$ Energy

(C) Glucose $\xrightarrow{O_2}$ Pyruvate $\xrightarrow{\text{Lack of oxygen}}$ Ethanol + Energy

(D) Glucose $\rightarrow$ Pyruvate $\xrightarrow{\text{Lack of oxygen}}$ Lactic acid + Energy

Correct Answer: (D)

Solution:

Concept: Anaerobic respiration is the breakdown of glucose in the absence of oxygen. In human muscle cells, this process leads to the formation of lactic acid.

Explanation:

- During intense exercise, oxygen supply to muscles becomes insufficient.
- Glucose is first converted into pyruvate.
- In the absence of oxygen, pyruvate is converted into lactic acid with release of a small amount of energy.

Correct Reaction:

$$\text{Glucose} \rightarrow \text{Pyruvate} \xrightarrow{\text{Lack of oxygen}} \text{Lactic acid} + \text{Energy}$$

Why Other Options Are Incorrect:

- (A) Ethanol formation occurs in yeast, not in human muscles.
- (B) Represents aerobic respiration (presence of oxygen).
- (C) Ethanol formation again applies to yeast fermentation.

Conclusion: In human muscles, anaerobic respiration produces lactic acid and energy in the absence of oxygen.

Quick Tip

Anaerobic respiration in muscles $\rightarrow$ Lactic acid formation. Yeast $\rightarrow$ Ethanol, Humans $\rightarrow$ Lactic acid.

---

5. Which of the following is a non-biodegradable pollutant?

(A) Paper

(B) DDT

(C) Wood

(D) Vegetable peel

Correct Answer: (B) DDT

Solution:

Concept: Pollutants are substances that contaminate the environment. They can be biodegradable or non-biodegradable depending on whether microorganisms can decompose them.

Explanation:

- **Biodegradable pollutants** can be broken down by microorganisms (e.g., paper, wood, vegetable peels).
- **Non-biodegradable pollutants** cannot be decomposed easily and persist in the environment for a long time.

About DDT:

- DDT (Dichloro-Diphenyl-Trichloroethane) is a synthetic pesticide.
- It does not decompose naturally and accumulates in the food chain.
- Causes biomagnification and environmental harm.

Conclusion: DDT is a non-biodegradable pollutant because it does not break down naturally and persists in the environment.

Quick Tip

Natural waste = Biodegradable. Chemicals like DDT = Non-biodegradable.

---

6. When a human egg is fertilized by a sperm having 'Y' chromosome, the zygote has the following combination of chromosomes:

(A) 44 + XX

(B) 22 + XX

(C) 44 + XY

(D) 22 + XY

Correct Answer: (C) 44 + XY

Solution:

Concept: Human body cells contain 46 chromosomes:

- 44 autosomes
- 2 sex chromosomes (XX or XY)

Explanation:

- The egg always carries 22 autosomes + X chromosome.
- A sperm can carry either:
  - 22 + X $\rightarrow$ Female child (XX)
  - 22 + Y $\rightarrow$ Male child (XY)
- If fertilization occurs with a Y-bearing sperm:

$$(22 + X) + (22 + Y) = 44 + XY$$

Conclusion: If a sperm carrying a Y chromosome fertilizes the egg, the zygote will have 44 autosomes and XY sex chromosomes, resulting in a male child.

Quick Tip

Egg always gives X. X sperm $\rightarrow$ XX (Female), Y sperm $\rightarrow$ XY (Male).

---

7. The reasons for excessive generation of wastes are:

(i) Use and throw policy. **(ii)** Increased availability of packaged food. **(iii)** Increased construction wastes. **(iv)** Non-sorting of dry and wet wastes.

Options:

(A) (i), (iii) and (iv)

(B) (i), (ii) and (iii)

(C) (i), (ii), (iii) and (iv)

(D) (ii), (iii) and (iv)

Correct Answer: (C) (i), (ii), (iii) and (iv)

Solution:

Concept: Excessive waste generation is mainly caused by modern lifestyle practices, urbanization, and improper waste management.

Explanation:

- **(i) Use and throw policy:** Increased use of disposable items like plastic and paper products leads to more waste.
- **(ii) Packaged food availability:** Packaged goods generate large amounts of plastic and non-biodegradable waste.
- **(iii) Construction waste:** Rapid urban development produces debris such as concrete, bricks, and metals.
- **(iv) Non-sorting of waste:** Mixing biodegradable and non-biodegradable waste increases landfill load and prevents recycling.

Conclusion: All the listed factors contribute to excessive waste generation, making option (C) correct.

Quick Tip

Modern lifestyle + Poor waste management = More waste generation.

---

8. Assertion (A): The peristaltic movements occur all along the gut. Reason (R): The lining of the gut has muscles that contract rhythmically to push the food in regulated manner.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

Correct Answer: (A)

Solution:

Explanation:

- Peristalsis is the rhythmic contraction and relaxation of muscles that pushes food along the digestive tract.
- This movement occurs throughout the alimentary canal (gut).
- The gut lining contains smooth muscles that contract rhythmically to move food forward.

Conclusion: Both the assertion and reason are true, and the reason correctly explains the assertion.

Quick Tip

Remember: *Peristalsis = rhythmic muscle movement of the gut*. If the reason mentions smooth muscle contractions pushing food forward, it correctly explains peristalsis.

---

9. Assertion (A): Bacteria produced as a result of asexual reproduction would be similar. Reason (R): There would be only minor differences between the bacteria generated due to small inaccuracies in DNA replication.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

Correct Answer: (A)

Solution:

Explanation:

- Asexual reproduction in bacteria produces genetically similar offspring.
- However, small variations may occur due to minor errors during DNA replication.
- These small inaccuracies explain why offspring are similar but not always identical.

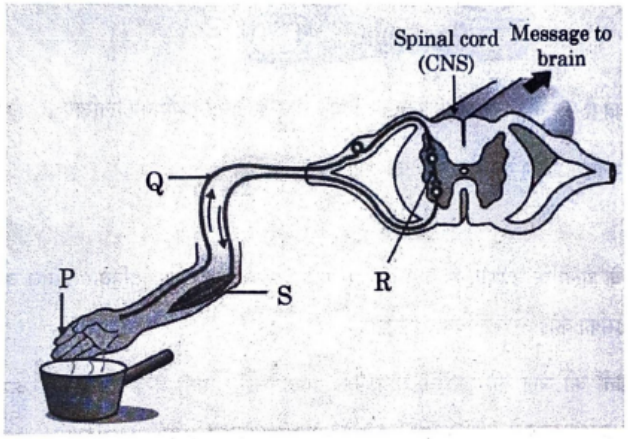
Conclusion: Both the assertion and reason are true, and the reason correctly explains the assertion.

Quick Tip

Asexual reproduction → Similar offspring. Minor DNA errors → Small variations.

---

10 (a) Observe the given figure and identify the labelled parts P, Q, R and S.



Solution:

Concept: The given diagram represents a reflex arc. A reflex arc is the pathway followed by nerve impulses during a reflex action. It involves receptors, sensory neurons, the spinal cord, motor neurons, and effectors.

Identification of Labelled Parts:

- **P** – Receptor (in skin)
- **Q** – Sensory neuron
- **R** – Spinal cord (relay neuron/interneuron)
- **S** – Motor neuron

Explanation:

- The receptor (P) detects the stimulus (hot object).
- The sensory neuron (Q) carries the impulse to the spinal cord.
- The spinal cord (R) processes the information through a relay neuron.
- The motor neuron (S) carries the response to the muscles (effector).

Quick Tip

Reflex arc pathway: Receptor → Sensory neuron → Spinal cord → Motor neuron → Effector.

---

10 (b) Which of the plant hormones are responsible for the following processes?

(i) Promote cell division (ii) Inhibition of growth (iii) Detection of light (iv) Wilting of leaves

Solution:

Concept: Plant hormones (phytohormones) regulate growth, development, and responses to environmental stimuli.

Answers:

- (i) **Promote cell division** → Cytokinins
- (ii) **Inhibition of growth** → Abscisic acid (ABA)

- (iii) **Detection of light** → Auxins
- (iv) **Wilting of leaves** → Abscisic acid (ABA)

Explanation:

- Cytokinins stimulate cell division in plants.
- Abscisic acid acts as a growth inhibitor and induces dormancy and wilting.
- Auxins help plants respond to light (phototropism).
- ABA causes stomatal closure leading to wilting under stress conditions.

Quick Tip

Cytokinin → Cell division. Auxin → Light response. ABA → Growth inhibition wilting.

---

11. Briefly mention the steps in double-circulation through human heart.

Solution:

Concept: Double circulation is the process in which blood passes through the heart twice during one complete cycle — once through pulmonary circulation and once through systemic circulation.

Steps in Double Circulation:

1. Pulmonary Circulation (Heart → Lungs → Heart):

1. Deoxygenated blood from the body enters the right atrium through the superior and inferior vena cava.
2. Blood flows from the right atrium to the right ventricle.
3. The right ventricle pumps blood to the lungs through the pulmonary artery.
4. In the lungs, carbon dioxide is exchanged for oxygen.
5. Oxygenated blood returns to the left atrium through the pulmonary veins.

2. Systemic Circulation (Heart → Body → Heart):

1. Oxygenated blood moves from the left atrium to the left ventricle.
2. The left ventricle pumps blood to the entire body through the aorta.
3. Body cells use oxygen and release carbon dioxide.
4. Deoxygenated blood returns to the right atrium through veins.

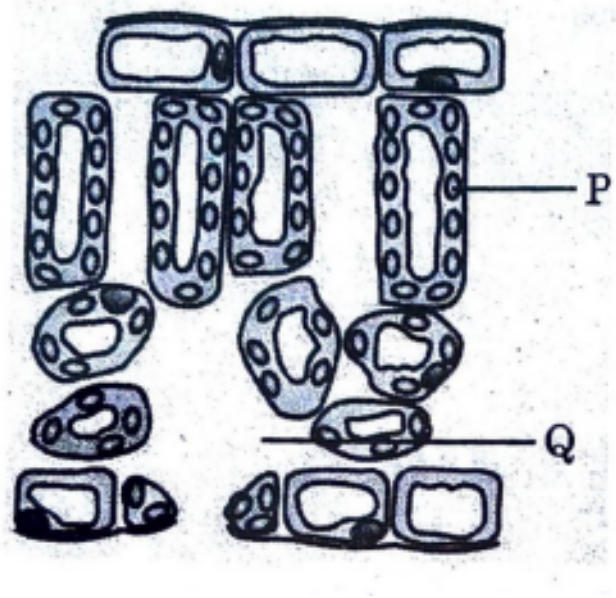
Conclusion: In double circulation, blood flows through the heart twice in one complete cycle — ensuring efficient oxygen supply and separation of oxygenated and deoxygenated blood.

Quick Tip

Double circulation = Pulmonary + Systemic circulation. Blood passes through heart twice in one cycle.

---

12. Given below is a diagrammatic representation of cross-section of a leaf:



(i) Identify 'P' in the given diagram and write down its role in plants. (ii) Write down a balanced equation of process of photo-synthesis.

Solution:

Concept: A leaf cross-section shows different layers involved in photosynthesis, including epidermis, mesophyll cells, vascular bundles, and stomata.

(i) Identification of 'P' and its Role:

P = Palisade mesophyll

Role:

- Palisade mesophyll cells contain a large number of chloroplasts.
- They are the main site of photosynthesis.
- These cells absorb maximum sunlight for food production.

(ii) Balanced Equation of Photosynthesis:

$$6CO_2 + 6H_2O \xrightarrow{\text{Sunlight, Chlorophyll}} C_6H_{12}O_6 + 6O_2$$

Conclusion: Palisade mesophyll is responsible for photosynthesis in leaves, and the balanced equation shows conversion of carbon dioxide and water into glucose and oxygen using sunlight.

Quick Tip

Palisade mesophyll = Main photosynthesis site. Photosynthesis: $CO_2 + H_2O \rightarrow$ Glucose + O_2 (sunlight).

---

13 (a) Mention any one harmful effect of using plastic bags on the environment. Suggest better alternatives to the usage of plastic bags.

Solution:

Harmful Effect: Plastic bags are non-biodegradable and remain in the environment for a long time, causing pollution and harm to animals and soil fertility.

Better Alternatives:

- Use cloth or cotton bags.

- Use jute or paper bags.
- Reusable biodegradable bags.

Conclusion: Replacing plastic bags with eco-friendly alternatives helps reduce pollution and protect the environment.

Quick Tip

Plastic bags = Non-biodegradable. Use cloth or jute bags for eco-friendly living.

---

13 (b) Paddy fields require a large amount of water. The pesticides and chemical fertilizers used are washed down into the soil or waterbodies. How do these chemicals reach our bodies? What is this phenomenon known as?

Solution:

Explanation:

- Chemical fertilizers and pesticides enter water bodies and soil through runoff.
- These chemicals are absorbed by plants or aquatic organisms.
- When humans consume these plants or animals, the chemicals enter our bodies through the food chain.
- Their concentration increases at higher trophic levels.

Name of the Phenomenon: Biomagnification

Conclusion: Harmful chemicals enter our bodies through the food chain, and their increasing concentration at successive trophic levels is called biomagnification.

Quick Tip

Toxins increase along food chain = Biomagnification.

---

14 (a) Mention the gland and the hormone secreted by it in scary situation in human beings.

Solution:

Gland: Adrenal gland

Hormone: Adrenaline (Epinephrine)

Explanation:

- In frightening or emergency situations, the adrenal glands release adrenaline.
- This prepares the body for "fight or flight" response.

Quick Tip

Fear or stress → Adrenal gland releases Adrenaline.

---

14 (b) Write two responses that enable the human body to be ready to deal with such situation.

Solution:

Responses of the Body:

- Increased heart rate and blood pressure.
- Faster breathing rate to supply more oxygen to muscles.
- Increased blood flow to muscles.
- Pupils dilate for better vision.

(Any two responses are acceptable.)

Conclusion: These physiological responses prepare the body to react quickly in dangerous or stressful situations.

Quick Tip

Adrenaline response = Faster heart rate + Rapid breathing + Alert body.

15 (a) Write the structure and function of Bowman's capsule.

Solution:

Structure:

- Bowman's capsule is a cup-shaped, double-walled structure.
- It surrounds the glomerulus in the nephron of the kidney.
- It forms the initial part of the renal tubule.

Function:

- It collects the filtrate formed by ultrafiltration of blood in the glomerulus.
- It allows water and small solutes (like urea, salts, glucose) to pass while retaining blood cells and proteins.

Quick Tip

Bowman's capsule = Cup-shaped part of nephron that collects filtrate from glomerulus.

15 (a) Write the structure and function of Bowman's capsule.

Solution:

Structure:

- Bowman's capsule is a cup-shaped, double-walled structure.
- It surrounds the glomerulus in the nephron of the kidney.
- It forms the initial part of the renal tubule.

Function:

- It collects the filtrate formed by ultrafiltration of blood in the glomerulus.
- It allows water and small solutes (like urea, salts, glucose) to pass while retaining blood cells and proteins.

Quick Tip

Bowman's capsule = Cup-shaped part of nephron that collects filtrate from glomerulus.

---

15 (c) What is excretion? Why is it necessary for any living organism?

Solution:

Definition: Excretion is the process of removal of metabolic waste products and toxic substances from the body.

Necessity:

- Removes harmful metabolic wastes like urea, carbon dioxide, and excess salts.
- Prevents accumulation of toxic substances in the body.
- Maintains internal balance (homeostasis).
- Helps proper functioning of cells and organs.

Quick Tip

Excretion removes metabolic wastes and maintains body balance.

OR 15 (c) State two similarities between lungs and kidneys.

Solution:

Similarities:

- Both are excretory organs that remove waste products from the body.
- Lungs remove carbon dioxide and water vapour, while kidneys remove urea and excess salts.
- Both help maintain internal balance of the body.

Quick Tip

Lungs and kidneys = Excretory organs helping maintain internal balance.

16 (A) (i) Sugarcane does not produce seeds so name the process through which it will be able to reproduce.

Solution:

Process: Vegetative propagation

Explanation: Sugarcane reproduces asexually through stem cuttings, where new plants grow from nodes of the stem.

Quick Tip

Sugarcane reproduces by vegetative propagation using stem cuttings.

(ii) List any two advantages of this method.

Solution:

Advantages:

- Produces genetically identical plants (true to parent).
- Faster method of reproduction.
- Useful for plants that do not produce viable seeds.

(Any two acceptable)

Quick Tip

Vegetative propagation = Fast and produces identical plants.

(iii) Besides sugarcane, give two more examples of plants that reproduce by this method.

Solution:

Examples:

- Potato

- Ginger
- Rose
- Bryophyllum

(Any two acceptable)

Quick Tip

Vegetative propagation examples: Potato, Ginger, Bryophyllum, Rose.

(iv) Why regeneration is not possible in all the types of animals?

Solution:

Explanation:

- Regeneration requires specialized cells capable of dividing and differentiating.
- Higher animals have complex body organization and specialized tissues.
- Most cells in higher animals cannot divide and form whole organisms.

Conclusion: Therefore, regeneration is limited to simpler organisms and not possible in all animals.

Quick Tip

Complex body structure limits regeneration in higher animals.

OR

16 (B) (i) State the changes taking place in the following structures of flower post fertilization:

(a) Zygote (b) Ovule (c) Ovary (d) Sepals

Solution:

Changes after Fertilization:

- (a) Zygote → Develops into embryo.
- (b) Ovule → Develops into seed.
- (c) Ovary → Develops into fruit.
- (d) Sepals → Usually wither and fall off (may persist in some plants).

Quick Tip

Post-fertilization: Zygote→Embryo, Ovule→Seed, Ovary→Fruit.

(ii) Define germination.

Solution:

Definition: Germination is the process by which a seed develops into a new plant under suitable conditions such as water, oxygen, and proper temperature.

Quick Tip

Germination = Seed grows into new plant under suitable conditions.

---

17. Which of the following set of compounds does not belong to same homologous series?

(A) CH_4 and C_4H_{10}

(B) C_2H_6 and C_3H_8

(C) C_3H_8 and C_5H_{12}

(D) C_4H_8 and C_5H_{12}

Correct Answer: (D) C_4H_8 and C_5H_{12}

Solution:

Concept: Compounds in the same homologous series have the same functional group and general formula and differ by a $–CH_2$ unit.

Explanation:

- Alkanes follow the general formula C_nH_{2n+2}.
- C_5H_{12} is an alkane (fits the formula).
- C_4H_8 follows C_nH_{2n}, which is the formula of alkenes.

Thus, they belong to different homologous series.

Conclusion: C_4H_8 and C_5H_{12} do not belong to the same homologous series.

Quick Tip

Same homologous series $\rightarrow$ Same general formula. Alkanes: C_nH_{2n+2}, Alkenes: C_nH_{2n}.

---

18. Which of the following is an amphoteric oxide?

(A) Na_2O

(B) K_2O

(C) CO_2

(D) Al_2O_3

Correct Answer: (D) Al_2O_3

Solution:

Concept: Amphoteric oxides are oxides that react with both acids and bases to form salt and water.

Explanation:

- Na_2O and K_2O are basic oxides.
- CO_2 is an acidic oxide.
- Al_2O_3 reacts with both acids and bases, showing amphoteric nature.

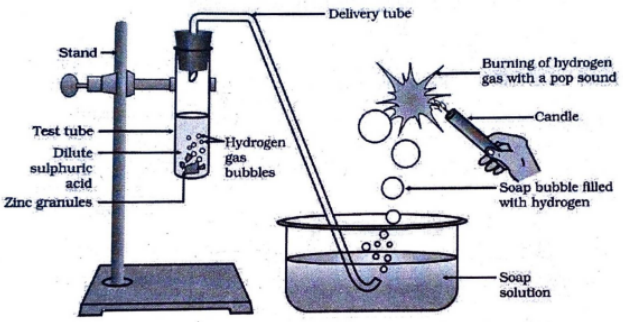
Conclusion: Aluminium oxide (Al_2O_3) is an amphoteric oxide.

Quick Tip

Amphoteric oxides react with both acids and bases (e.g., Al_2O_3, ZnO).

---

19. In the following diagram, if acetic acid of same concentration is taken in place of dilute sulphuric acid, then



(A) Same amount of H_2 gas will be evolved.

(B) H_2 gas will not be evolved.

(C) The amount of H_2 gas evolved will be less.

(D) In place of H_2 gas, O_2 gas will be evolved.

Correct Answer: (C) The amount of H_2 gas evolved will be less.

Solution:

Concept: Metals react with acids to produce hydrogen gas. The rate and amount of hydrogen evolved depend on the strength of the acid.

Explanation:

- Dilute sulphuric acid is a strong acid and ionizes completely in water.
- Acetic acid is a weak acid and ionizes only partially.
- Fewer H^+ ions are available in acetic acid compared to sulphuric acid.
- Hence, less hydrogen gas will be produced when acetic acid is used.

Conclusion: Since acetic acid is a weak acid, the amount of hydrogen gas evolved will be less compared to dilute sulphuric acid.

Quick Tip

Strong acid $\rightarrow$ More H_2 gas. Weak acid (like acetic acid) $\rightarrow$ Less H_2 gas.

---

20. The volume ratio of hydrogen and oxygen gases liberated during electrolysis of water is:

(A) 1 : 2

(B) 2 : 1

(C) 1 : 3

(D) 4 : 1

Correct Answer: (B) 2 : 1

Solution:

Concept: Electrolysis of water decomposes it into hydrogen and oxygen gases. The ratio of gases produced is based on the chemical equation.

Balanced Equation:

$$2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$$

Explanation:

- 2 molecules of hydrogen gas are produced for every 1 molecule of oxygen gas.
- Hence, the volume ratio of hydrogen to oxygen is 2 : 1.

Conclusion: During electrolysis of water, hydrogen and oxygen gases are produced in the ratio 2 : 1 by volume.

Quick Tip

Electrolysis of water $\rightarrow$ H_2 : O_2 = 2 : 1.

---

21. Study the following table and select the correct option: (A) NaCl from HCl (strong acid) and NaOH (strong base) $\rightarrow$ Neutral, not basic

(B) Na_2CO_3 from weak acid (H_2CO_3) and strong base $\rightarrow$ Basic, not

(C) Na_2SO_4 from strong acid and strong base $\rightarrow$ Neutral, not acidic

(D) CH_3COONa from weak acid (CH_3COOH) and strong base (NaOH) $\rightarrow$ Basic

Correct Answer: (D)

Solution:

Concept: The nature of a salt depends on the strength of the acid and base from which it is formed.

- Strong acid + Strong base $\rightarrow$ Neutral salt
- Strong acid + Weak base $\rightarrow$ Acidic salt
- Weak acid + Strong base $\rightarrow$ Basic salt

Analysis of Options:

- (A) NaCl from HCl (strong acid) and NaOH (strong base) $\rightarrow$ Neutral, not basic
- (B) Na_2CO_3 from weak acid (H_2CO_3) and strong base $\rightarrow$ Basic, not neutral
- (C) Na_2SO_4 from strong acid and strong base $\rightarrow$ Neutral, not acidic
- (D) CH_3COONa from weak acid (CH_3COOH) and strong base (NaOH) $\rightarrow$ Basic

Conclusion: Sodium acetate (CH_3COONa) is formed from a weak acid and a strong base, making it a basic salt.

Quick Tip

Weak acid + Strong base $\rightarrow$ Basic salt (e.g., CH_3COONa).

---

22. Which of the following will not undergo addition reaction?

(A) C_4H_8

(B) C_2H_2

(C) C_3H_8

(D) C_2H_4

Correct Answer: (C) C_3H_8

Solution:

Concept: Addition reactions occur in unsaturated hydrocarbons (alkenes and alkynes) that contain double or triple bonds. Saturated hydrocarbons (alkanes) do not undergo addition reactions.

Explanation:

- $C_4H_8 \rightarrow$ Alkene (unsaturated)
- $C_2H_2 \rightarrow$ Alkyne (unsaturated)
- $C_2H_4 \rightarrow$ Alkene (unsaturated)
- $C_3H_8 \rightarrow$ Alkane (saturated)

Conclusion: C_3H_8 is a saturated hydrocarbon and does not undergo addition reaction.

Quick Tip

Addition reactions occur in unsaturated hydrocarbons, not alkanes.

---

23. On reaction with dilute HCl, which of the following pair of metals will evolve hydrogen gas?

(A) Copper and zinc

(B) Copper and iron

(C) Silver and magnesium

(D) Magnesium and aluminium

Correct Answer: (D) Magnesium and aluminium

Solution:

Concept: Metals above hydrogen in the reactivity series react with dilute acids to produce hydrogen gas. Metals below hydrogen do not displace hydrogen from acids.

Explanation:

- Copper and silver are below hydrogen $\rightarrow$ Do not evolve H_2.
- Zinc, iron, magnesium, and aluminium are above hydrogen $\rightarrow$ Evolve H_2.
- Only the pair where both metals react is magnesium and aluminium.

Conclusion: Magnesium and aluminium react with dilute HCl and evolve hydrogen gas.

Quick Tip

Metals above hydrogen in reactivity series evolve H_2 with acids.

---

24. Assertion (A): Reaction of quick lime with water is an exothermic reaction. Reason (R): A large amount of heat is evolved on the reaction of quick lime and water.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

Correct Answer: (A)

Solution:

Concept: An exothermic reaction is one in which heat is released during the reaction.

Explanation:

- Quicklime (CaO) reacts with water to form slaked lime ($Ca(OH)_2$).

$$CaO + H_2O \rightarrow Ca(OH)_2 + \text{Heat}$$

- A large amount of heat is released in this reaction.
- Therefore, it is an exothermic reaction.

Conclusion: Both the assertion and reason are true, and the reason correctly explains why the reaction is exothermic.

Quick Tip

Quicklime + Water $\rightarrow$ Slaked lime + Heat (Exothermic reaction).

---

25. How is a universal indicator obtained? How is the wide range of pH of solution tested by it?

Solution:

Concept: A universal indicator is a mixture of several indicators that shows different colours at different pH values. It is used to determine the pH of a solution over a wide range.

How Universal Indicator is Obtained:

- It is prepared by mixing a number of indicators such as methyl orange, phenolphthalein, bromothymol blue, etc.
- Each indicator works over a different pH range.
- The combined mixture gives a gradual colour change across the full pH scale.

Testing Wide Range of pH using Universal Indicator:

1. A few drops of universal indicator are added to the solution.
2. The solution shows a specific colour depending on its pH.
3. The observed colour is compared with a standard pH colour chart.

4. This helps determine whether the solution is acidic, neutral, or basic and gives an approximate pH value (0–14).

Conclusion: A universal indicator is made by mixing several indicators and is used to test a wide pH range by comparing the colour change with a standard pH chart.

Quick Tip

Universal indicator = Mixture of indicators. Colour change + pH chart $\rightarrow$ Determine pH (0–14).

---

26. What happens when (i) Calcium carbonate is heated? (ii) Silver bromide is exposed to sunlight? (iii) Lead is added to copper (II) chloride solution?

Write balanced chemical equations of the reactions involved in support of your answer.

Solution:

(i) Heating of Calcium Carbonate:

Observation: Calcium carbonate decomposes into calcium oxide and carbon dioxide on heating.

Type of Reaction: Thermal decomposition reaction

$$\mathrm{CaCO_3}(s) \xrightarrow{\Delta} \mathrm{CaO}(s) + \mathrm{CO_2}(g)$$

(ii) Silver Bromide in Sunlight:

Observation: Silver bromide decomposes into silver and bromine in presence of sunlight, turning grey.

Type of Reaction: Photochemical decomposition reaction

$$2\mathrm{AgBr}(s) \xrightarrow{\text{Sunlight}} 2\mathrm{Ag}(s) + \mathrm{Br_2}(g)$$

(iii) Lead added to Copper (II) Chloride Solution:

Observation: Lead displaces copper from copper chloride solution, forming lead chloride and copper metal.

Type of Reaction: Displacement reaction

$$\text{Pb}(s) + \text{CuCl}_2(aq) \rightarrow \text{PbCl}_2(s) + \text{Cu}(s)$$

Conclusion: These reactions illustrate decomposition (thermal and photochemical) and displacement reactions with balanced chemical equations.

Quick Tip

Heating $\rightarrow$ Thermal decomposition. Sunlight $\rightarrow$ Photochemical reaction. Reactive metal $\rightarrow$ Displacement reaction.

---

27 (A)

(a) Give the chemical name and formula of Plaster of Paris.

Solution:

Chemical Name: Calcium sulphate hemihydrate

Formula: $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

Quick Tip

Plaster of Paris = Calcium sulphate hemihydrate.

(b) Write the chemical equation of its preparation.

Solution:

Plaster of Paris is prepared by heating gypsum.

$$\text{CaSO}_4 \cdot 2H_2O \xrightarrow{100-120^\circ C} \text{CaSO}_4 \cdot \frac{1}{2}H_2O + \frac{3}{2}H_2O$$

Quick Tip

Heating gypsum produces Plaster of Paris.

(c) Give any two uses of it.

Solution:

Uses of Plaster of Paris:

- Making casts to support fractured bones.
- Making statues, toys, and decorative materials.
- Used in false ceilings and moulds.

(Any two acceptable)

Quick Tip

POP uses: Medical casts and decorative items.

OR

27 (B)

(a) Name the acid present in ant's sting.

Solution:

Acid: Formic acid (Methanoic acid)

Quick Tip

Ant sting contains formic acid.

(b) Give reason:

(i) While diluting an acid, it is recommended that the acid should be added to water.

Solution:

Dilution of acid is highly exothermic. Adding acid slowly to water allows heat to dissipate safely and prevents splashing or explosion.

Quick Tip

Always add acid to water to avoid splashing due to heat.

(ii) Baking soda is used as an antacid.

Solution:

Baking soda ($NaHCO_3$) is basic in nature and neutralizes excess stomach acid, providing relief from acidity and indigestion.

Quick Tip

Baking soda neutralizes excess acid, so it works as an antacid.

---

28 (a) Write structural formula and name of 4^{th} member of alcohol homologous series.

Solution:

Homologous Series: Alcohols follow the general formula $C_nH_{2n+1}OH$.

First four members:

- $1^{st} \rightarrow$ Methanol (CH_3OH)
- $2^{nd} \rightarrow$ Ethanol (C_2H_5OH)
- $3^{rd} \rightarrow$ Propanol (C_3H_7OH)
- $4^{th} \rightarrow$ Butanol (C_4H_9OH)

Name: Butanol

Structural Formula: $CH_3–CH_2–CH_2–CH_2OH$

Quick Tip

4^{th} alcohol = Butanol (C_4H_9OH).

(b) What happens when ethanol is heated with alkaline $KMnO_4$? Write chemical equation involved.

Solution:

Observation: Ethanol is oxidized to ethanoic acid by alkaline potassium permanganate.

Reaction:

$$CH_3CH_2OH + [O] \xrightarrow{KMnO_4} CH_3COOH + H_2O$$

Explanation: $KMnO_4$ acts as an oxidizing agent and converts alcohol into a carboxylic acid.

Quick Tip

$KMnO_4$ oxidizes ethanol $\rightarrow$ Ethanoic acid.

(c) Write the chemical equation of reaction of ethanol with ethanoic acid in the presence of concentrated H_2SO_4. Write the name of this reaction.

Solution:

Reaction:

$$CH_3COOH + C_2H_5OH \xrightarrow{\text{conc. } H_2SO_4} CH_3COOC_2H_5 + H_2O$$

Name of Reaction: Esterification reaction

Explanation: Ethanol reacts with ethanoic acid to form an ester (ethyl ethanoate) with a fruity smell.

Quick Tip

Alcohol + Acid $\rightarrow$ Ester (Esterification).

OR

(c) What happens when ethanol is heated with excess concentrated sulphuric acid at 443 K? Write chemical equation involved. What is the role of concentrated sulphuric acid in this reaction?

Solution:

Observation: Ethanol gets dehydrated to form ethene.

Reaction:

$$C_2H_5OH \xrightarrow{443\,K,\,conc.\,H_2SO_4} C_2H_4 + H_2O$$

Role of Concentrated H_2SO_4:

- Acts as a dehydrating agent.
- Removes water from ethanol to form ethene.

Quick Tip

Conc. H_2SO_4 at 443 K $\rightarrow$ Dehydration of ethanol to ethene.

---

29 (A)

(i) Give reasons for the following:

(I) Ionic compounds have generally high melting points and boiling points.

Solution:

Ionic compounds have strong electrostatic forces of attraction between oppositely charged ions. A large amount of energy is required to break these forces, resulting in high melting and boiling points.

Quick Tip

Strong ionic bonds $\rightarrow$ High melting and boiling points.

---

29 (A)

(i) Give reasons for the following:

(I) Ionic compounds have generally high melting points and boiling points.

Solution:

Ionic compounds have strong electrostatic forces of attraction between oppositely charged ions. A large amount of energy is required to break these forces, resulting in high melting and boiling points.

Quick Tip

Strong ionic bonds $\rightarrow$ High melting and boiling points.

(II) Solder, an alloy of lead and tin, is used for welding electrical wires.

Solution:

Solder has a low melting point and good electrical conductivity. It melts easily and solidifies quickly, forming a strong and conductive joint between wires.

Quick Tip

Solder has low melting point and good conductivity, ideal for joining wires.

(III) Carbon cannot reduce the oxides of Na or Mg.

Solution:

Sodium and magnesium are highly reactive metals and lie above carbon in the reactivity series. Hence, carbon cannot reduce their oxides.

Quick Tip

Carbon reduces oxides of less reactive metals only.

(III) Carbon cannot reduce the oxides of Na or Mg.

Solution:

Sodium and magnesium are highly reactive metals and lie above carbon in the reactivity series. Hence, carbon cannot reduce their oxides.

Quick Tip

Carbon reduces oxides of less reactive metals only.

(ii) Give reasons for the following:

(I) The wires carrying current in homes have a coating of PVC.

Solution:

PVC is an electrical insulator. It prevents electric shocks and protects wires from moisture and damage.

(II) To make hot water tanks, copper is used and not steel.

Copper is less reactive and a better conductor of heat. It does not corrode easily, making it suitable for hot water tanks.

Quick Tip

PVC = Insulator. Copper = Good conductor and corrosion resistant.

(iii) Show the formation of ionic compound CaO with electron dot structure.

Solution:

Atomic numbers: Ca = 20, O = 8

Electronic configuration:

- Ca = 2, 8, 8, 2 (loses 2 electrons)
- O = 2, 6 (gains 2 electrons)

Formation: Calcium transfers two electrons to oxygen forming Ca^{2+} and O^{2-}.

$$Ca \rightarrow Ca^{2+} + 2e^{-}$$

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

Result: Ca^{2+} and O^{2-} combine to form CaO.

Quick Tip

Ca loses $2e^-$, O gains $2e^- \rightarrow$ Ionic bond forming CaO.

---

30. To restore clear vision in persons whose size of the eyeball has reduced, he/she is suggested to use suitable

(A) Converging lens

(B) Diverging lens

(C) Bifocal lens

(D) Cylindrical lens

Correct Answer: (A) Converging lens

Solution:

Concept: A reduced eyeball size causes hypermetropia (long-sightedness), where distant objects are clear but nearby objects are blurred.

Explanation:

- In hypermetropia, the image forms behind the retina.
- A converging (convex) lens converges light rays before they enter the eye.
- This helps form the image on the retina, restoring clear vision.

Conclusion: A converging (convex) lens is used to correct vision when the eyeball size is reduced.

Quick Tip

Hypermetropia $\rightarrow$ Use convex (converging) lens.

31. Rays from the sun converge at a point 25 cm behind a convex lens. The distance at which an object be placed in front of the lens to get a virtual image, is:

(A) 20 cm

(B) 40 cm

(C) 50 cm

(D) More than 50 cm

Correct Answer: (A) 20 cm

Solution:

Concept: Parallel rays from the sun focus at the focal point of a convex lens. So focal length, $f = 25$ cm.

Key Rule: A convex lens forms a virtual image only when the object is placed within the focal length (i.e., object distance $<$ focal length).

Analysis of Options:

- 20 cm $<$ 25 cm $\rightarrow$ Virtual image possible
- 40 cm, 50 cm, more than 50 cm $\rightarrow$ Object beyond focal length $\rightarrow$ Real image

Conclusion: The object must be placed closer than the focal length, so 20 cm is correct.

Quick Tip

Convex lens gives virtual image only when object is within focal length.

---

32. Assertion (A): The needle of a magnetic compass kept in strong external magnetic field, always aligns itself in north-south direction on the earth. Reason (R): Behaviour of the needle of a compass is same as that of a freely suspended bar magnet.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

Correct Answer: (D)

Solution:

Explanation:

- A compass needle aligns along the direction of the strongest magnetic field acting on it.
- If a strong external magnetic field is present, the needle will align with that field, not necessarily in the Earth's north-south direction.
- Hence, the assertion is false.

Reason Analysis:

- A compass needle behaves like a small freely suspended bar magnet.
- Therefore, the reason is true.

Conclusion: Assertion is false but reason is true. Hence, option (D) is correct.

Quick Tip

Compass aligns with strongest magnetic field present.

33.

(a) Define absolute refractive index of an optical medium.

Solution:

The absolute refractive index of a medium is defined as the ratio of the speed of light in vacuum to the speed of light in that medium.

$$n = \frac{c}{v}$$

Where, c = speed of light in vacuum v = speed of light in the medium

Quick Tip

Absolute refractive index = Speed in vacuum ÷ Speed in medium.

(b) Arrange the given material mediums in increasing order of speed of light through them.

Given Refractive Indices:

- A = 1.50
- B = 1.46
- C = 1.31
- D = 1.77

Solution:

Concept: Speed of light in a medium is inversely proportional to refractive index. Higher refractive index $\rightarrow$ Lower speed of light.

Arrangement: Highest refractive index to lowest (for increasing speed):
D (1.77) $<$ A (1.50) $<$ B (1.46) $<$ C (1.31)

Answer: D $\rightarrow$ A $\rightarrow$ B $\rightarrow$ C

Quick Tip

Higher refractive index $\rightarrow$ Slower light speed.

---

34 (A)

(i) How does the change in curvature of the eye lens help us in the process of seeing the nearby objects clearly?

Solution:

Explanation:

- To see nearby objects, the ciliary muscles contract.
- This increases the curvature (thickness) of the eye lens.
- The focal length of the lens decreases.
- As a result, the image of the nearby object is formed clearly on the retina.

Quick Tip

Nearby object → Lens becomes thicker → Focal length decreases.

(ii) State the range of the power of accommodation of a normal human eye.

Solution:

The power of accommodation of a normal human eye is about **4 dioptres**.

It enables the eye to adjust focus from infinity (distant vision) to about 25 cm (near point).

Quick Tip

Normal eye power of accommodation 4 D.

OR

34 (B) Draw a ray diagram to show the correction of eye defect of an old man who cannot see an object placed closer than 1 m from his eye clearly.

Solution:

Defect Identified: This condition is hypermetropia (long-sightedness), common in old age (presbyopia).

Correction:

- A convex (converging) lens is used.
- The convex lens converges light rays from a nearby object.
- It helps form the image on the retina.

Ray Diagram Description:

- Rays from a nearby object pass through a convex lens.
- The convex lens bends rays to converge before entering the eye.
- The eye lens then focuses them on the retina.

Quick Tip

Cannot see near objects → Use convex lens (hypermetropia correction).

---

35 (a) Why does an electric bulb become dim when an electric heater in parallel circuit is switched ON?

Solution:

Explanation:

- When a heater is switched ON in parallel, the total current drawn from the source increases.
- Due to internal resistance of the power supply or wiring, the voltage across each appliance may drop slightly.
- As a result, less voltage is available across the bulb.
- Reduced voltage decreases the brightness of the bulb, making it appear dim.

Quick Tip

More appliances ON → More current → Voltage drop → Bulb dims.

(b) How to connect three resistors each of resistance 8 Ω, so that the equivalent resistance of the combination is 12 Ω? Draw diagram of the combination and justify your answer.

Solution:

Required: Equivalent resistance = 12 Ω using three 8 Ω resistors.

Combination:

- Connect two 8 Ω resistors in parallel.
- Then connect this parallel combination in series with the third 8 Ω resistor.

Calculation:

Step 1: Parallel combination of two resistors

$$\frac{1}{R_p} = \frac{1}{8} + \frac{1}{8} = \frac{2}{8} = \frac{1}{4}$$

$$R_p = 4\Omega$$

Step 2: Series with third resistor

$$R_{eq} = 4 + 8 = 12\Omega$$

Diagram Description:

- Two resistors connected side by side (parallel).
- Their ends connected to a third resistor in series.

Conclusion: Two resistors in parallel and one in series give the required equivalent resistance of 12 Ω.

Quick Tip

Two equal resistors in parallel → Half resistance, then add series resistor.

36. An object is placed at a distance of 30 cm in front of a convex lens of focal length 15 cm. Use lens formula to determine the position of the image. What will be the size of the image in this case?

Solution:

Given:

- Object distance, $u = -30$ cm (in front of lens)
- Focal length, $f = +15$ cm (convex lens)

Lens Formula:

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

Substitute values:

$$\frac{1}{15} = \frac{1}{v} - \left(-\frac{1}{30}\right)$$

$$\frac{1}{15} = \frac{1}{v} + \frac{1}{30}$$

$$\frac{1}{v} = \frac{1}{15} - \frac{1}{30}$$

$$\frac{1}{v} = \frac{2-1}{30} = \frac{1}{30}$$

$$v = +30 \text{ cm}$$

Position of Image: Image is formed 30 cm on the other side of the lens.

Size of Image:

Magnification,

$$m = \frac{v}{u} = \frac{30}{-30} = -1$$

- Magnitude of magnification = 1 $\rightarrow$ Image size = Object size
- Negative sign $\rightarrow$ Image is inverted

Conclusion:

- Image is formed at 30 cm on the other side of the lens.
- The image is real, inverted, and equal in size to the object.

Quick Tip

Object at 2f of convex lens $\rightarrow$ Image at 2f, same size, inverted.

37.

(a) Draw the ray diagram for refraction of light through a glass prism and mark angle of refraction and angle of deviation.

Solution:

Ray Diagram Description:

- A ray of light is incident on one face of the glass prism.
- It bends towards the normal on entering the prism (refraction).
- The refracted ray travels inside the prism and strikes the second face.
- On emerging into air, it bends away from the normal.

Markings:

- **Angle of refraction (r):** Angle between refracted ray and normal inside the prism.
- **Angle of deviation (δ):** Angle between the direction of incident ray and emergent ray.

Quick Tip

Angle of deviation = Angle between incident and emergent rays.

(b) When the path of a light ray refracted through a glass prism is reversed, how will the angle of deviation change? Explain.

Solution:

Explanation:

- Refraction of light through a prism obeys the principle of reversibility of light.
- If the path of the light ray is reversed, it retraces the same path in the opposite direction.
- Therefore, the angle of deviation remains unchanged.

Conclusion: When the path of light is reversed through a prism, the angle of deviation remains the same.

Quick Tip

Reversibility of light $\rightarrow$ Same path $\rightarrow$ Same angle of deviation.

---

38. Passage: Three students Shweta, Ayesha and Samridhi were performing i an experiment to understand the factors on which the resistance of a conductor depends. Each one of them completed electric circuit with the help of a cell, an ammeter, a plug key and wire. Shweta put nichrome wire of length 7' in the circuit and after plugging the key, noted current in the ammeter. Ayesha put nichrome wire of same thickness but twice the length i.e. '21' in the circuit and after plugging the key, noted current in the ammeter. Samridhi took copper wire of length 'I' and same thickness in the circuit and after plugging the key, noted current in the ammeter. **(a) If the ammeter reading is X ampere with nichrome wire of length l, then what will be the ammeter reading if the length of nichrome wire is doubled with same area of cross-section?**

Solution:

Concept: Resistance of a wire is directly proportional to its length.

$$R \propto l$$

If length is doubled $\rightarrow$ Resistance doubles.

From Ohm's law,

$$I = \frac{V}{R}$$

So current is inversely proportional to resistance.

Result: If resistance doubles, current becomes half.

$$\text{New current} = \frac{X}{2}$$

Quick Tip

Length $\uparrow \rightarrow$ Resistance $\uparrow \rightarrow$ Current $\downarrow$.

(b) What happens to the ammeter reading if the area of cross-section of nichrome wire is doubled, keeping the length of wire l the same?

Solution:

Concept: Resistance is inversely proportional to area of cross-section.

$$R \propto \frac{1}{A}$$

If area is doubled $\rightarrow$ Resistance becomes half.

From Ohm's law,

$$I = \frac{V}{R}$$

So current increases when resistance decreases.

Result: If resistance becomes half, current doubles.

$$\text{New current} = 2X$$

Quick Tip

Area $\uparrow \rightarrow$ Resistance $\downarrow \rightarrow$ Current $\uparrow$.

(c) Define resistivity. Write its SI unit. Compare the resistivity of an alloy with its constituent metals.

Solution:

Definition: Resistivity is a property of a material that measures how strongly it opposes the flow of electric current.

$$\rho = \frac{RA}{l}$$

SI Unit: Ohm metre (Ωm)

Comparison:

- Alloys generally have higher resistivity than their constituent pure metals.
- This is because impurities and irregular structure increase resistance to electron flow.

Quick Tip

Alloys have higher resistivity than pure metals.

OR

(c) Give reason:

(i) Tungsten is used almost exclusively for making the filament of electric lamps.

Solution:

Tungsten has a very high melting point and can withstand high temperatures hookup without melting. It also has high resistivity and emits light when heated, making it ideal for lamp filaments.

(ii) Conductors of bread-toasters are made of an alloy rather than a pure metal.

Alloys have higher resistivity and do not oxidize easily at high temperatures. They can produce more heat and last longer than pure metals.

Quick Tip

Tungsten $\rightarrow$ High melting point. Alloys $\rightarrow$ High resistivity and durability.

OR

(c) Give reason:

(i) Tungsten is used almost exclusively for making the filament of electric lamps.

Solution:

Tungsten has a very high melting point and can withstand high temperatures hookup without melting. It also has high resistivity and emits light when heated, making it ideal for lamp filaments.

(ii) Conductors of bread-toasters are made of an alloy rather than a pure metal.

Alloys have higher resistivity and do not oxidize easily at high temperatures. They can produce more heat and last longer than pure metals.

Quick Tip

Tungsten → High melting point. Alloys → High resistivity and durability.

---

39 (A)

(i) List any two features of the electric current used in the houses of India.

Solution:

Features:

- It is alternating current (AC).
- Frequency is 50 Hz.
- Voltage is about 220–230 V.

(Any two acceptable)

Quick Tip

Domestic supply in India = AC, 220–230 V, 50 Hz.

(ii) Write any two differences between direct current and alternating current.

Solution:

Feature	Direct Current (DC)	Alternating Current (AC)
Direction	Flows in one direction	Changes direction periodically
Source	Cells, batteries	Power stations
Magnitude	Constant	Varies with time

(Any two differences acceptable)

Quick Tip

DC → One direction. AC → Changes direction periodically.

(iii) How will you identify live wire and neutral wire in a domestic electric circuit?

Solution:

Method: Using a tester (neon tester).

- Connect the tester to the wire.
- If the tester bulb glows → It is the live wire.
- If the tester does not glow → It is the neutral wire.

Quick Tip

Tester glows → Live wire. No glow → Neutral wire.

(ii) Distinguish between overloading and short-circuiting of a circuit.

Solution:

Feature	Overloading	Short-Circuiting
Cause	Too many appliances connected	Live and neutral wires come in contact
Current	Excess current drawn	Sudden very large current
Damage	Heating of wires	Sparks and fire risk

Quick Tip

Overloading → Too many devices. Short circuit → Live and neutral touch.

(iii) Giving reason explain what type of materials are used in fuse wires.

Solution:

Fuse wires are made of materials with:

- Low melting point
- High resistivity

Reason: Such materials melt quickly when excess current flows, breaking the circuit and protecting appliances.

Example: Alloys of tin and lead.

Quick Tip

Fuse wire → Low melting point alloy.
