

RAMAN SPACE MANTHAN

DEPARTMENTS OF NUCLEAR PHYSICS ISSI

CLASS 10 SCIENCE COMPREHENSIVE STUDY NOTES & STANDARD MCQ BANK

Mentor: Prof. Dr. Yuvraj Gaikwad

Target: Grade 10 Board Exam

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CHAPTER 1 : CHEMICAL REACTIONS AND EQUATIONS

WEIGHTAGE: 5 - 6 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Chemical Reaction:** A process in which one or more substances (reactants) react to form new substances (products) with completely different chemical properties.
- **Chemical Equation:** Symbolic representation of a chemical reaction. A balanced chemical equation obeys the *Law of Conservation of Mass* (atoms of each element remain equal on both sides).
- **Types of Chemical Reactions:**
 - **Combination Reaction:** Two or more substances combine to form a single product. Ex: $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{Heat}$ (Exothermic).
 - **Decomposition Reaction:** A single reactant breaks down into simpler products using Heat (Thermal), Light (Photolytic), or Electricity (Electrolytic). Ex: $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$.
 - **Displacement Reaction:** A more reactive element displaces a less reactive element from its solution. Ex: $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$.
 - **Double Displacement Reaction:** Exchange of ions between reactants. Precipitation reactions fall here. Ex: $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4\downarrow + 2\text{NaCl}$.
 - **Redox Reaction:** Oxidation (gain of oxygen / loss of hydrogen) and Reduction (loss of oxygen / gain of hydrogen) occur simultaneously.
 - **Corrosion & Rancidity:** Corrosion is oxidation of metals due to moisture/air (e.g., rusting of iron). Rancidity is oxidation of fats and oils causing bad taste and smell, prevented by antioxidants or flushing nitrogen gas.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Which of the following is a balanced chemical equation?

- | | |
|---|--|
| a) $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$ | b) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ |
| c) $\text{H}_2 + 2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$ | d) $2\text{H}_2 + 2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$ |

Correct Answer: Option (B)

Q2. Calcium oxide reacts vigorously with water to produce slaked lime. This reaction is:

- a) Endothermic & Combination
- b) Exothermic & Combination
- c) Endothermic & Decomposition
- d) Exothermic & Displacement

Correct Answer: Option (B)

Q3. When green color ferrous sulphate crystals are heated, the color changes to:

- a) Blue
- b) White/Brownish
- c) Yellow
- d) Pink

Correct Answer: Option (B)

Q4. Electrolysis of water is a decomposition reaction. The mole ratio of hydrogen and oxygen gases liberated is:

- a) 1:1
- b) 2:1
- c) 4:1
- d) 1:2

Correct Answer: Option (B)

Q5. Which gas is used to flush bags of potato chips to prevent oxidation?

- a) Oxygen
- b) Hydrogen
- c) Nitrogen
- d) Carbon dioxide

Correct Answer: Option (C)

Q6. The brown coating formed on iron articles exposed to moist air for a long time is:

- a) FeO
- b) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$
- c) Fe_3O_4
- d) FeCO_3

Correct Answer: Option (B)

Q7. In the reaction $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$, the oxidizing agent is:

- a) H_2
- b) CuO
- c) Cu
- d) H_2O

Correct Answer: Option (B)

Q8. Which of the following is an endothermic process?

- a) Dilution of sulphuric acid
- b) Sublimation of dry ice
- c) Condensation of water vapours
- d) Respiration

Correct Answer: Option (B)

Q9. A shiny brown element 'X' on heating in air becomes black in color. Name 'X':

- a) Copper
- b) Silver
- c) Iron
- d) Aluminium

Correct Answer: Option (A)

Q10. When lead nitrate powder is heated in a test tube, brown fumes are evolved. These fumes are of:

- a) NO
- b) NO₂
- c) N₂O
- d) N₂O₅

Correct Answer: Option (B)

Q11. Which of the following statements about the reaction $2\text{PbO} + \text{C} \rightarrow 2\text{Pb} + \text{CO}_2$ is correct?

- a) Lead is getting reduced
- b) Carbon dioxide is getting oxidized
- c) Carbon is getting oxidized
- d) Lead oxide is getting oxidized

Correct Answer: Option (C)

Q12. The reaction between sodium sulphate and barium chloride is an example of:

- a) Combination
- b) Displacement
- c) Double displacement
- d) Decomposition

Correct Answer: Option (C)

Q13. Respiration is considered an:

- a) Endothermic reaction
- b) Exothermic reaction
- c) Neutralization reaction
- d) Reduction reaction

Correct Answer: Option (B)

Q14. Which of the following salts causes white precipitate when added to BaCl₂ solution?

- a) NaCl
- b) Na₂SO₄
- c) KCl
- d) KNO₃

Correct Answer: Option (B)

Q15. Photolytic decomposition is used in:

- a) Refining of copper
- b) Black and white photography
- c) Thermite process
- d) Galvanization

Correct Answer: Option (B)

Q16. What happens when dilute hydrochloric acid is added to iron filings?

- a) Hydrogen gas and iron chloride are produced
- b) Chlorine gas and iron hydroxide are produced
- c) No reaction takes place
- d) Iron salt and water are produced

Correct Answer: Option (A)

Q17. The addition of oxygen to a substance is called:

- a) Reduction
- b) Oxidation
- c) Corrosion
- d) Hydrolysis

Correct Answer: Option (B)

Q18. Removal of hydrogen from a compound is called:

- a) Oxidation
- b) Reduction
- c) Hydration
- d) Neutralization

Correct Answer: Option (A)

Q19. In the equation $x \text{ Fe} + y \text{ H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + z \text{ H}_2$, the values of x, y, and z are:

- a) 3, 4, 4
- b) 3, 2, 2
- c) 2, 4, 4
- d) 3, 4, 2

Correct Answer: Option (A)

Q20. Chemical formula of marble is:

- a) CaO
- b) Ca(OH)_2
- c) CaCO_3
- d) CaCl_2

Correct Answer: Option (C)

Q21. 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)

Correct Answer: Option (D)

Q22. Slaked lime is chemical formula:

- a) Ca(OH)_2
- b) CaO
- c) CaCO_3
- d) CaCl_2

Correct Answer: Option (A)

Q23. Which metal is displaced when Zinc is added to Copper Sulphate solution?

- a) Zinc
- b) Copper
- c) Sulphur
- d) Oxygen

Correct Answer: Option (B)

Q24. Corrosion of silver produces a coating of:

- a) Silver oxide (black)
- b) Silver sulphide (black)
- c) Silver carbonate (green)
- d) Silver nitrate (white)

Correct Answer: Option (B)

Q25. Rusting of iron is a combination of oxidation and:

- a) Reduction
- b) Hydration
- c) Sublimation
- d) Combustion

Correct Answer: Option (B)

Q26. In the reaction $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$, C acts as:

- a) Oxidizing agent
- b) Reducing agent
- c) Catalyst
- d) Solvent

Correct Answer: Option (B)

Q27. Which of the following reaction is thermal decomposition?

- a) $2\text{AgCl} \rightarrow 2\text{Ag} + \text{Cl}_2$
- b) $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- c) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- d) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

Correct Answer: Option (C)

Q28. Fatty foods become rancid due to:

- a) Oxidation
- b) Reduction
- c) Hydrogenation
- d) Corrosion

Correct Answer: Option (A)

Q29. Precipitation reactions produce:

- a) Soluble salts
- b) Insoluble salts
- c) Acidic solutions
- d) Gases

Correct Answer: Option (B)

Q30. Which gas turns lime water milky?

- a) Oxygen
- b) Hydrogen
- c) Carbon dioxide
- d) Nitrogen

Correct Answer: Option (C)

CHAPTER 2 : ACIDS, BASES AND SALTS

WEIGHTAGE: 6 - 7 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Acids:** Sour in taste, turn blue litmus red, release H^+ / H_3O^+ ions in aqueous solution. $\text{pH} < 7$.
- **Bases:** Bitter in taste, soapy touch, turn red litmus blue, release OH^- ions in aqueous solution. $\text{pH} > 7$. Water soluble bases are called *alkalis*.
- **Indicators:** Natural (Litmus, Turmeric), Synthetic (Methyl orange, Phenolphthalein), Olfactory (Onion, Vanilla).
- **pH Scale:** Measures hydrogen ion concentration. $\text{pH} = 7$ is neutral; $\text{pH} < 7$ is acidic; $\text{pH} > 7$ is basic.
- **Important Chemical Compounds & Formulas:**
 - **Bleaching Powder:** CaOCl_2 (Prepared by action of Cl_2 on dry slaked lime).
 - **Baking Soda:** NaHCO_3 (Sodium Hydrogen Carbonate). Used in antacids and fire extinguishers.
 - **Washing Soda:** $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (Sodium Carbonate Decahydrate).

• • **Plaster of Paris:** $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. On mixing with water, hardens into Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$).

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Which of the following is present in acid?

- a) H^+ ions
- b) OH^- ions
- c) Na^+ ions
- d) Cl^- ions

Correct Answer: Option (A)

Q2. An aqueous solution turns red litmus solution blue. Excess addition of which solution would reverse the change?

- a) Baking powder
- b) Lime
- c) Ammonium hydroxide solution
- d) Hydrochloric acid

Correct Answer: Option (D)

Q3. A solution reacts with crushed egg-shells to give a gas that turns lime-water milky. The solution contains:

- a) NaCl
- b) HCl
- c) LiCl
- d) KCl

Correct Answer: Option (B)

Q4. Which of the following gives OH^- ions in water?

- a) Acids
- b) Bases
- c) Salts
- d) Neutral oxides

Correct Answer: Option (B)

Q5. Nettle sting injects which acid into the skin causing pain?

- a) Methanoic acid
- b) Ethanoic acid
- c) Citric acid
- d) Tartaric acid

Correct Answer: Option (A)

Q6. What is the pH of neutral water at 25 degrees C?

- a) 0
- b) 7
- c) 14
- d) 1

Correct Answer: Option (B)

Q7. Tomato contains which natural acid?

- a) Acetic acid
- b) Oxalic acid
- c) Tartaric acid
- d) Lactic acid

Correct Answer: Option (B)

Q8. Plaster of Paris is chemically known as:

- a) Calcium sulphate hemihydrate
- b) Calcium sulphate dehydrate
- c) Calcium carbonate
- d) Calcium chloride

Correct Answer: Option (A)

Q9. Chemical formula of Baking Soda is:

- a) Na_2CO_3
- b) NaHCO_3
- c) NaOH
- d) NaCl

Correct Answer: Option (B)

Q10. Which salt is used in removing permanent hardness of water?

- a) Baking soda
- b) Washing soda
- c) Bleaching powder
- d) Gypsum

Correct Answer: Option (B)

Q11. Tooth decay starts when pH of mouth is lower than:

- a) 5.5
- b) 6.5
- c) 7.5
- d) 8.5

Correct Answer: Option (A)

Q12. Rain is called acid rain when its pH falls below:

- a) 7.0
- b) 6.0
- c) 5.6
- d) 4.0

Correct Answer: Option (C)

Q13. Sodium hydroxide is a:

- a) Weak base
- b) Strong base
- c) Strong acid
- d) Weak acid

Correct Answer: Option (B)

Q14. When an acid reacts with a metal, which gas is liberated?

- a) Oxygen
- b) Carbon dioxide
- c) Hydrogen
- d) Nitrogen

Correct Answer: Option (C)

Q15. Brine is an aqueous solution of:

- a) Sodium carbonate
- b) Sodium chloride
- c) Sodium hydroxide
- d) Sodium sulphate

Correct Answer: Option (B)

Q16. Bleaching powder is represented as:

- a) CaOCl_2
- b) CaCl_2
- c) $\text{Ca}(\text{ClO}_3)_2$
- d) $\text{Ca}(\text{OH})_2$

Correct Answer: Option (A)

Q17. Phenolphthalein indicator turns which color in basic medium?

- a) Red
- b) Pink
- c) Yellow
- d) Colorless

Correct Answer: Option (B)

Q18. Phenolphthalein in acidic medium is:

- a) Pink
- b) Blue
- c) Colorless
- d) Orange

Correct Answer: Option (C)

Q19. Which of the following acid is present in sour milk or curd?

- a) Oxalic acid
- b) Citric acid
- c) Lactic acid
- d) Tartaric acid

Correct Answer: Option (C)

Q20. Antacids contain mild bases like:

- a) $\text{Mg}(\text{OH})_2$
- b) NaOH
- c) KOH
- d) HCl

Correct Answer: Option (A)

Q21. Gypsum chemical formula is:

- a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- b) $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$
- c) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- d) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Correct Answer: Option (A)

Q22. Copper sulphate crystals have blue color due to presence of water of crystallization. How many water molecules are present?

- a) 2
- b) 5
- c) 7
- d) 10

Correct Answer: Option (B)

Q23. Alkalies are:

- a) Acids soluble in water
- b) Bases insoluble in water
- c) Bases soluble in water
- d) Neutral salts

Correct Answer: Option (C)

Q24. Which indicator gives red color with acid and yellow with base?

- a) Litmus
- b) Methyl orange
- c) Phenolphthalein
- d) Turmeric

Correct Answer: Option (B)

Q25. Turmeric stain on cloth turns reddish-brown when washed with soap because soap is:

- a) Acidic
- b) Basic
- c) Neutral
- d) Amphoteric

Correct Answer: Option (B)

Q26. The pH range of human body works within:

- a) 7.0 to 7.8
- b) 6.0 to 6.8
- c) 5.0 to 5.8
- d) 8.0 to 8.8

Correct Answer: Option (A)

Q27. Chlor-alkali process produces:

- a) Chlorine, Hydrogen, NaOH
- b) Chlorine, Oxygen, Na_2CO_3
- c) Hydrogen, CO_2 , NaHCO_3
- d) Oxygen, NaCl, H_2O

Correct Answer: Option (A)

Q28. Which acid is present in Tamarind?

- a) Tartaric acid
- b) Citric acid
- c) Acetic acid
- d) Lactic acid

Correct Answer: Option (A)

Q29. Rock salt is brown in color due to:

- a) Presence of iron
- b) Impregnated impurities
- c) Organic matter
- d) High pH

Correct Answer: Option (B)

Q30. What is the pH of strong acid like 1M HCl?

- a) ~0
- b) ~7
- c) ~14
- d) ~5

Correct Answer: Option (A)

CHAPTER 3 : METALS AND NON-METALS

WEIGHTAGE: 7 - 8 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Properties of Metals:** Malleable, ductile, good conductors of heat/electricity, high melting point, sonorous, lustrous. (Exceptions: Mercury is liquid, Sodium/Potassium are soft).
- **Properties of Non-metals:** Non-malleable, brittle, poor conductors. (Exceptions: Graphite conducts electricity, Diamond is hardest substance, Iodine is lustrous).
- **Chemical Properties:** Metal oxides are basic/amphoteric (Al_2O_3 , ZnO). Non-metal oxides are acidic or neutral.
- **Reactivity Series:** $K > Na > Ca > Mg > Al > Zn > Fe > Pb > [H] > Cu > Hg > Ag > Au$.
- **Ionic Compounds:** Formed by electron transfer from metal to non-metal. Properties: High melting points, soluble in water, conduct electricity in molten/aqueous state.
- **Metallurgy:** Extraction of metals from ores. Roasting (heating in presence of air for sulphide ores), Calcination (heating in limited air for carbonate ores). Reduction using C or Thermite reaction.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Which of the following metal exists as liquid at room temperature?

- | | |
|------------|--------------|
| a) Sodium | b) Mercury |
| c) Gallium | d) Potassium |

Correct Answer: Option (B)

Q2. Which metal can be cut easily with a knife?

- | | |
|-----------|-----------|
| a) Iron | b) Sodium |
| c) Copper | d) Gold |

Correct Answer: Option (B)

Q3. Amphoteric oxides are those which react with:

- | | |
|-------------------------|----------------------------|
| a) Acids only | b) Bases only |
| c) Both acids and bases | d) Neither acids nor bases |

Correct Answer: Option (C)

Q4. Which of the following is an amphoteric oxide?

- | | |
|--------------|----------|
| a) Na_2O | b) MgO |
| c) Al_2O_3 | d) CaO |

Correct Answer: Option (C)

Q5. Which non-metal is a good conductor of electricity?

- | | |
|------------|-------------|
| a) Diamond | b) Graphite |
| c) Iodine | d) Sulphur |

Correct Answer: Option (B)

Q6. The ability of metals to be drawn into thin wires is called:

- | | |
|-----------------|-----------------|
| a) Malleability | b) Ductility |
| c) Sonority | d) Conductivity |

Correct Answer: Option (B)

Q7. Which metal is most reactive among the following?

- | | |
|-------|-------|
| a) Cu | b) Fe |
| c) Zn | d) K |

Correct Answer: Option (D)

Q8. An alloy of mercury with another metal is called:

- | | |
|------------|-----------|
| a) Brass | b) Bronze |
| c) Amalgam | d) Solder |

Correct Answer: Option (C)

Q9. Brass is an alloy of:

- | | |
|--------------|--------------|
| a) Cu and Zn | b) Cu and Sn |
| c) Pb and Sn | d) Fe and C |

Correct Answer: Option (A)

Q10. Bronze is an alloy of:

- | | |
|--------------|--------------|
| a) Cu and Zn | b) Cu and Sn |
| c) Fe and Ni | d) Al and Cu |

Correct Answer: Option (B)

Q11. Heating sulphide ores in excess air is known as:

- | | |
|----------------|-------------|
| a) Calcination | b) Roasting |
| c) Smelting | d) Refining |

Correct Answer: Option (B)

Q12. Heating carbonate ores in limited air is known as:

- | | |
|--------------|-----------------|
| a) Roasting | b) Calcination |
| c) Reduction | d) Electrolysis |

Correct Answer: Option (B)

Q13. Thermite reaction involves the reduction of metal oxide using:

- a) Carbon
- b) Hydrogen
- c) Aluminium powder
- d) Carbon monoxide

Correct Answer: Option (C)

Q14. Anode mud in electrolytic refining of copper settles at:

- a) Anode
- b) Cathode
- c) Bottom of anode
- d) Bottom of cathode

Correct Answer: Option (C)

Q15. Non-metal which is lustrous:

- a) Carbon
- b) Oxygen
- c) Iodine
- d) Nitrogen

Correct Answer: Option (C)

Q16. Galvanization is a method of protecting iron from rusting by coating with a thin layer of:

- a) Gallium
- b) Aluminium
- c) Zinc
- d) Silver

Correct Answer: Option (C)

Q17. Ionic compounds have high melting points due to:

- a) Strong electrostatic forces between ions
- b) Weak Van der Waals forces
- c) Covalent bonds
- d) Metallic bonding

Correct Answer: Option (A)

Q18. Which gas is evolved when metals react with dilute nitric acid (generally exceptions apply)?

- a) Hydrogen is NOT evolved generally
- b) Always H₂
- c) Always O₂
- d) Cl₂

Correct Answer: Option (A)

Q19. Aqua regia is a freshly prepared mixture of concentrated HCl and concentrated HNO₃ in ratio:

- a) 3:1
- b) 1:3
- c) 2:1
- d) 1:1

Correct Answer: Option (A)

Q20. Solder is an alloy of:

- a) Lead and Tin
- b) Copper and Tin
- c) Copper and Zinc
- d) Lead and Copper

Correct Answer: Option (A)

Q21. Food cans are coated with tin and not with zinc because:

- a) Zinc is costlier than tin
- b) Zinc has higher melting point than tin
- c) Zinc is more reactive than tin
- d) Zinc is less reactive than tin

Correct Answer: Option (C)

Q22. Which metal does NOT react with cold or hot water, but reacts with steam?

- a) Sodium
- b) Calcium
- c) Iron
- d) Potassium

Correct Answer: Option (C)

Q23. Which non-metal is liquid at room temperature?

- a) Chlorine
- b) Bromine
- c) Iodine
- d) Fluorine

Correct Answer: Option (B)

Q24. Stainless steel is made by mixing iron with:

- a) Ni and Cr
- b) Cu and Zn
- c) Sn and Pb
- d) Mg and Al

Correct Answer: Option (A)

Q25. Pure gold is:

- a) 24 Carat
- b) 22 Carat
- c) 18 Carat
- d) 20 Carat

Correct Answer: Option (A)

Q26. Which of the following non-metals is hardest known substance?

- a) Graphite
- b) Diamond
- c) Fullerene
- d) Coal

Correct Answer: Option (B)

Q27. Cinnabar is an ore of:

- a) Copper
- b) Mercury
- c) Lead
- d) Zinc

Correct Answer: Option (B)

Q28. Bauxite is an ore of:

- a) Iron
- b) Aluminium
- c) Copper
- d) Zinc

Correct Answer: Option (B)

Q29. Oxides of non-metals are generally:

- a) Basic
- b) Acidic
- c) Amphoteric
- d) Neutral only

Correct Answer: Option (B)

Q30. Which property is generally NOT shown by metals?

- a) Electrical conduction
- b) Sonorous nature
- c) Dullness
- d) Ductility

Correct Answer: Option (C)

CHAPTER 4 : CARBON AND ITS COMPOUNDS

WEIGHTAGE: 6 - 7 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Cation & Covalent Bonding:** Carbon is tetravalent (valency 4) and forms covalent bonds by sharing electrons. Carbon exhibits *Catenation* (ability to form long chains/rings).
- **Allotropes of Carbon:** Diamond (3D tetrahedral structure, hard), Graphite (layered hexagonal arrays, conducts electricity), Buckminsterfullerene (C_{60}).
- **Hydrocarbons:**
 - *Saturated (Alkanes):* Single bonds, general formula C_nH_{2n+2} .
 - *Unsaturated (Alkenes & Alkynes):* Double bond C_nH_{2n} ; Triple bond C_nH_{2n-2} .
- **Functional Groups:** Alcohol (-OH), Aldehyde (-CHO), Ketone ($>C=O$), Carboxylic acid (-COOH), Halo group (-Cl, -Br).
- **Chemical Properties:** Combustion, Oxidation (using alkaline $KMnO_4$), Addition Reaction (Hydrogenation of oils), Substitution Reaction.
- **Important Compounds:**
 - *Ethanol (C_2H_5OH):* Reacts with Na to give H_2 gas. Dehydration gives ethene.
 - *Ethanoic Acid (CH_3COOH):* 5-8% solution in water is Vinegar. Esterification with ethanol forms sweet smelling ester.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Covalent compounds generally have:

- a) High melting and boiling points
- b) Low melting and boiling points
- c) High electrical conductivity
- d) Ionic lattice structure

Correct Answer: Option (B)

Q2. Hydrocarbons containing double bonds are called:

- a) Alkanes
- b) Alkenes
- c) Alkynes
- d) Cycloalkanes

Correct Answer: Option (B)

Q3. General formula of Alkanes is:

- a) C_nH_{2n}
- b) C_nH_{2n+2}
- c) C_nH_{2n-2}
- d) C_nH_{2n+1}

Correct Answer: Option (B)

Q4. General formula of Alkynes is:

- a) C_nH_{2n}
- b) C_nH_{2n+2}
- c) C_nH_{2n-2}
- d) C_nH_{2n+1}

Correct Answer: Option (C)

Q5. The functional group present in carboxylic acid is:

- a) -OH
- b) -CHO
- c) -COOH
- d) $>C=O$

Correct Answer: Option (C)

Q6. Vinegar is a solution of:

- a) 50-60% acetic acid in alcohol
- b) 5-8% acetic acid in water
- c) 50-60% acetic acid in water
- d) 15-20% acetic acid in water

Correct Answer: Option (B)

Q7. Conversion of ethanol to ethanoic acid is an example of:

- a) Addition reaction
- b) Oxidation reaction
- c) Substitution reaction
- d) Reduction reaction

Correct Answer: Option (B)

Q8. Which of the following gas is liberated when sodium reacts with ethanol?

- a) Oxygen
- b) Hydrogen
- c) Carbon dioxide
- d) Nitrogen

Correct Answer: Option (B)

Q9. Vegetable oils are converted into vegetable ghee by hydrogen gas in presence of catalyst:

- a) Iron
- b) Nickel
- c) Copper
- d) Platinum only

Correct Answer: Option (B)

Q10. Soaps are sodium or potassium salts of long chain:

- a) Aldehydes
- b) Carboxylic acids
- c) Alcohols
- d) Hydrocarbons

Correct Answer: Option (B)

Q11. Ionic end of soap molecule is:

- a) Hydrophobic
- b) Hydrophilic
- c) Lipophilic
- d) Non-polar

Correct Answer: Option (B)

Q12. Hydrocarbon end of soap molecule is:

- a) Hydrophilic
- b) Hydrophobic
- c) Soluble in water
- d) Polar

Correct Answer: Option (B)

Q13. Scum is formed when soap is treated with:

- a) Soft water
- b) Hard water
- c) Distilled water
- d) Rain water

Correct Answer: Option (B)

Q14. Esterification reaction is reaction between:

- a) Alcohol and Acid
- b) Alcohol and Base
- c) Acid and Base
- d) Alkane and Chlorine

Correct Answer: Option (A)

Q15. Sweet smelling substance formed during esterification is used in:

- a) Perfumes and Flavouring agents
- b) Antacids
- c) Disinfectants
- d) Fertilizers

Correct Answer: Option (A)

Q16. How many single covalent bonds are present in a molecule of ethane (C₂H₆)?

- a) 6
- b) 7
- c) 8
- d) 9

Correct Answer: Option (B)

Q17. Which of the following is an allotrope of carbon?

- a) Diamond
- b) Graphite
- c) Buckminsterfullerene
- d) All of these

Correct Answer: Option (D)

Q18. Pentane has the molecular formula C_5H_{12} . It has structural isomers:

- a) 2
- b) 3
- c) 4
- d) 5

Correct Answer: Option (B)

Q19. Functional group of Propanone is:

- a) Alcohol
- b) Aldehyde
- c) Ketone
- d) Carboxylic acid

Correct Answer: Option (C)

Q20. Butanoic acid is a 4-carbon compound with functional group:

- a) $-OH$
- b) $-CHO$
- c) $-COOH$
- d) $-CO-$

Correct Answer: Option (C)

Q21. Chlorine reacts with saturated hydrocarbons in presence of sunlight. This is a:

- a) Substitution reaction
- b) Addition reaction
- c) Oxidation reaction
- d) Combustion reaction

Correct Answer: Option (A)

Q22. Chemical formula of Ethanoic acid (Ethanoic acid) is:

- a) CH_3COOH
- b) $HCOOH$
- c) C_2H_5COOH
- d) CH_3CHO

Correct Answer: Option (A)

Q23. The functional group $-CHO$ represents:

- a) Alcohol
- b) Aldehyde
- c) Ketone
- d) Ester

Correct Answer: Option (B)

Q24. Methane is also known as:

- a) Marsh gas
- b) Producer gas
- c) Water gas
- d) Laughing gas

Correct Answer: Option (A)

Q25. In diamond, each carbon atom is bonded to how many other carbon atoms?

- a) 2
- b) 3
- c) 4
- d) 5

Correct Answer: Option (C)

Q26. In graphite, carbon atoms form layers of hexagonal rings held by:

- a) Strong covalent forces
- b) Weak Van der Waals forces
- c) Ionic bonds
- d) Metallic bonds

Correct Answer: Option (B)

Q27. Fullerene C₆₀ looks like a:

- a) Soccer ball
- b) Rugby ball
- c) Cylinder
- d) Cube

Correct Answer: Option (A)

Q28. Detergents are superior to soaps because they:

- a) Form lather even in hard water
- b) Are completely biodegradable
- c) Are cheaper
- d) Don't dissolve in water

Correct Answer: Option (A)

Q29. Reagent used for dehydration of ethanol to ethene is:

- a) Alkaline KMnO₄
- b) Hot concentrated H₂SO₄
- c) Acidified K₂Cr₂O₇
- d) Dilute HCl

Correct Answer: Option (B)

Q30. First organic compound synthesized in laboratory was:

- a) Methane
- b) Urea
- c) Acetic acid
- d) Glucose

Correct Answer: Option (B)

CHAPTER 5 : ELECTRICITY

WEIGHTAGE: 7 - 8 MARKS

NCERT Class 10 Science Core Curriculum • Raman Space Manthan Academic Series

KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Electric Current (I):** Rate of flow of electric charge. $I = Q/t$. Unit: Ampere (A). Measured by Ammeter (connected in series).
- **Electric Potential & Potential Difference (V):** Work done per unit charge. $V = W/Q$. Unit: Volt (V). Measured by Voltmeter (connected in parallel).
- **Ohm's Law:** Current flowing through a conductor is directly proportional to potential difference across its ends (at constant temperature). $V = IR$.
- **Resistance (R):** Property to resist flow of charge. $R = \rho L/A$ (ρ = Resistivity).
- **Combination of Resistors:**
 - **Series:** $R_{eq} = R_1 + R_2 + R_3$ (Current remains same).
 - **Parallel:** $1/R_{eq} = 1/R_1 + 1/R_2 + 1/R_3$ (Voltage remains same).

• **Joule's Heating Effect:** Heat produced $H = I^2 R t$.

• **Electric Power (P):** $P = VI = I^2 R = V^2 / R$. Unit: Watt (W). Commercial unit: $1 kWh = 3.6 \times 10^6 J$.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. SI unit of electric current is:

- a) Volt
- b) Ampere
- c) Ohm
- d) Joule

Correct Answer: Option (B)

Q2. SI unit of electric potential difference is:

- a) Ampere
- b) Volt
- c) Coulomb
- d) Watt

Correct Answer: Option (B)

Q3. The instrument used to measure electric current in a circuit is:

- a) Voltmeter
- b) Ammeter
- c) Galvanometer
- d) Rheostat

Correct Answer: Option (B)

Q4. Ammeter is always connected in circuit in:

- a) Parallel
- b) Series
- c) Any fashion
- d) Mixed mode

Correct Answer: Option (B)

Q5. Voltmeter is connected in circuit in:

- a) Series
- b) Parallel
- c) Both series and parallel
- d) None of these

Correct Answer: Option (B)

Q6. Ohm's law gives relationship between:

- a) Power and Voltage
- b) Current and Potential difference
- c) Resistance and Power
- d) Charge and Time

Correct Answer: Option (B)

Q7. SI unit of electrical resistance is:

- a) Ohm-meter
- b) Ohm
- c) Volt
- d) Ampere

Correct Answer: Option (B)

Q8. SI unit of electrical resistivity is:

- a) Ohm
- b) Ohm-meter
- c) Volt/meter
- d) Ampere/meter

Correct Answer: Option (B)

Q9. If length of conductor is doubled keeping cross-section same, its resistance becomes:

- a) Half
- b) Double
- c) Four times
- d) Unchanged

Correct Answer: Option (B)

Q10. If area of cross-section of wire is doubled, its resistance becomes:

- a) Double
- b) Half
- c) Four times
- d) One fourth

Correct Answer: Option (B)

Q11. Three resistors of 2 ohm, 3 ohm, and 6 ohm are connected in parallel. Equivalent resistance is:

- a) 11 ohm
- b) 1 ohm
- c) 0.5 ohm
- d) 6 ohm

Correct Answer: Option (B)

Q12. Three resistors of 2 ohm, 3 ohm, and 5 ohm are connected in series. Total resistance is:

- a) 10 ohm
- b) 1 ohm
- c) 5 ohm
- d) 30 ohm

Correct Answer: Option (A)

Q13. Joule's law of heating formula is given by:

- a) $H = I R t$
- b) $H = I^2 R t$
- c) $H = I R^2 t$
- d) $H = V I^2 t$

Correct Answer: Option (B)

Q14. Commercial unit of electrical energy is:

- a) Joule
- b) Watt-hour
- c) Kilowatt-hour (kWh)
- d) Volt-Ampere

Correct Answer: Option (C)

Q15. 1 kWh is equal to how many Joules?

- a) $3.6 \times 10^5 \text{ J}$
- b) $3.6 \times 10^6 \text{ J}$
- c) $36 \times 10^6 \text{ J}$
- d) $0.36 \times 10^6 \text{ J}$

Correct Answer: Option (B)

Q16. Filament of electric bulb is made of:

- a) Copper
- b) Aluminium
- c) Tungsten
- d) Nichrome

Correct Answer: Option (C)

Q17. Heating element of electric iron is made of:

- a) Copper
- b) Nichrome
- c) Tungsten
- d) Iron

Correct Answer: Option (B)

Q18. Charge on an electron is:

- a) $1.6 \times 10^{-19} \text{ C}$
- b) $1.6 \times 10^{-18} \text{ C}$
- c) $9.1 \times 10^{-31} \text{ C}$
- d) $1.6 \times 10^{19} \text{ C}$

Correct Answer: Option (A)

Q19. 1 Coulomb charge contains how many electrons approximately?

- a) 6.25×10^{18}
- b) 6.25×10^{19}
- c) 1.6×10^{19}
- d) 6.25×10^{23}

Correct Answer: Option (A)

Q20. Rate of doing work or rate of consumption of electrical energy is called:

- a) Resistance
- b) Electric Power
- c) Potential Difference
- d) Current

Correct Answer: Option (B)

Q21. Which formula does NOT represent electric power?

- a) $P = VI$
- b) $P = I^2 R$
- c) $P = IR^2$
- d) $P = V^2 / R$

Correct Answer: Option (C)

Q22. An electric bulb is rated 220V and 100W. When operated on 110V, power consumed will be:

- a) 100 W
- b) 75 W
- c) 50 W
- d) 25 W

Correct Answer: Option (D)

Q23. Resistivity of a wire depends on:

- a) Length
- b) Area of cross-section
- c) Material of wire
- d) Shape of wire

Correct Answer: Option (C)

Q24. Fuse wire is an alloy of lead and tin. It has:

- a) High melting point and low resistance
- b) Low melting point and high resistance
- c) High melting point and high resistance
- d) Low melting point and low resistance

Correct Answer: Option (B)

Q25. In domestic circuit, appliances are connected in:

- a) Series
- b) Parallel
- c) Mixed
- d) Series-Parallel combination

Correct Answer: Option (B)

Q26. When current I flows through resistor R for time t , heat produced is proportional to:

- a) Current I
- b) Square of current I^2
- c) Square root of I
- d) $1/I$

Correct Answer: Option (B)

Q27. Electrical resistivity of metals is of order:

- a) 10^{-8} to 10^{-6} ohm-m
- b) 10^8 to 10^{10} ohm-m
- c) 10^{12} to 10^{17} ohm-m
- d) 10^2 to 10^4 ohm-m

Correct Answer: Option (A)

Q28. Good conductors have electrical resistivity of order:

- a) Very high
- b) Very low
- c) Zero
- d) Infinite

Correct Answer: Option (B)

Q29. If power of an appliance is 1000 W and used for 1 hour, energy consumed is:

- a) 1 unit
- b) 10 units
- c) 100 units
- d) 0.1 unit

Correct Answer: Option (A)

Q30. Work done in moving a unit positive charge from one point to another is called:

- a) Current
- b) Potential difference
- c) Resistance
- d) Conductance

Correct Answer: Option (B)

CHAPTER 6 : MAGNETIC EFFECTS OF ELECTRIC CURRENT

NCERT Class 10 Science Core Curriculum • Raman Space Manthan Academic Series

WEIGHTAGE: 6 - 7 MARKS

KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Magnetic Field lines:** Continuous closed curves emerging from North pole and entering South pole outside magnet. Density indicates field strength. They never intersect.
- **Oersted's Discovery:** Electric current carrying wire produces a magnetic field around it.
- **Right-Hand Thumb Rule:** Points thumb in current direction; curled fingers show direction of magnetic field lines.
- **Solenoid:** Long coil of many circular turns of insulated copper wire. Inside solenoid, field is uniform and parallel.
- **Electromagnet:** Soft iron core placed inside solenoid carrying current.
- **Fleming's Left-Hand Rule:** Direction of force on current carrying conductor in magnetic field (Forefinger = Field, Middle finger = Current, Thumb = Motion/Force). Basis of Electric Motor.
- **Domestic Electric Circuits:** Live wire (Red/Brown, 220V), Neutral wire (Black/Blue, 0V), Earth wire (Green/Yellow for safety against leakage). Fuse and MCB protect against overloading & short circuiting.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Magnetic field lines outside a bar magnet move from:

- a) South to North
- b) North to South
- c) East to West
- d) West to East

Correct Answer: Option (B)

Q2. Inside a bar magnet, magnetic field lines move from:

- a) North to South
- b) South to North
- c) West to East
- d) Random direction

Correct Answer: Option (B)

Q3. Magnetic field lines never intersect because:

- a) They are parallel
- b) At point of intersection, compass needle would point in two directions
- c) They are imaginary
- d) Field strength is zero

Correct Answer: Option (B)

Q4. Direction of magnetic field around current carrying straight conductor is given by:

- a) Fleming's Left Hand Rule
- b) Fleming's Right Hand Rule
- c) Right Hand Thumb Rule
- d) Ampere's Law

Correct Answer: Option (C)

Q5. The magnetic field inside a long straight current-carrying solenoid is:

- a) Zero
- b) Decreases near ends
- c) Increases near ends
- d) Same at all points (Uniform)

Correct Answer: Option (D)

Q6. Material used for making permanent magnets is:

- a) Soft iron
- b) Steel / Alnico
- c) Copper
- d) Aluminium

Correct Answer: Option (B)

Q7. Material used as core of electromagnet is:

- a) Steel
- b) Soft iron
- c) Copper
- d) Platinum

Correct Answer: Option (B)

Q8. Fleming's Left-Hand Rule is used to find direction of:

- a) Magnetic field
- b) Induced current
- c) Force on current-carrying conductor
- d) Electric current

Correct Answer: Option (C)

Q9. In Fleming's Left-Hand Rule, forefinger represents:

- a) Force
- b) Magnetic Field
- c) Current
- d) Motion

Correct Answer: Option (B)

Q10. In Fleming's Left-Hand Rule, thumb represents:

- a) Magnetic Field
- b) Electric Current
- c) Direction of Force/Motion
- d) Induced voltage

Correct Answer: Option (C)

Q11. Device that converts electrical energy into mechanical energy is:

- a) Electric Generator
- b) Electric Motor
- c) Galvanometer
- d) Transformer

Correct Answer: Option (B)

Q12. Potential difference between Live wire and Neutral wire in India is:

- a) 110 V
- b) 220 V
- c) 440 V
- d) 240 V

Correct Answer: Option (B)

Q13. Color of insulation cover on Live wire in traditional domestic supply is:

- a) Black
- b) Green
- c) Red
- d) Blue

Correct Answer: Option (C)

Q14. Earth wire is connected to metal body of appliances to prevent:

- a) Overloading
- b) Short circuit
- c) Electric Shock
- d) High voltage

Correct Answer: Option (C)

Q15. Overloading occurs when:

- a) Live and Neutral wire come in direct contact
- b) Too many electrical appliances connected to single socket
- c) Voltage fluctuates
- d) Earth wire breaks

Correct Answer: Option (B)

Q16. Short circuiting happens when:

- a) Live and Neutral wires touch directly
- b) Appliance is earthed
- c) Current is zero
- d) Fuse melts

Correct Answer: Option (A)

Q17. Safety device based on heating effect of electric current is:

- a) Ammeter
- b) Voltmeter
- c) Electric Fuse
- d) Generator

Correct Answer: Option (C)

Q18. Frequency of Alternating Current (AC) supplied in India is:

- a) 50 Hz
- b) 60 Hz
- c) 100 Hz
- d) 0 Hz

Correct Answer: Option (A)

Q19. Direct current (DC) differs from AC because DC:

- a) Changes direction periodically
- b) Flows in one direction only
- c) Has high frequency
- d) Cannot be stored

Correct Answer: Option (B)

Q20. Strength of magnetic field inside a solenoid increases with:

- a) Increasing current
- b) Increasing number of turns
- c) Inserting soft iron core
- d) All of the above

Correct Answer: Option (D)

Q21. Instrument used to detect presence of electric current is:

- a) Voltmeter
- b) Galvanometer
- c) Rheostat
- d) Ammeter

Correct Answer: Option (B)

Q22. A strength of magnetic field around a current-carrying wire:

- a) Increases with distance
- b) Decreases with distance
- c) Remains same
- d) First increases then decreases

Correct Answer: Option (B)

Q23. Concentric circles formed by magnetic field lines around wire center at:

- a) The wire
- b) Magnet pole
- c) Infinity
- d) Earth center

Correct Answer: Option (A)

Q24. Force acting on a current-carrying conductor in magnetic field is maximum when angle is:

- a) 0 degrees
- b) 45 degrees
- c) 90 degrees
- d) 180 degrees

Correct Answer: Option (C)

Q25. Force acting on a current carrying conductor is zero when placed:

- a) Parallel to magnetic field
- b) Perpendicular to magnetic field
- c) At 45 degree angle
- d) At 60 degree angle

Correct Answer: Option (A)

Q26. Commercial electric motors do NOT use:

- a) Electromagnet to rotate armature
- b) Soft iron core on which coil wound
- c) Permanent magnet to rotate armature
- d) Large number of turns of conducting wire

Correct Answer: Option (C)

Q27. Commutator in electric motor functions to:

- a) Reverse direction of current in coil
- b) Increase voltage
- c) Decrease resistance
- d) Measure current

Correct Answer: Option (A)

Q28. In domestic electric circuit, fuse is always connected in:

- a) Neutral wire
- b) Earth wire
- c) Live wire
- d) Any wire

Correct Answer: Option (C)

Q29. Color code of Earth wire is generally:

- | | |
|-------------------|----------|
| a) Red | b) Black |
| c) Green / Yellow | d) Blue |

Correct Answer: Option (C)

Q30. AC generator works on the principle of:

- | | |
|-------------------------------|--------------------|
| a) Electromagnetic induction | b) Heating effect |
| c) Magnetic effect of current | d) Chemical effect |

Correct Answer: Option (A)

CHAPTER 7 : OUR ENVIRONMENT

WEIGHTAGE: 4 - 5 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Ecosystem:** Structural and functional unit of biosphere consisting of biotic (living: plants, animals, microbes) and abiotic components (non-living: air, water, soil, sunlight).
- **Food Chain & Food Web:** Transfer of energy through a series of organisms. Trophic levels: Producers → Primary Consumers → Secondary Consumers → Tertiary Consumers.
- **10% Law (Lindeman):** Only 10% of energy is transferred from one trophic level to the next; 90% is lost as heat and metabolic activities.
- **Biological Magnification:** Progressive accumulation of non-biodegradable chemicals (like DDT) at higher trophic levels.
- **Ozone Layer Depletion:** Ozone (O_3) protects Earth from harmful UV rays. Depleted by Chlorofluorocarbons (CFCs) used in refrigerants. UNEP agreement (1987) froze CFC production.
- **Garbage Management:** Biodegradable waste (decomposed by microbes) vs Non-biodegradable waste (plastic, glass, pesticides). Strategies: 10 R's, composting, recycling.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Which of the following is a non-biodegradable waste?

- | | |
|--------------------|------------|
| a) Paper | b) Plastic |
| c) Vegetable peels | d) Wood |

Correct Answer: Option (B)

Q2. Ozone layer protects Earth from:

- | | |
|------------------|--------------------------|
| a) Infrared rays | b) Ultraviolet (UV) rays |
| c) Gamma rays | d) X-rays |

Correct Answer: Option (B)

Q3. Ozone molecule consists of how many atoms of oxygen?

- a) 1
- b) 2
- c) 3
- d) 4

Correct Answer: Option (C)

Q4. According to 10% law, if 1000 J energy is available at producer level, energy at primary consumer level is:

- a) 100 J
- b) 10 J
- c) 1 J
- d) 1000 J

Correct Answer: Option (A)

Q5. Main chemical responsible for ozone layer depletion is:

- a) CO₂
- b) CFCs
- c) CH₄
- d) SO₂

Correct Answer: Option (B)

Q6. Accumulation of non-biodegradable pesticides at successive trophic levels is called:

- a) Eutrophication
- b) Biomagnification
- c) Pollution
- d) Bioremediation

Correct Answer: Option (B)

Q7. Organisms which synthesize their own food are called:

- a) Heterotrophs
- b) Autotrophs
- c) Decomposers
- d) Parasites

Correct Answer: Option (B)

Q8. Decomposers help in:

- a) Recycling of nutrients
- b) Producing oxygen
- c) Trapping solar energy
- d) Preventing erosion

Correct Answer: Option (A)

Q9. In a food chain, maximum concentration of pesticides accumulates in:

- a) Producers
- b) Primary consumers
- c) Top consumers (Humans)
- d) Herbivores

Correct Answer: Option (C)

Q10. Which of the following is an abiotic component of ecosystem?

- a) Plants
- b) Animals
- c) Temperature
- d) Bacteria

Correct Answer: Option (C)

Q11. Artificial ecosystem example is:

- a) Forest
- b) Lake
- c) Crop field / Aquarium
- d) Pond

Correct Answer: Option (C)

Q12. Natural ecosystem example is:

- a) Aquarium
- b) Crop field
- c) Garden
- d) Forest

Correct Answer: Option (D)

Q13. Trophic level 1 consists of:

- a) Herbivores
- b) Carnivores
- c) Producers
- d) Decomposers

Correct Answer: Option (C)

Q14. Herbivores occupy which trophic level?

- a) First
- b) Second
- c) Third
- d) Fourth

Correct Answer: Option (B)

Q15. UNEP stands for:

- a) United Nations Environment Programme
- b) Universal National Education Policy
- c) Union Network for Energy Protection
- d) United Nations Energy Plan

Correct Answer: Option (A)

Q16. In 1987, UNEP agreement succeeded in freezing production of:

- a) CO₂
- b) CFCs
- c) Methane
- d) DDT

Correct Answer: Option (B)

Q17. UV rays cause which disease in human beings?

- a) Skin cancer
- b) Cholera
- c) Tuberculosis
- d) Dengue

Correct Answer: Option (A)

Q18. Which of the following group contains only biodegradable items?

- a) Grass, flowers, leather
- b) Grass, wood, plastic
- c) Fruit peels, cake, lime juice
- d) Both a and c

Correct Answer: Option (D)

Q19. Which of the following form a food chain?

- a) Grass, wheat, mango
- b) Grass, goat, human
- c) Goat, cow, elephant
- d) Grass, fish, goat

Correct Answer: Option (B)

Q20. Flow of energy in an ecosystem is always:

- a) Unidirectional
- b) Bidirectional
- c) Multidirectional
- d) Cyclic

Correct Answer: Option (A)

Q21. Amount of energy transferred from one trophic level to next is:

- a) 1%
- b) 10%
- c) 50%
- d) 90%

Correct Answer: Option (B)

Q22. Green plants capture approximately what percentage of solar energy incident on leaves?

- a) 1%
- b) 10%
- c) 50%
- d) 100%

Correct Answer: Option (A)

Q23. Microorganisms like bacteria and fungi are:

- a) Producers
- b) Consumers
- c) Decomposers
- d) Herbivores

Correct Answer: Option (C)

Q24. Disposal of garbage can be reduced by:

- a) Using plastic bags
- b) Composting and Recycling
- c) Burning plastic
- d) Dumping in rivers

Correct Answer: Option (B)

Q25. Ozone is formed in upper atmosphere by action of UV light on:

- a) Oxygen molecule (O₂)
- b) CO₂
- c) Water vapour
- d) Nitrogen gas

Correct Answer: Option (A)

Q26. Non-biodegradable substances:

- a) Are broken down by bacteria
- b) Persist in environment for long time
- c) Enrich soil fertility
- d) Are safe for environment

Correct Answer: Option (B)

Q27. Trophic level 3 consists of:

- a) Producers
- b) Primary consumers
- c) Secondary consumers / Small carnivores
- d) Top carnivores

Correct Answer: Option (C)

Q28. Food web is:

- a) Linear network of food chains
- b) Interconnected network of food chains
- c) Single feeding level
- d) Energy pyramid

Correct Answer: Option (B)

Q29. Which gas is produced in landfill sites?

- a) Oxygen
- b) Methane
- c) Nitrogen
- d) Argon

Correct Answer: Option (B)

Q30. Incineration means:

- a) Burning waste at high temperature
- b) Burying waste in soil
- c) Recycling paper
- d) Composting leaves

Correct Answer: Option (A)

CHAPTER 8 : HUMAN EYE AND COLOURFUL WORLD

WEIGHTAGE: 5 - 6 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Structure of Human Eye:** Cornea (refracts light), Iris (controls pupil size), Pupil (regulates light entry), Crystalline Lens (convex lens), Ciliary Muscles (adjust focal length - *Accommodation*), Retina (screen with rods and cones).
- **Defects of Vision:**
 - *Myopia (Near-sightedness):* Can see near objects clearly. Image forms in front of retina. Corrected by **Concave Lens**.
 - *Hypermetropia (Far-sightedness):* Can see distant objects clearly. Image forms behind retina. Corrected by **Convex Lens**.
 - *Presbyopia:* Old age defect due to weakening ciliary muscles. Corrected by **Bifocal Lens**.
- **Prism & Dispersion:** Splitting of white light into spectrum (VIBGYOR) due to different bending angles (Red bends least, Violet bends most).
- **Atmospheric Refraction:** Twinkling of stars, Advanced sunrise (2 min before) and delayed sunset (2 min after).
- **Tyndall Effect & Scattering:** Scattering of light by colloidal particles. Blue color of sky (short wavelength scattered more), Reddish sky at sunrise/sunset.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. The human eye forms the image of an object at its:

- a) Cornea
- b) Iris
- c) Pupil
- d) Retina

Correct Answer: Option (D)

Q2. Least distance of distinct vision for a young adult with normal vision is about:

- a) 25 m
- b) 2.5 cm
- c) 25 cm
- d) 2.5 m

Correct Answer: Option (C)

Q3. The change in focal length of an eye lens is caused by the action of the:

- a) Pupil
- b) Retina
- c) Ciliary muscles
- d) Iris

Correct Answer: Option (C)

Q4. A person near-sighted can see near objects clearly. Defect is called:

- a) Hypermetropia
- b) Myopia
- c) Presbyopia
- d) Astigmatism

Correct Answer: Option (B)

Q5. Myopia is corrected by using a:

- a) Convex lens
- b) Concave lens
- c) Bifocal lens
- d) Cylindrical lens

Correct Answer: Option (B)

Q6. Hypermetropia is corrected by using a:

- a) Concave lens
- b) Convex lens
- c) Bifocal lens
- d) Plane mirror

Correct Answer: Option (B)

Q7. Part of eye controlling entry of light into eye is:

- a) Retina
- b) Cornea
- c) Pupil
- d) Optic nerve

Correct Answer: Option (C)

Q8. Part of eye controlling size of pupil is:

- | | |
|-------------------|---------|
| a) Ciliary muscle | b) Iris |
| c) Cornea | d) Lens |

Correct Answer: Option (B)

Q9. Splitting of white light into its component colors is called:

- | | |
|---------------|---------------|
| a) Refraction | b) Reflection |
| c) Dispersion | d) Scattering |

Correct Answer: Option (C)

Q10. Which color bends the least when passing through a glass prism?

- | | |
|-----------|----------|
| a) Violet | b) Blue |
| c) Red | d) Green |

Correct Answer: Option (C)

Q11. Which color bends the most when passing through a glass prism?

- | | |
|-----------|-----------|
| a) Red | b) Yellow |
| c) Violet | d) Green |

Correct Answer: Option (C)

Q12. Twinkling of stars is due to:

- | | |
|------------------------------|------------------------|
| a) Atmospheric refraction | b) Dispersion of light |
| c) Total internal reflection | d) Tyndall effect |

Correct Answer: Option (A)

Q13. Apparent advance sunrise and delayed sunset is due to:

- | | |
|---------------------------|---------------|
| a) Atmospheric refraction | b) Dispersion |
| c) Scattering of light | d) Reflection |

Correct Answer: Option (A)

Q14. Sky appears blue because:

- | | |
|--------------------------------|--|
| a) Blue light is absorbed | b) Short wavelength blue light is scattered more by atmosphere |
| c) Red light is scattered more | d) Sun emits blue light only |

Correct Answer: Option (B)

Q15. At sunset or sunrise, sun appears red because:

- | | |
|--------------------------------|---|
| a) Red light is scattered most | b) Red light has longer wavelength and is scattered least |
| c) Blue light reaches eyes | d) Atmosphere absorbs red light |

Correct Answer: Option (B)

Q16. Scattering of light by fine particles in a colloid or fine suspension is called:

- a) Rainbow formation
- b) Tyndall Effect
- c) Spectrum effect
- d) Refraction

Correct Answer: Option (B)

Q17. Far point of normal human eye is:

- a) 25 cm
- b) 1 meter
- c) Infinity
- d) 100 cm

Correct Answer: Option (C)

Q18. Power of accommodation of eye means:

- a) Ability to adjust focal length of eye lens
- b) Ability to see in dark
- c) Ability to change pupil size
- d) Ability to refract light

Correct Answer: Option (A)

Q19. Danger signal lights are red because red light is:

- a) Scattered least by fog and smoke
- b) Scattered most by fog
- c) Absorbed by air
- d) Invisible at night

Correct Answer: Option (A)

Q20. Clear sky appears dark to an astronaut in space because:

- a) Space is full of dark matter
- b) No atmosphere to cause scattering of light
- c) Sun is not bright in space
- d) Distance is too large

Correct Answer: Option (B)

Q21. Presbyopia is caused due to:

- a) Weakening of ciliary muscles
- b) Decreasing flexibility of eye lens
- c) Both a and b
- d) Elongation of eyeball

Correct Answer: Option (C)

Q22. Bifocal lenses contain:

- a) Upper concave and lower convex
- b) Upper convex and lower concave
- c) Both concave
- d) Both convex

Correct Answer: Option (A)

Q23. Rainbow formation is caused by water droplets acting like tiny:

- a) Mirrors
- b) Prisms
- c) Concave lenses
- d) Lenses

Correct Answer: Option (B)

Q24. Phenomena involved in rainbow formation are:

- a) Refraction, dispersion, and internal reflection
- b) Reflection only
- c) Scattering only
- d) Atmospheric refraction only

Correct Answer: Option (A)

Q25. Rods in retina are sensitive to:

- a) Color of light
- b) Intensity of light
- c) Shape of object
- d) Distance

Correct Answer: Option (B)

Q26. Cones in retina are sensitive to:

- a) Light intensity
- b) Color of light
- c) Pressure
- d) Motion

Correct Answer: Option (B)

Q27. Image formed on retina is:

- a) Virtual and erect
- b) Real and inverted
- c) Real and erect
- d) Virtual and inverted

Correct Answer: Option (B)

Q28. When light enters eye, maximum refraction occurs at:

- a) Crystalline lens
- b) Outer surface of cornea
- c) Pupil
- d) Retina

Correct Answer: Option (B)

Q29. Sun appears white when it is:

- a) Near horizon at sunrise
- b) Directly overhead at noon
- c) Near horizon at sunset
- d) During eclipse

Correct Answer: Option (B)

Q30. In Myopia, image of distant object is formed:

- a) On retina
- b) In front of retina
- c) Behind retina
- d) At blind spot

Correct Answer: Option (B)

CHAPTER 9 : HOW DO ORGANISMS REPRODUCE?

WEIGHTAGE: 6 - 7 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Asexual Reproduction:** Single parent involved, no gamete fusion. Types:
 - *Binary Fission:* Amoeba, Leishmania. *Multiple Fission:* Plasmodium.
 - *Fragmentation:* Spirogyra. *Regeneration:* Planaria, Hydra.
 - *Budding:* Hydra, Yeast. *Spore Formation:* Rhizopus.
 - *Vegetative Propagation:* Layering, Grafting, Cutting (Bryophyllum leaves).
- **Sexual Reproduction in Flowering Plants:** Flower is reproductive organ. Stamen (Male: Anther, Filament), Pistil/Carpel (Female: Stigma, Style, Ovary). Double fertilization forms Zygote (2n) and Endosperm (3n).
- **Human Reproductive System:**
 - *Male:* Testes (produce sperm & testosterone), Vas deferens, Prostate & Seminal vesicles (seminal fluid).
 - *Female:* Ovaries (produce ova & estrogen/progesterone), Fallopian tube (site of fertilization), Uterus (implantation & gestation).
 - *Contraception:* Barrier methods (condoms), Chemical (pills), IUCDs (Copper-T), Surgical (Vasectomy in males, Tubectomy in females).

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Asexual reproduction takes place through budding in:

- | | |
|---------------|---------------|
| a) Amoeba | b) Yeast |
| c) Plasmodium | d) Leishmania |

Correct Answer: Option (B)

Q2. Which of the following is NOT a part of female reproductive system in human beings?

- | | |
|-----------------|-------------------|
| a) Ovary | b) Uterus |
| c) Vas deferens | d) Fallopian tube |

Correct Answer: Option (C)

Q3. Anther contains:

- | | |
|------------|------------------|
| a) Sepals | b) Ovules |
| c) Carpels | d) Pollen grains |

Correct Answer: Option (D)

Q4. Organism reproducing by multiple fission is:

- | | |
|---------------|---------------|
| a) Amoeba | b) Paramecium |
| c) Plasmodium | d) Hydra |

Correct Answer: Option (C)

Q5. Spirogyra reproduces by:

- | | |
|-----------------|------------------|
| a) Budding | b) Fragmentation |
| c) Regeneration | d) Fission |

Correct Answer: Option (B)

Q6. Bryophyllum reproduces vegetatively through its:

- | | |
|-----------|------------|
| a) Stem | b) Roots |
| c) Leaves | d) Flowers |

Correct Answer: Option (C)

Q7. Planaria exhibits high capacity for:

- | | |
|-------------------|--------------------|
| a) Binary fission | b) Regeneration |
| c) Budding | d) Spore formation |

Correct Answer: Option (B)

Q8. Male germ cells in flowering plants are present in:

- | | |
|-----------------|----------|
| a) Stigma | b) Style |
| c) Pollen grain | d) Ovule |

Correct Answer: Option (C)

Q9. Site of fertilization in human female body is:

- | | |
|-----------------------------|-----------|
| a) Ovary | b) Uterus |
| c) Fallopian tube (Oviduct) | d) Vagina |

Correct Answer: Option (C)

Q10. Placenta is a tissue that provides nutrition to fetus from mother's blood and removes:

- | | |
|-------------------------------------|------------|
| a) Oxygen | b) Glucose |
| c) Waste material / CO ₂ | d) Water |

Correct Answer: Option (C)

Q11. Surgical blocking of vas deferens in males is called:

- | | |
|-----------------|--------------|
| a) Tubectomy | b) Vasectomy |
| c) Hysterectomy | d) Copper-T |

Correct Answer: Option (B)

Q12. Surgical blocking of fallopian tubes in females is called:

- | | |
|--------------|--------------|
| a) Vasectomy | b) Tubectomy |
| c) Dialysis | d) MTP |

Correct Answer: Option (B)

Q13. Which of the following is a sexually transmitted bacterial disease?

- a) Gonorrhea & Syphilis
- b) HIV-AIDS
- c) Warts
- d) Hepatitis

Correct Answer: Option (A)

Q14. Which of the following is a viral STI?

- a) Syphilis
- b) Gonorrhea
- c) HIV-AIDS & Warts
- d) Cholera

Correct Answer: Option (C)

Q15. Mechanical barrier method of contraception that prevents STI is:

- a) Condom
- b) Oral pills
- c) Copper-T
- d) Vasectomy

Correct Answer: Option (A)

Q16. Copper-T is placed in female body in:

- a) Ovary
- b) Fallopian tube
- c) Uterus
- d) Vagina

Correct Answer: Option (C)

Q17. Testes are located outside abdominal cavity in scrotum because:

- a) Requires higher temperature for sperm formation
- b) Requires lower temperature (2-2.5 deg C lower) for sperm formation
- c) Easy movement
- d) Protection from organs

Correct Answer: Option (B)

Q18. Hormone secreted by testes is:

- a) Estrogen
- b) Progesterone
- c) Testosterone
- d) Insulin

Correct Answer: Option (C)

Q19. Primary sex organ in females is:

- a) Uterus
- b) Ovary
- c) Fallopian tube
- d) Vagina

Correct Answer: Option (B)

Q20. Duration of gestation period in human beings is approximately:

- a) 280 days / 9 months
- b) 200 days
- c) 300 days
- d) 150 days

Correct Answer: Option (A)

Q21. Breakdown of uterine lining along with blood flow when egg is not fertilized is called:

- a) Gestation
- b) Menstruation
- c) Ovulation
- d) Implantation

Correct Answer: Option (B)

Q22. Double fertilization is a characteristic feature of:

- a) Gymnosperms
- b) Angiosperms (Flowering plants)
- c) Bryophytes
- d) Algae

Correct Answer: Option (B)

Q23. Female reproductive organ of flower is called:

- a) Stamen
- b) Carpel / Pistil
- c) Petal
- d) Sepal

Correct Answer: Option (B)

Q24. Male reproductive organ of flower is called:

- a) Carpel
- b) Stamen
- c) Sepal
- d) Style

Correct Answer: Option (B)

Q25. Rhizopus (Bread mould) reproduces by:

- a) Budding
- b) Spore formation
- c) Regeneration
- d) Fission

Correct Answer: Option (B)

Q26. Reproduction essential for:

- a) Individual survival
- b) Continuation of species
- c) Energy production
- d) Excretion

Correct Answer: Option (B)

Q27. DNA replication during reproduction ensures:

- a) Transfer of genetic traits from parent to offspring
- b) Mutation only
- c) Growth of parent
- d) Death of cell

Correct Answer: Option (A)

Q28. In Leishmania, binary fission occurs:

- a) In any plane
- b) In a definite orientation relative to whip-like structure
- c) Transversely only
- d) Horizontally only

Correct Answer: Option (B)

Q29. Ovule develops into what after fertilization?

- | | |
|-----------|---------|
| a) Fruit | b) Seed |
| c) Flower | d) Leaf |

Correct Answer: Option (B)

Q30. Ovary develops into what after fertilization?

- | | |
|-----------|--------------|
| a) Seed | b) Fruit |
| c) Embryo | d) Endosperm |

Correct Answer: Option (B)

CHAPTER 10 : LIGHT – REFLECTION AND REFRACTION WEIGHTAGE: 8 - 10 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Laws of Reflection:** Angle of incidence (i) = Angle of reflection (r). Incident ray, normal, and reflected ray lie in same plane.
- **Spherical Mirrors:**
 - *Concave Mirror:* Converging mirror. Used in searchlights, solar furnaces, shaving mirrors.
 - *Convex Mirror:* Diverging mirror. Forms virtual, erect, diminished image. Used as rear-view mirror in vehicles.
 - *Mirror Formula:* $1/f = 1/v + 1/u$. Magnification $m = -v/u = h'/h$.
- **Refraction of Light:** Bending of light when passing from one medium to another. Snell's Law: $\sin i / \sin r = n$.
- **Lenses:**
 - *Convex Lens:* Converging lens.
 - *Concave Lens:* Diverging lens.
 - *Lens Formula:* $1/f = 1/v - 1/u$. Magnification $m = v/u$.
 - *Power of Lens (P):* $P = 1 / f$ (in meters). Unit: Diopetre (D).

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Focal length of a spherical mirror of radius of curvature R is:

- | | |
|-------------|--------------|
| a) $f = R$ | b) $f = R/2$ |
| c) $f = 2R$ | d) $f = R/4$ |

Correct Answer: Option (B)

Q2. Mirror used by dentists to see large image of teeth is:

- | | |
|------------------|-----------------------|
| a) Convex mirror | b) Concave mirror |
| c) Plane mirror | d) Cylindrical mirror |

Correct Answer: Option (B)

Q3. Which mirror is used as rear-view mirror in vehicles?

- a) Concave mirror
- b) Convex mirror
- c) Plane mirror
- d) Inverted mirror

Correct Answer: Option (B)

Q4. Image formed by convex mirror is always:

- a) Real and erect
- b) Virtual, erect and diminished
- c) Real and inverted
- d) Virtual and magnified

Correct Answer: Option (B)

Q5. Speed of light in vacuum is:

- a) 3×10^8 m/s
- b) 3×10^5 m/s
- c) 3×10^{10} m/s
- d) 3×10^6 m/s

Correct Answer: Option (A)

Q6. SI unit of power of a lens is:

- a) Meter
- b) Dioptre (D)
- c) Watt
- d) Joule

Correct Answer: Option (B)

Q7. A convex lens has focal length of 0.5 m. Its power is:

- a) +2 D
- b) -2 D
- c) +0.5 D
- d) +5 D

Correct Answer: Option (A)

Q8. Focal length of concave lens is always:

- a) Positive
- b) Negative
- c) Zero
- d) Infinite

Correct Answer: Option (B)

Q9. Lens formula is given by:

- a) $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$
- b) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$
- c) $\frac{1}{f} = \frac{1}{u} - \frac{1}{v}$
- d) $f = v + u$

Correct Answer: Option (B)

Q10. Mirror formula is given by:

- a) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$
- b) $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$
- c) $f = u + v$
- d) $\frac{1}{f} = \frac{v}{u}$

Correct Answer: Option (B)

Q11. Magnification produced by a rear view mirror fitted in vehicles is:

- a) Less than 1
- b) More than 1
- c) Equal to 1
- d) Zero

Correct Answer: Option (A)

Q12. When an object is placed at focus of concave mirror, image is formed at:

- a) Focus
- b) Center of curvature
- c) Infinity
- d) Between F and C

Correct Answer: Option (C)

Q13. When light travels from rarer to denser medium, it bends:

- a) Away from normal
- b) Towards normal
- c) Undeviated
- d) Reflects back 180 deg

Correct Answer: Option (B)

Q14. Refractive index of water is 1.33. Speed of light in water is approximately:

- a) 2.25×10^8 m/s
- b) 3×10^8 m/s
- c) 1.5×10^8 m/s
- d) 2×10^8 m/s

Correct Answer: Option (A)

Q15. Power of a concave lens of focal length 2 m is:

- a) -0.5 D
- b) +0.5 D
- c) -2 D
- d) +2 D

Correct Answer: Option (A)

Q16. Virtual image formed by convex lens is obtained when object is placed:

- a) At infinity
- b) Between optical center and focus
- c) At 2F
- d) At F

Correct Answer: Option (B)

Q17. Snell's Law of refraction states:

- a) $\sin i / \sin r = \text{constant}$
- b) $\sin i * \sin r = \text{constant}$
- c) $\sin i + \sin r = \text{constant}$
- d) $i / r = \text{constant}$

Correct Answer: Option (A)

Q18. An object is placed at 2F of a convex lens. Image is formed at:

- a) F
- b) 2F
- c) Infinity
- d) Between F and 2F

Correct Answer: Option (B)

Q19. Size of image formed at 2F of convex lens is:

- a) Magnified
- b) Same size as object
- c) Diminished
- d) Highly magnified

Correct Answer: Option (B)

Q20. A ray passing through optical center of lens emerges:

- a) Without any deviation
- b) Bending towards principal axis
- c) Bending away from axis
- d) Reflected back

Correct Answer: Option (A)

Q21. Convex mirror always forms image which is:

- a) In front of mirror
- b) Behind mirror
- c) At infinity only
- d) On surface

Correct Answer: Option (B)

Q22. To get a real, inverted and enlarged image by concave mirror, object should be placed:

- a) Between F and C
- b) At C
- c) Beyond C
- d) At P

Correct Answer: Option (A)

Q23. Full length image of a tall building can definitely be seen in:

- a) Small concave mirror
- b) Small convex mirror
- c) Plane mirror
- d) None of these

Correct Answer: Option (B)

Q24. Absolute refractive index of medium is ratio of speed of light in:

- a) Medium to Vacuum
- b) Vacuum to Medium
- c) Water to Medium
- d) Air to Glass

Correct Answer: Option (B)

Q25. Which lens is known as converging lens?

- a) Convex lens
- b) Concave lens
- c) Cylindrical lens
- d) Plane lens

Correct Answer: Option (A)

Q26. Which lens is known as diverging lens?

- a) Convex lens
- b) Concave lens
- c) Bifocal lens
- d) Plano-convex lens

Correct Answer: Option (B)

Q27. Unit of refractive index is:

- a) Diopetre
- b) Meter
- c) Unitless / No unit
- d) Joule

Correct Answer: Option (C)

Q28. If magnification $m = -1$, image is:

- a) Real, inverted and same size
- b) Virtual, erect and enlarged
- c) Real, inverted and diminished
- d) Virtual, erect and same size

Correct Answer: Option (A)

Q29. If magnification $m = +0.5$, image is:

- a) Virtual, erect and diminished
- b) Real, inverted and diminished
- c) Virtual and enlarged
- d) Real and enlarged

Correct Answer: Option (A)

Q30. Radius of curvature R is equal to:

- a) $f / 2$
- b) $2f$
- c) $f + 2$
- d) $1/f$

Correct Answer: Option (B)

CHAPTER 11 : LIFE PROCESSES

WEIGHTAGE: 8 - 9 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

• Nutrition:

- **Autotrophic:** Photosynthesis ($6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$ in presence of Chlorophyll & Sunlight). Stomata regulate gas exchange.

- **Heterotrophic:** Holozoic (Amoeba, Humans), Saprophytic (Fungi), Parasitic (Cuscuta, Ticks).

- **Respiration:** Breakdown of glucose to release energy (ATP).

- **Aerobic (in mitochondria):** Presence of $O_2 \rightarrow CO_2 + H_2O + 38 ATP$.

- **Anaerobic (in yeast):** Absence of $O_2 \rightarrow$ Ethanol + $CO_2 + 2 ATP$.

- **In Muscle cells:** Lack of $O_2 \rightarrow$ Lactic acid + 2 ATP (causes cramps).

• Transportation:

- **Humans:** Double Circulation (Heart: 4 chambers - 2 Atria, 2 Ventricles). Arteries carry oxygenated blood away; Veins carry deoxygenated blood to heart; Capillaries exchange materials.

- **Plants:** Xylem transports water/minerals (transpiration pull); Phloem transports food (translocation using ATP).

- **Excretion:** Removal of toxic nitrogenous waste.

- **Nephron:** Structural and functional unit of Kidney (Glomerulus, Bowman's capsule, Tubular part).

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Autotrophic mode of nutrition requires:

- a) Carbon dioxide and water
- b) Chlorophyll
- c) Sunlight
- d) All of the above

Correct Answer: Option (D)

Q2. The breakdown of pyruvate to give carbon dioxide, water and energy takes place in:

- a) Cytoplasm
- b) Mitochondria
- c) Chloroplast
- d) Nucleus

Correct Answer: Option (B)

Q3. Which of the following is responsible for transport of water in plants?

- a) Xylem
- b) Phloem
- c) Stomata
- d) Roots

Correct Answer: Option (A)

Q4. Translocation of food in plants takes place through:

- a) Xylem
- b) Phloem
- c) Cambium
- d) Epidermis

Correct Answer: Option (B)

Q5. Kidneys in human beings are a part of the system for:

- a) Nutrition
- b) Respiration
- c) Excretion
- d) Transportation

Correct Answer: Option (C)

Q6. Basic filtration unit of kidney is called:

- a) Neuron
- b) Nephron
- c) Alveoli
- d) Cilia

Correct Answer: Option (B)

Q7. Which tissue converts light energy into chemical energy during photosynthesis?

- a) Chloroplast
- b) Mitochondria
- c) Ribosome
- d) Vacuole

Correct Answer: Option (A)

Q8. Site of aerobic respiration in cell is:

- | | |
|--------------------------|-----------------|
| a) Cytoplasm | b) Mitochondria |
| c) Endoplasmic reticulum | d) Golgi body |

Correct Answer: Option (B)

Q9. Accumulation of which acid in muscles causes cramps during sudden heavy exercise?

- | | |
|-----------------|----------------|
| a) Pyruvic acid | b) Lactic acid |
| c) Acetic acid | d) Citric acid |

Correct Answer: Option (B)

Q10. In human digestive system, bile juice is secreted by:

- | | |
|-------------|--------------------|
| a) Pancreas | b) Stomach |
| c) Liver | d) Small intestine |

Correct Answer: Option (C)

Q11. Bile juice is stored in:

- | | |
|------------|----------------|
| a) Liver | b) Gallbladder |
| c) Stomach | d) Pancreas |

Correct Answer: Option (B)

Q12. Enzyme present in saliva is:

- | | |
|-------------------------------|------------|
| a) Pepsin | b) Trypsin |
| c) Salivary Amylase (Ptyalin) | d) Lipase |

Correct Answer: Option (C)

Q13. Pepsin enzyme digests:

- | | |
|------------------|-------------|
| a) Carbohydrates | b) Proteins |
| c) Fats | d) Vitamins |

Correct Answer: Option (B)

Q14. Trypsin is secreted by pancreas and acts on:

- | | |
|-----------|-------------|
| a) Fats | b) Proteins |
| c) Starch | d) Glucose |

Correct Answer: Option (B)

Q15. Lipase enzyme breaks down:

- | | |
|-------------|--------------------|
| a) Proteins | b) Emulsified fats |
| c) Starch | d) Cellulose |

Correct Answer: Option (B)

Q16. Complete digestion of carbohydrates, proteins, and fats takes place in:

- a) Stomach
- b) Large intestine
- c) Small intestine
- d) Oesophagus

Correct Answer: Option (C)

Q17. Heart of human beings has how many chambers?

- a) 2
- b) 3
- c) 4
- d) 5

Correct Answer: Option (C)

Q18. Blood vessel carrying oxygenated blood from lungs to left atrium of heart is:

- a) Pulmonary artery
- b) Pulmonary vein
- c) Vena Cava
- d) Aorta

Correct Answer: Option (B)

Q19. Blood vessel carrying deoxygenated blood from heart to lungs is:

- a) Pulmonary artery
- b) Pulmonary vein
- c) Aorta
- d) Renal artery

Correct Answer: Option (A)

Q20. Blood pressure is measured using an instrument called:

- a) Barometer
- b) Sphygmomanometer
- c) Thermometer
- d) Galvanometer

Correct Answer: Option (B)

Q21. Normal blood pressure in human adult is:

- a) 120/80 mm Hg
- b) 140/90 mm Hg
- c) 100/60 mm Hg
- d) 80/120 mm Hg

Correct Answer: Option (A)

Q22. Loss of water in form of vapor from aerial parts of plant is called:

- a) Translocation
- b) Transpiration
- c) Guttation
- d) Excretion

Correct Answer: Option (B)

Q23. Pores on leaves through which gas exchange occurs are:

- a) Lenticels
- b) Stomata
- c) Hydathodes
- d) Veins

Correct Answer: Option (B)

Q24. Opening and closing of stomatal pore is controlled by:

- a) Guard cells
- b) Epidermal cells
- c) Chloroplasts
- d) Mesophyll cells

Correct Answer: Option (A)

Q25. Respiratory pigment in human body is:

- a) Chlorophyll
- b) Hemoglobin
- c) Carotene
- d) Xanthophyll

Correct Answer: Option (B)

Q26. Alveoli are structural and functional units of:

- a) Kidneys
- b) Lungs
- c) Heart
- d) Brain

Correct Answer: Option (B)

Q27. Double circulation means blood flows through heart how many times during one cycle?

- a) Once
- b) Twice
- c) Thrice
- d) Four times

Correct Answer: Option (B)

Q28. Which blood cells help in clotting of blood at site of injury?

- a) RBCs
- b) WBCs
- c) Platelets
- d) Plasma

Correct Answer: Option (C)

Q29. Liquid portion of blood is called:

- a) Lymph
- b) Serum
- c) Plasma
- d) Platelet

Correct Answer: Option (C)

Q30. Anaerobic respiration in yeast produces:

- a) Lactic acid
- b) Ethanol + CO₂
- c) CO₂ + H₂O
- d) Pyruvate

Correct Answer: Option (B)

CHAPTER 12 : CONTROL AND COORDINATION

WEIGHTAGE: 5 - 6 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Nervous System:** Structural and functional unit is **Neuron** (Dendrite → Cell body → Axon → Axon terminal → Synapse).
- **Reflex Arc:** Sudden, involuntary response to a stimulus. Pathway: Receptor → Sensory Neuron → Spinal Cord (Relay Neuron) → Motor Neuron → Effector (Muscle).
- **Human Brain:**
 - *Forebrain:* Cerebrum (thinking, intelligence, memory, voluntary actions).
 - *Midbrain & Hindbrain:* Cerebellum (posture & body balance), Medulla (involuntary actions like BP, salivation, vomiting), Pons (respiration).
- **Plant Hormones (Phytohormones):** Auxin (cell elongation/phototropism), Gibberellins (stem growth), Cytokinins (cell division), Absciscic Acid (inhibits growth/wilting of leaves).
- **Tropic Movements:** Directional growth movements (Phototropism, Geotropism, Hydrotropism, Chemotropism). Nastic movements are non-directional (e.g. Touch-me-not plant).
- **Endocrine System (Human Hormones):** Pituitary (Master gland - Growth hormone), Thyroid (Thyroxin - requires Iodine), Pancreas (Insulin - regulates blood sugar), Adrenal (Adrenaline - emergency hormone).

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Structural and functional unit of nervous system is:

- | | |
|------------|-----------|
| a) Nephron | b) Neuron |
| c) Brain | d) Axon |

Correct Answer: Option (B)

Q2. Gap between two neurons is called:

- | | |
|-------------|------------|
| a) Dendrite | b) Synapse |
| c) Axon | d) Impulse |

Correct Answer: Option (B)

Q3. Which part of brain controls posture and balance of body?

- | | |
|-------------|---------------|
| a) Cerebrum | b) Cerebellum |
| c) Medulla | d) Pons |

Correct Answer: Option (B)

Q4. Which part of brain controls involuntary actions like blood pressure and salivation?

- | | |
|---------------|----------------------|
| a) Cerebrum | b) Medulla oblongata |
| c) Cerebellum | d) Hypothalamus |

Correct Answer: Option (B)

Q5. Main thinking part of human brain is:

- | | |
|--------------|-------------------------|
| a) Hindbrain | b) Cerebrum (Forebrain) |
| c) Midbrain | d) Cerebellum |

Correct Answer: Option (B)

Q6. Plant hormone responsible for cell elongation and phototropism is:

- | | |
|----------------|-------------------|
| a) Gibberellin | b) Auxin |
| c) Cytokinin | d) Absciscic acid |

Correct Answer: Option (B)

Q7. Plant hormone that promotes cell division is:

- | | |
|----------------|--------------|
| a) Auxin | b) Cytokinin |
| c) Gibberellin | d) Ethylene |

Correct Answer: Option (B)

Q8. Plant hormone that inhibits growth and causes wilting of leaves is:

- | | |
|--------------|-------------------------|
| a) Auxin | b) Absciscic acid (ABA) |
| c) Cytokinin | d) Gibberellin |

Correct Answer: Option (B)

Q9. Growth of pollen tube towards ovule is an example of:

- | | |
|-----------------|-----------------|
| a) Phototropism | b) Chemotropism |
| c) Geotropism | d) Hydrotropism |

Correct Answer: Option (B)

Q10. Bending of plant stem towards light is called:

- | | |
|------------------|-----------------|
| a) Geotropism | b) Phototropism |
| c) Thigmotropism | d) Hydrotropism |

Correct Answer: Option (B)

Q11. Deficiency of iodine in diet causes which disease?

- | | |
|-------------|------------|
| a) Diabetes | b) Goitre |
| c) Dwarfism | d) Rickets |

Correct Answer: Option (B)

Q12. Insulin hormone is secreted by:

- | | |
|--------------|-------------|
| a) Thyroid | b) Pancreas |
| c) Pituitary | d) Adrenal |

Correct Answer: Option (B)

Q13. Deficiency of insulin causes:

- | | |
|--------------|----------------------|
| a) Goitre | b) Diabetes mellitus |
| c) Gigantism | d) Anemia |

Correct Answer: Option (B)

Q14. Emergency hormone in human body is:

- | | |
|-------------|---------------|
| a) Thyroxin | b) Adrenaline |
| c) Insulin | d) Estrogen |

Correct Answer: Option (B)

Q15. Master gland of endocrine system is:

- | | |
|------------------|--------------------|
| a) Thyroid gland | b) Pituitary gland |
| c) Adrenal gland | d) Pancreas |

Correct Answer: Option (B)

Q16. Hormone regulating carbohydrate, protein and fat metabolism in body is:

- | | |
|-------------------|---------------|
| a) Insulin | b) Thyroxin |
| c) Growth hormone | d) Adrenaline |

Correct Answer: Option (B)

Q17. Reflex actions are controlled by:

- | | |
|----------------------|----------------|
| a) Brain | b) Spinal cord |
| c) Peripheral nerves | d) Heart |

Correct Answer: Option (B)

Q18. Electrical impulse travels in a neuron in following direction:

- | | |
|---|--------------------------------------|
| a) Dendrite -> Cell body -> Axon -> Axon terminal | b) Axon -> Cell body -> Dendrite |
| c) Cell body -> Dendrite -> Axon | d) Axon terminal -> Axon -> Dendrite |

Correct Answer: Option (A)

Q19. Drooping of leaves in Mimosa pudica (Touch-me-not plant) is:

- | | |
|-------------------------|----------------------------------|
| a) Tropic movement | b) Nastic movement (Thigmonasty) |
| c) Phototropic movement | d) Growth movement |

Correct Answer: Option (B)

Q20. Growth of roots towards gravity is:

- | | |
|--------------------------|------------------------|
| a) Positive geotropism | b) Negative geotropism |
| c) Positive phototropism | d) Hydrotropism |

Correct Answer: Option (A)

Q21. Growth of shoots away from gravity is:

- a) Positive geotropism
- b) Negative geotropism
- c) Positive hydrotropism
- d) Chemotropism

Correct Answer: Option (B)

Q22. Gland located on top of kidneys is:

- a) Thyroid
- b) Adrenal gland
- c) Pituitary
- d) Thymus

Correct Answer: Option (B)

Q23. Thyroxin hormone synthesis requires:

- a) Calcium
- b) Iodine
- c) Iron
- d) Sodium

Correct Answer: Option (B)

Q24. Dwarfism results due to deficiency of:

- a) Thyroxin
- b) Growth hormone
- c) Insulin
- d) Adrenaline

Correct Answer: Option (B)

Q25. Involuntary actions in body are controlled by:

- a) Medulla in hindbrain
- b) Cerebrum in forebrain
- c) Spinal cord only
- d) Cerebellum

Correct Answer: Option (A)

Q26. Receptor for detecting taste is called:

- a) Olfactory receptor
- b) Gustatory receptor
- c) Photoreceptor
- d) Phonoreceptor

Correct Answer: Option (B)

Q27. Receptor for detecting smell is called:

- a) Gustatory receptor
- b) Olfactory receptor
- c) Thermoreceptor
- d) Phonoreceptor

Correct Answer: Option (B)

Q28. Chemical substance released across synapse is:

- a) Hormone
- b) Neurotransmitter (e.g. Acetylcholine)
- c) Enzyme
- d) Lymph

Correct Answer: Option (B)

Q29. Which part of brain controls heartbeat and breathing rate?

- a) Cerebrum
- b) Medulla oblongata
- c) Cerebellum
- d) Thalamus

Correct Answer: Option (B)

Q30. Plant growth hormone ripen fruits:

- a) Auxin
- b) Ethylene
- c) Cytokinin
- d) ABA

Correct Answer: Option (B)

CHAPTER 13 : HEREDITY AND EVOLUTION

WEIGHTAGE: 6 - 7 MARKS

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KEY CONCEPT NOTES & ESSENTIAL KEYWORDS

- **Heredity:** Transmission of characters/traits from parents to offspring.
- **Mendel's Experiments:** Father of Genetics (Gregor Johann Mendel) chose Garden Pea (*Pisum sativum*).
- **Monohybrid Cross:** Cross involving 1 pair of contrasting traits (Tall vs Dwarf). Phenotypic ratio F₂ = **3:1**, Genotypic ratio F₂ = **1:2:1**.
- **Dihybrid Cross:** Cross involving 2 pairs of traits (Round Green vs Wrinkled Yellow). Phenotypic ratio F₂ = **9:3:3:1**.
- **Laws of Inheritance:** Law of Dominance, Law of Segregation, Law of Independent Assortment.
- **Sex Determination in Humans:** Humans have 23 pairs of chromosomes (22 pairs autosomes, 1 pair sex chromosomes). Females: XX, Males: XY. Father determines sex of child.
- **Note on Evolution:** As per updated NCERT syllabus, the 'Evolution' section has been rationalized; emphasis is primarily on **Heredity, Monohybrid/Dihybrid crosses, and Sex Determination**.

STANDARD LEVEL MULTIPLE CHOICE QUESTIONS (MIN 30 MCQS)

Q1. Who is known as Father of Genetics?

- a) Charles Darwin
- b) Gregor Johann Mendel
- c) Jean Lamarck
- d) Watson and Crick

Correct Answer: Option (B)

Q2. Mendel performed his experiments on which plant?

- a) Wild pea
- b) Garden pea (*Pisum sativum*)
- c) Mustard plant
- d) Sunflower plant

Correct Answer: Option (B)

Q3. Phenotypic ratio of F2 generation in a monohybrid cross is:

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

Correct Answer: Option (B)

Q4. Genotypic ratio of F2 generation in a monohybrid cross is:

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

Correct Answer: Option (B)

Q5. Phenotypic ratio of F2 generation in a dihybrid cross is:

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

Correct Answer: Option (C)

Q6. Human male has sex chromosomes:

- a) XX
- b) XY
- c) YY
- d) XO

Correct Answer: Option (B)

Q7. Human female has sex chromosomes:

- a) XY
- b) XX
- c) YY
- d) XO

Correct Answer: Option (B)

Q8. Number of pairs of chromosomes in human cell is:

- a) 23
- b) 46
- c) 22
- d) 44

Correct Answer: Option (A)

Q9. Number of autosomes in human somatic cell is:

- a) 23 pairs
- b) 22 pairs (44 chromosomes)
- c) 1 pair
- d) 46 pairs

Correct Answer: Option (B)

Q10. Sex of a child in humans is determined by:

- a) Mother
- b) Father
- c) Both mother and father equally
- d) Environmental temperature

Correct Answer: Option (B)

Q11. A cross between two tall pea plants produced some dwarf offsprings. Genotypes of parents must be:

- a) TT and TT
- b) Tt and Tt
- c) TT and tt
- d) tt and tt

Correct Answer: Option (B)

Q12. Which of the following is a dominant trait in pea plant?

- a) Dwarf stem
- b) Tall stem
- c) Wrinkled seed
- d) Green seed color

Correct Answer: Option (B)

Q13. The exchange of genetic material takes place in:

- a) Vegetative reproduction
- b) Asexual reproduction
- c) Sexual reproduction
- d) Budding

Correct Answer: Option (C)

Q14. Functional unit of heredity is:

- a) Chromosome
- b) Gene
- c) DNA
- d) Nucleus

Correct Answer: Option (B)

Q15. In human sperm, number of chromosomes present is:

- a) 46
- b) 23
- c) 22
- d) 1

Correct Answer: Option (B)

Q16. If a round green seeded plant (RRyy) is crossed with wrinkled yellow seeded plant (rrYY), F1 generation seeds will be:

- a) Round and Yellow
- b) Wrinkled and Green
- c) Round and Green
- d) Wrinkled and Yellow

Correct Answer: Option (A)

Q17. A gene showing its effect in presence of another contrasting gene is called:

- a) Recessive gene
- b) Dominant gene
- c) Codominant gene
- d) Mutant gene

Correct Answer: Option (B)

Q18. Trait which remains hidden in F1 generation is called:

- a) Dominant trait
- b) Recessive trait
- c) Acquired trait
- d) Inherited trait

Correct Answer: Option (B)

Q19. Acquired traits are NOT passed to next generation because they do NOT cause change in:

- a) Somatic cells
- b) Germ cell DNA
- c) Cytoplasm
- d) Body weight

Correct Answer: Option (B)

Q20. Example of acquired trait is:

- a) Eye color
- b) Learning a language / Loss of tail
- c) Height
- d) Skin color

Correct Answer: Option (B)

Q21. Which of the following combinations results in a female child?

- a) X from mother and Y from father
- b) X from mother and X from father
- c) Y from mother and X from father
- d) Y from mother and Y from father

Correct Answer: Option (B)

Q22. Zygote which has X chromosome inherited from father will develop into:

- a) Boy
- b) Girl
- c) Either boy or girl
- d) Twin

Correct Answer: Option (B)

Q23. Zygote which has Y chromosome inherited from father will develop into:

- a) Girl
- b) Boy
- c) Twin
- d) Undetermined

Correct Answer: Option (B)

Q24. DNA stands for:

- a) Deoxyribonucleic Acid
- b) Denitro Nucleic Acid
- c) Dual Nucleic Acid
- d) Deoxyribose Nucleus Acid

Correct Answer: Option (A)

Q25. Mendel's law of independent assortment is demonstrated by:

- a) Monohybrid cross
- b) Dihybrid cross
- c) Test cross
- d) Back cross

Correct Answer: Option (B)

Q26. Alternate forms of a gene are called:

- a) Chromosomes
- b) Alleles
- c) Hybrids
- d) Genotypes

Correct Answer: Option (B)

Q27. Genetic makeup of an organism is called its:

- a) Phenotype
- b) Genotype
- c) Karyotype
- d) Prototype

Correct Answer: Option (B)

Q28. Physical expression or appearance of an organism is called:

- a) Genotype
- b) Phenotype
- c) Allele
- d) Genome

Correct Answer: Option (B)

Q29. Blood group in humans is controlled by how many alleles of gene I?

- a) 2
- b) 3 (IA, IB, i)
- c) 4
- d) 1

Correct Answer: Option (B)

Q30. Total number of chromosomes in a human zygote is:

- a) 23
- b) 46
- c) 92
- d) 22

Correct Answer: Option (B)

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