



ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಶಾಲಾ ಶಿಕ್ಷಣ ಇಲಾಖೆ

ಪಾಠ ಅධ್ಯಾರಿತ ಮೌಲ್ಯಾಂಕನ ಸಾಮಗ್ರಿ

2025-26

**10 ನೇತೃರ್ಗತಿ**

ವಿಜ್ಞಾನ (ಕನ್ನಡ ಮಾಧ್ಯಮ)

ರಾಜ್ಯ ಶಿಕ್ಷಣ ಸಂಶೋಧನೆ ಮತ್ತು ತರಬೇತಿ ಇಲಾಖೆ,  
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ಮತ್ತು

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ಉಪನಾಯಕರು  
ಡಯಟ್ ಚಿತ್ರದುರ್ಗ

### ಸಂಯೋಜನೆ

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### ಪಾಠ ಅಧಾರಿತ ಮೌಲ್ಯಾಂಕನ ಸಾಮಗ್ರಿ ರಚನಾ ಸಂಪನ್ಮೂಲ ತಂಡ

1. ಶ್ರೀ ನಾಗಭೂಪಣ ಕೆ.ಟಿ, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ರೇಖಲಗೆರೆ ಲಂಬಾಣಿಹಟ್ಟಿ, ಚೆಳ್ಳಕೆರೆ
2. ಶ್ರೀ ಶ್ರೀನಿವಾಸ್ ಟಿ, ಚಿನ್ಮೂಲಾದ್ವಿ ರಾಷ್ಟ್ರೀಯ ಪೌರ್ಣಾಲೆ, ಚಿತ್ರದುರ್ಗ
3. ಶ್ರೀ ಮತಿ ಜಯಚಿತ್ರ ಕೆ.ಪಿ, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ನಲಗೇತನಹಟ್ಟಿ, ಚೆಳ್ಳಕೆರೆ
4. ಶ್ರೀ ಕುಮಾರಸ್ವಾಮಿ ಎಂ.ಹೆಚ್, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ಎನ್.ಜಿ.ಹಳ್ಳಿ, ಹೊಳ್ಳಿಲ್ಕೆರೆ
5. ಶ್ರೀ ವೀರಣ್ಣ.ಸಿ, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ಕಲಮರಹಳ್ಳಿ, ಚೆಳ್ಳಕೆರೆ
6. ಶ್ರೀ ಕಾಂತರಾಜು ಕೆ.ಸಿ, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ಎನ್. ದೇವರಹಳ್ಳಿ, ಚೆಳ್ಳಕೆರೆ
7. ಶ್ರೀ ರಾಜೇಶ್ ಎಲ್.ಎನ್, ಸರ್ಕಾರಿ ಪದವಿ ಪೂರ್ವ ಕಾಲೇಜು (ಪೌರ್ಣಾಲಾ ವಿಭಾಗ) ತುರುವನೂರು, ಚಿತ್ರದುರ್ಗ
8. ಶ್ರೀ ಡಾ|| ಮಹೇಶ್ ಕೆ.ಎನ್, ಆಂಜನೇಯ ಪೌರ್ಣಾಲೆ, ಕಡ್ಲೆಗುದ್ದು, ಚಿತ್ರದುರ್ಗ
9. ಶ್ರೀ ಮುತ್ತರಾಜ್ ಸಿ, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ಅಲೂರು, ಹಿರಿಯೂರು
10. ಶ್ರೀ ಸಯ್ಯದ್ ಸಾದಿಕ್, ಶರಣಬಸವೇಶ್ವರ ಚಿತ್ರಹಳ್ಳಿ, ಚಿತ್ರದುರ್ಗ
11. ಶ್ರೀ ನವೀನ್.ಪಿ.ಎಸ್, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ಬೇತೂರು ಪಾಳ್ಣಿ, ಹಿರಿಯೂರು
12. ಶ್ರೀಮತಿ ರೂಪ.ಸಿ, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ ಮೆಂಗಸಂದ್ಯಾಹೋಸದುರ್ಗ
13. ಶ್ರೀ ಡಾ|| ಅನಿಲ್ ಕುಮಾರ್ ಸಿ.ಎನ್, ಸರ್ಕಾರಿ ಪೌರ್ಣಾಲೆ, ಭರಮಸಾಗರ, ಚಿತ್ರದುರ್ಗ
14. ಶ್ರೀ ಮತ್ತುಂಜಯ ಸ್ವಾಮಿ, ಪಟ್ಟೇಲ್ ಬಸಣ್ಣ ಪೌರ್ಣಾಲೆ, ಮಾಡನಾಯಕನಹಳ್ಳಿ, ಚಿತ್ರದುರ್ಗ
15. ಶ್ರೀ ಅಶೋಕ್ ಎ.ಟಿ, ಶ್ರೀ ವಾಸವಿ ವಿದ್ಯಾ ಸಂಸ್ಥೆ, ಚಿತ್ರದುರ್ಗ

### ಮಾರ್ಗದರ್ಶಕರು ಹಾಗೂ ಪರಿಶೀಲಕರು

**ಶ್ರೀ ಚಲುವನಾರಾಯಣಸ್ವಾಮಿ.ಪಿ**, ಉಪ ಪ್ರಾಂಶುಪಾಲರು ಕೆ.ಪಿ.ಎಸ್, ಕಿಕ್ಕೇರಿ, ಕೆ.ಆರ್ ಹೇಟೆ, ಮಂಡ್ಯ ಜಿಲ್ಲೆ  
**ಶ್ರೀ ಚನ್ನೋಗ್ರಾಂ**. ನಿಮ್ಮತ್ತ ಮುಖ್ಯ ಶಿಕ್ಷಕರು, ಶ್ರೀ ಗಂಗಾಧರೇಶ್ವರ ಪೌರ್ಣಾಲೆ, ಮಾಗಡಿ, ಬೆಂಗಳೂರು ದಕ್ಷಿಣ ಜಿಲ್ಲೆ.

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## LEARNING OUTCOMES

<b>Serial number Of Units</b>	<b>Learning outcomes</b>
<b>Unit – 1 Chemical Equations and Reactions</b>	<ul style="list-style-type: none"> <li>➤ Will be able to understand the meaning chemical equation.</li> <li>➤ Will be able to identify and balance chemical equations.</li> <li>➤ Differentiate the types of chemical reactions with examples.</li> <li>➤ Recall the endothermic and exothermic reactions.</li> <li>➤ explain oxidation and reduction and redox reactions</li> <li>➤ Recrd the observations of Experiments</li> <li>➤ Observe the effects of oxidation reaction in day to day life.</li> </ul>
<b>Unit – 2 Acids,Bases and Salts</b>	<ul style="list-style-type: none"> <li>➤ Will be able to understand the physical properties of acids and bases.</li> <li>➤ Learn about indicators to identify acids and bases.</li> <li>➤ Understand through experiments about the reaction of Acids and bases with Carbonates and Hydrogen carbonates of metals.</li> <li>➤ understand about neutralisation reactions. Explain with the help of Chlor-alkali process that Aquatic solutions of acids and bases are good conductors of electricity.</li> <li>➤ Understand the importance of pH value and predict the daily uses of it.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ List the uses of different salts</li> </ul>
<b>Unit – 5 LifeProces</b>	<ul style="list-style-type: none"> <li>➤ Understand the meaning of life processes, Explain the process of digestion, respiration, circulation and excretion in human beings.</li> <li>➤ Draws the diagrams of the cross sectional view of Human heart, and structure of Nephron</li> <li>➤ Explain about digestion, respiration, circulation and excretion processes in plants and compare them with those of animals.</li> <li>➤ Appreciate the importance of enzymes that help in the process of digestion in human beings</li> </ul>
<b>Unit – 6 Controle and Co ordintion</b>	<ul style="list-style-type: none"> <li>➤ learn the meaning of control and coordination in Plants and animals.</li> <li>➤ understand the importance of nervous system in animals.</li> <li>➤ Come to know about reflex arc and reflex reaction.</li> <li>➤ Draws the diagram human brain and understands the functions of different parts of it</li> <li>➤ Classify the plant and animal hormones and list their functions.</li> <li>➤ Discuss about the secretions and fuctions of endocrinal glands.</li> </ul>
<b>Unit – 11 Electricity</b>	<ul style="list-style-type: none"> <li>➤ Understand the meaning of electric current, electric potential, potential difference, electric charge, electric power, their units</li> <li>➤ Draw the schematic diagram of electric circuit and symbols of circuit elements.</li> <li>➤ State Ohm's law and Joules law</li> <li>➤ Learns about the resistance , factors on which resistance depends, Draw the schematic diagram of Resistors connected in series and parallel and learns their advantages and disadvantages.</li> <li>➤ Solves problems related to heating effect of electric current and lists the practical applications of it.</li> </ul>
<b>Unit – 12 Electromagnetic Effect of Current</b>	<ul style="list-style-type: none"> <li>➤ Understands the meaning of Magnetic field and properties of magnetic field lines.</li> <li>➤ Understand the flow of electric current and magnetic force occurred around Straight and circular conductor.</li> <li>➤ Explain the meaning of Solenoid and its functions.</li> <li>➤ State Fleming's left hand rule and right hand thumb rule</li> <li>➤ Discuss about domestic electric circuits</li> </ul>
<b>Unit – 3 Metals and Non Metals</b>	<ul style="list-style-type: none"> <li>➤ Recall the physical properties of metals and non metals and classify them.</li> <li>➤ Understand the physical and chemical properties of metals and non metals explain using chemical equations.</li> <li>➤ Learn about reactivity series of metals, the availability of metals and methods of their extraction.</li> <li>➤ Understand the causes of corrosion of metals and learns how to protect them from corrosion</li> <li>➤ Draw the diagram of copper extaction apparatus and label the parts.</li> </ul>
<b>Unit – 4 Carbon and its Compounds</b>	<ul style="list-style-type: none"> <li>➤ Learns the importance of carbon, write electron dot structure for different types of carbonic compounds and explain its nature.</li> <li>➤ Define catenation</li> <li>➤ Differentiate between saturated and unsaturated compounds.</li> <li>➤ Learn to name the organic compounds.</li> <li>➤ Discuss the properties of carbon compounds and their uses.</li> <li>➤ Understand the properties and uses of Ethanol and ethanoic acid.</li> <li>➤ Apply the functions soaps and detergents in daily life</li> </ul>
<b>Unit – 7 How do Organisms Reproduce ?</b>	<ul style="list-style-type: none"> <li>➤ Understand the significance of diversity.</li> <li>➤ identify the reproductive methods found in unicellular organisms and classify nature of their properties</li> </ul>

	<ul style="list-style-type: none"> <li>➤ understands the meaning of sexual reproduction and their significance.</li> <li>➤ draw the structure of typical flower and label its parts.</li> <li>➤ explains the structure and functions of male and female reproductive systems in human beings</li> <li>➤ Learn the precautions reproduction and sexual health.</li> </ul>
<b>Unit – 8 Heredity</b>	<ul style="list-style-type: none"> <li>➤ understands the convergence of differences in the context of reproduction.</li> <li>➤ appreciates and explains the meaning of heredity, traits and Mendel's contribution to heredity.</li> <li>➤ Understands how sex of a child is determined in Humans.</li> </ul>
<b>Unit – 9 Light,Reflection And Refraction</b>	<ul style="list-style-type: none"> <li>➤ State the laws of reflection and refraction of light.</li> <li>➤ understands the meaning and uses of spherical mirrors and lenses.</li> <li>➤ solve problems related to image formation in spherical mirrors and lenses magnification and power of lenses.</li> <li>➤ draw the schematic diagram of image formation in mirrors and lenses</li> </ul>
<b>Human Eye And Colourful World</b>	<ul style="list-style-type: none"> <li>➤ understands the structure and function of human eye.</li> <li>➤ explains the accommodation capacity of the human eye.</li> <li>➤ understands the defects of human eye and their remedies.</li> <li>➤ observe the phenomenon of refraction, dispersion of light and scattering in atmosphere and explain their applications</li> </ul>
<b>Unit – 13 Our Environment</b>	<ul style="list-style-type: none"> <li>➤ understands the meaning of environmental system and its components.</li> <li>➤ differentiates between food chains and food webs</li> <li>➤ Reasons out how human activities are impacting the environment</li> <li>➤ discuss the proper management of the waste we produce</li> </ul>

## Unit-1 Chemical Reactions and Equations

### Weightage –Difficulty level

Difficulty level	Marks	No. of questions
Easy (E) 30%.	22	35
Average (A) 50%.	28	59
Difficulty (D) 20%.	50	24

### Learning points

- Chemical Equations
- Balancing Chemical Equations
- Types of Chemical Reactions
- Endothermic and Exothermic Reactions
- Oxidation and Reduction and Redox Reactions
- Effects of Oxidation Reactions in Daily Life

### I. Multiple Choice Questions. One mark questions.

1. An example for chemical change among the following is (A)
  - A. Dissolving salt in water
  - B. Tearing of paper
  - C. Rusting of iron
  - D. Boiling of water.
2. This is not a property of a chemical reaction among the following. (A)
  - A. Change in color
  - B. Release of heat
  - C. Change in shape
  - D. Release of gas.
3.  $\text{Fe}_2\text{O}_3 + 2\text{Al} \longrightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$  (Sup 2019)
 

The above chemical reaction is an example for (A)

  - A. Combination reaction
  - B. Decomposition reaction
  - C. Displacement reaction
  - D. Double displacement reaction.
4. The group of reactants among the following which react with each other to exchange ions and form a precipitate is (D) MAR-2023
  - A.  $\text{BaCl}_2$  and  $\text{Na}_2\text{SO}_4$
  - B.  $\text{Al}_2\text{O}_3$  and  $\text{HCl}$
  - C.  $\text{NaOH}$  and  $\text{H}_2\text{SO}_4$
  - D.  $\text{Na}_2\text{O}$  and  $\text{CO}_2$
5. The evolution of Oxygen and Hydrogen gases in the electrolysis of water is (E)
  - A. Double displacement reaction
  - B. Exothermic reaction
  - C. Displacement reaction
  - D. Decomposition reaction
6. The chemical reaction that takes place when reactants exchange their ions mutually is (E)
  - A. Double displacement reaction
  - B. Dissociation reaction
  - C. Dissociation reaction
  - D. Combination reaction
7.  $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$  In this reaction, the reactants that undergo oxidation and reduction respectively are (Mar 2020,Apr 2025 -1) (D)
  - A.  $\text{CuO} + \text{H}_2$
  - B.  $\text{H}_2 + \text{CuO}$
  - C.  $\text{Cu} + \text{H}_2\text{O}$
  - D.  $\text{H}_2\text{O} + \text{Cu}$
8. Silver nitrate turns into gray colour in the presence of sunlight because (D)
  - A. Silver chloride decomposes to form silver.
  - B. Silver chloride decomposes to form chlorine.
  - C. Silver chloride undergoes oxidation.
  - D. Silver chloride undergoes reduction.
9. The ratio of hydrogen and oxygen gases released in the electrolysis of water is (Aug2024) (D)
  - A. Hydrogen : Oxygen:: 1 : 2
  - B. Oxygen : Hydrogen:: 2 : 3
  - C. Hydrogen : Oxygen :: 2 : 1
  - D. Oxygen : Hydrogen:: 3 : 2
10. The conversion of vegetable waste into compost is an example for (E)
  - A. Reduction reaction
  - B. Exothermic reaction
  - C. Endothermic reaction
  - D. Redox reaction.
11. The gas released at the cathode in the electrolysis of water is (April 2022) (A)
  - A. Oxygen
  - B. Hydrogen
  - C. Chlorine
  - D. Nitrogen

12. Identify the chemical equation in which the chemical reaction takes place in the following.(Jun 2019) (D)

- A.  $\text{FeSO}_4 + \text{Pb} \longrightarrow \text{PbSO}_4 + \text{Fe}$       B.  $\text{ZnSO}_4 + \text{Fe} \longrightarrow \text{FeSO}_4 + \text{Zn}$   
C.  $2\text{AgNO}_3 + \text{Cu} \longrightarrow \text{Cu(NO}_3)_2 + \text{Ag}$       D.  $\text{PbCl}_2 + \text{Cu} \longrightarrow \text{CuCl}_2 + \text{Pb}$

13. When dilute hydrochloric acid is added to iron fillings (E)

- A. Hydrogen gas and Iron chloride are produced  
B. Chlorine gas and ferric hydroxide are produced.  
C. No reaction takes place  
D. Ferrous salt and water are produced.

14. The metal that displaces copper from copper sulphate (June2022 Apr2022) (D)

- A. Gold      B. Silver      C. Copper      D. Iron

15. Ferrous sulphate crystals lose their green colour when heated because this compound

(April2024 (1) (D))

- A. Breaks down into simpler compounds  
B. Loses water molecules  
C. Releases sulphur dioxide gas  
D. Produces brown smoke

16. Chip manufacturers flush bags of chips with nitrogen gas because

june2023 (E)

- A. To prevent corrosion  
B. To prevent oxidation  
C. To cause corrosion.  
D. To prevent reduction.

## II. Answer the following. One mark questions.

17. What is a chemical reaction? (E)

18. What is a chemical equation? (E)

19. Why should a magnesium ribbon be cleaned with sandpaper before burning it in air? (A)

20. Chemical equations are to be balanced. Why? (D)

21. The decomposition of vegetable matter into compost and the respiration process are exothermic reactions. Why ? (D)

22. What is precipitation reaction? Give an example. (E)

23. What is corrosion? (E)

24. Manufactures of chips flush the pockets of chips with nitrogen. why? (Sep2020, Mar2023,Apr2025-1) (A)

25. Iron articles are to be painted. Why? (A)

26. What is rancidity? (Apr2025-1,Apr2024-1,Apr2022) (E)

27. Suggest any two methods to prevent rancidity. (Model2025-1,Apr2025-1,Apr2024-1,Apr2022)(E)

28.  $\text{Zn} + \text{CO} \longrightarrow \text{ZnO} + \text{C}$  (Model 2025-4,Apr2024,Apr2022,Apr2020),  
Identify the substances that are oxidized and reduced in the above chemical reaction. (D)

29. When sodium sulphate solution is added to barium chloride solution, a white precipitate of barium sulphate is formed. Which are the ions responsible for this precipitate formation? (A)

30. Name the product formed when calcium oxide reacts with water. (E)

31. The magnesium ribbon burns with a dazzling white flame in air and changes into magnesium oxide  
Identify the type of reaction.(E)

## III. Answer the following questions two-mark questions.

32. List out the observations that help us to determine that a chemical reaction has taken place. (E)

33. What is a combination reaction? Give an example. (E)

34. What is a decomposition reaction? Give an example (E)

35. What is a displacement reaction? Give an example. (E)

36. Why does an iron nail change its colour when immersed in copper sulphate solution? Write the chemical equation for this reaction. . (Apr2022 Aug2024-3), (E)

37.  $\text{FeSO}_4 + \text{Cu} \longrightarrow \text{CuSO}_4 + \text{Fe}$

Is it possible for the above chemical reaction to take place? Justify your answer. (D)

38. What is a double displacement reaction? Give an example.(E)

39. Which coloured precipitation is formed, when the lead nitrate solution is mixed with Potassium iodide solution? Name the precipitate and identify the type of chemical reaction. (A)

40. Name the brown fumes liberated when lead nitrate is heated.

Write the balanced chemical equation for this reaction. (A)

41. What are endothermic and exothermic reactions? Give an example for each. (A)

42. When calcium carbonate is heated, calcium oxide and carbon dioxide are produced. (A)

Write the balanced chemical equation for this reaction and state the type of chemical reaction. (A)

43. What is a redox reaction? Give an example. (Aug2024-3) (E)

44. The chemical reaction that takes place between sodium sulphate solution and barium chloride solution is called double displacement reaction. Why? Write the balanced chemical equation for this reaction.(Sup 2022) (A)

45. Which is the type of chemical reaction where quicklime is obtained from limestone Calcium carbonate.? Write the chemical equation for this reaction. (June2022) (A)

46. Mention any two measures to prevent Corrosion.(Rusting of Iron) (Mar2020) (A)

47. A shiny brown coloured element X on heating in air becomes a black coloured compound Y. Then
- Name the element X
  - Name the compound Y. (A)

48. The given equation represents the reaction of copper sulphate with an element X.



- Which element is represented by X among Fe and Ag? Justify your answer.
- Write the molecular formula of the compound Y. (D)

49. Draw a diagram of the apparatus used in electrolysis of water and label the following parts. (A)

- Graphite rod
- Oxygen.

(Apr2019,June2019,july2022)

#### IV. Answer the following questions. Three marks questions.

50. To a solution of 5 ml of Sodium sulphate solution if the same amount of barium chloride is added, Then

- Name the white precipitate formed.
- Name the ions responsible for the formation of white precipitate.
- Mention the type of chemical reaction. (A)

51. Strips of zinc, iron, magnesium and copper are taken in test tubes A, B, C and D respectively. Equal amount of ferrous sulphate solution is added to these test tubes. In which of these test tubes does the chemical reaction take place. why? Write the chemical equations for the reactions taking place here.(Sep2020) (D)

52. Explain with an example each for the decomposition reactions that take place when energy is supplied in the form of heat, Light and Electricity. (A)

53. Name the salts that are used in black and white photography. Write the equations for the reactions when they are exposed to sunlight? (A)

54. A solution of substance Z is used for white washing

- Name the substance Z
- Write its molecular formula.
- Write the balanced chemical equation when Z reacts with water. Apr2022(A)

55. What type of chemical reaction takes place when an iron nail is immersed in a copper sulphate solution? Why? Write balanced chemical equation for this chemical reaction. (E)

56. The reaction of Barium chloride with Aluminum sulphate solution is an example for which type of chemical reaction? Why? Write the balanced chemical equation for this reaction. (A)

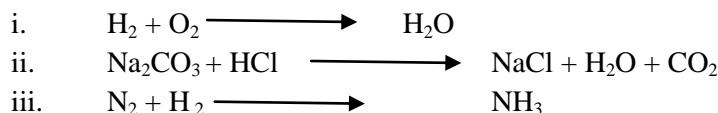
57. Write balanced chemical equations for the following chemical reactions.

- Calcium carbonate  $\longrightarrow$  Calcium oxide + carbon dioxide
- Hydrogen + chlorine  $\longrightarrow$  Hydrogen chloride
- Magnesium + hydrochloric acid  $\longrightarrow$  Magnesium chloride+ Hydrogen (A)

58. Balance the following chemical equations.

(Apr2025)

(A)



59. Write balanced equations for the following chemical reactions.

(E)

- Quicklime has reacted with water.
- Zinc flakes were added to copper sulphate solution.
- Sodium chloride solution is added to silver nitrate solution.

60. Translate the following statements into balanced chemical equations

(D)

- Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
- Barium chloride reacts with aluminum sulphate to give aluminum chloride and barium sulphate.
- Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

61. Write the balanced equation for the following chemical reactions.

(A)

- Combustion of natural gas
- Reaction of potassium metal with water
- Reaction of iron with copper sulphate.

62. Explain the following with chemical equation.

(A)

- Oxidation
- Reduction.

#### V. Four marks questions.

63. "Lead nitrate is mixed with potassium iodide solution" Answer the following questions related to the above chemical reaction.

(A)

- Write the balanced equation for this reaction.
- Name the precipitate formed in this reaction.
- Name the colour of the precipitate
- What type of chemical reaction this is?

64. Write the balanced chemical equations for the following chemical reactions and identify the type of reaction in each case.

(A)

- Hydrogen + oxygen  $\longrightarrow$  water
- Zinc sulphate + copper  $\longrightarrow$  coppersulphate + zinc
- Zinc carbonate  $\longrightarrow$  zinc oxide + Carbon dioxide
- Sodium chloride + Silver nitrate  $\longrightarrow$  Silver chloride + Sodium nitrate.

65. Give a reason

(A)

- Objects made of copper lose their luster when exposed to air.
- An iron nail placed in a solution of copper sulphate slowly turns brown.

## UNIT : 2 ACIDS, BASES AND SALTS

### Learning points

- Physical properties of acids, basic acids
- Physical properties of acids, basic acids
- Chemical properties of acids, basic acids
- How strong are solutions of acids, basic acids
- Importance of PH in daily life
- More about salts
- Uses of salts

S1 No	Types of Questions	No of Questions	Marks	Percentage
1	Easy	16	35	30
2	Average	32	59	50
3	Difficulty	19	23	20

I. Four alternatives are given for each of the following questions / incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet. (1 Marks)

1. The chemical equation that represents neutralization reaction among the following is MAIN 2019  
 (A)  $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl}$   
 (B)  $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$   
 (C)  $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$   
 (D)  $\text{AgNO}_3 + \text{HCl} \rightarrow \text{AgCl} + \text{HNO}_3$  MAIN-2019 (D)  
MAIN- 2020
2. As the pH value of a neutral solution increases  
 (A) basic property decreases and number of  $\text{OH}^-$  ions increases  
 (B) acidic property increases and number of  $\text{H}^+$  ions decreases  
 (C) basic property increases and number of  $\text{OH}^-$  ions increases  
 (D) acidic property decreases and number of  $\text{H}^+$  ions increases. (D)  
MAIN- 2021
3. A compound that reacts with both acids as well as bases to produce salts and water is  
 (A) Aluminium Oxide  
 (B) Copper Oxide  
 (C) Iron Oxide  
 (D) Sodium Oxide (A)  
MAIN- 2021
4. The gas liberated when sodium carbonate reacts with dilute hydrochloric acid is MAIN- 2021  
 (A) Carbon Dioxide  
 (B) Nitrogen Dioxide  
 (C) Hydrogen  
 (D) Chlorine (A)  
MAIN- 2021
5. The substance that converts blue litmus paper into red colour is  
 (A) Lime water  
 (B) Pure water  
 (C) Sodium hydroxide solution  
 (D) Gastric juice (A)  
MAIN- 2021
6. An acid present in the stinging hair of nettle plant leaves is MAIN- 2021  
 (A) Methanoic acid  
 (B) Oxalic acid  
 (C) Citric acid  
 (D) Lactic acid (E)  
AUG-2024
7. The compound used to remove the permanent hardness of water is  
 A) Sodium carbonate  
 B) Sodium hydroxide

- C) Sodium hydrogen carbonate  
D) sodium chloride (E)
8. The pH value range of an acid. (E)  
A) 0-7  
B) 2-12  
C) 7-14  
D) 12 - 14
9. As the number of hydrogen ions increases in a solution , then it (A)  
A) becomes neutral  
B) increases acidity  
C) Increases the basicity  
D) reduces acidity
10. Gas released when the dilute sulphuric acid is mixed with lead is (A)  
A) oxygen  
B) nitrogen  
C) Hydozen  
D) carbon
11. The product obtained when an acid is mixed with a metal is (D)  
A) Metal oxide & water  
B) Salt & water  
C) Metal oxide & hydrogen gas  
D) Salt & hydrogen gas
12. The molecular formula of lime water is (A)  
A) CaO  
B) Ca(OH)2  
C) CaCO3  
D) CO2
13. When hydrochloric acid is added to a copper oxide solution, its colour turns into blue-green due to (D)  
A) Copper oxide  
B) Water  
C) Copper hydroxide  
D) Copper chloride
14. Acid should be added to water, not water to acid. Because it is (A)  
A) Exothermic and may explode.  
B) Endothermic and may explode  
C) It does not mix

D) Mixes very slowly

**II. Answer the following questions. (1 Marks)**

15. What is Neutralisation reaction ? JUNE 2019 (E)

16. Plaster of Paris should be stored in a moisture-proof container. Give scientific reason. JUNE 2019 (A)

17. What are amphoteric oxides ? SUP-2020 (E)

18. Can detergents be used to detect the permanent hardness of water? Give reason SUP- 2020(D)

19. Name the ions responsible for acidic and basic natures of the substances. SUP-2023 (E)

20. Write any two uses of washing soda. APRIL2024(E)

21 1ml of acetic acid is mixed with 1ml of sodium hydroxide solution. Determine the nature of the salt forms here with suitable reason.

(D)

22. How is concentrated acid diluted? APRIL2025 (A)

23. How do you detect acid with litmus paper? (D)

24. What is an acid? (E)

25. Write a chemical equation for the reaction of a metal with a base (A)

26. What is the reaction product when air is blown into lime water? (A)

27. Which is the gas released when acids react with metal carbonate and metal hydrogen carbonate? (A)

28. Why is a metal oxide called a basic oxide? (A)

29. Why is a non-metal oxide called an acidic oxide? (A)

30. What are bases? (E)

31. What is the ion formed when an acid dissolves in water? (A)

32. What happens as the number of hydroxide ions in a solution increases? (A)

33. What is the pH value of acid rain? (E)

34. What is the chemical name of baking powder? (E)

35. Write the chemical equation for the preparation of baking powder. (A)

36. What is baking powder? (E)

37. Give the molecular formula and chemical name of washing soda (A)

38. Which salt is used in fire extinguishers? (E)

39. Why does baking soda swell when mixed with bread dough? (A)

**III. Answer the following questions. (2 Marks)**

40. Give scientific reason : While diluting an acid, the acid should be added to water. (JUNE-2019) (D)

41. Agricultural scientists have suggested to add a certain amount of lime powder to an agricultural field. What may be the reasons for this? Explain.

MAIN- 2020 (D)

42. The PH values of the solutions A, B and C are 5, 6 and 7 respectively. Which of these solutions has the most acidic nature and why? (D)

43. State the properties of acids. (E)

44. State the properties of bases (E)

45. You are given three test tubes, one containing distilled water and the other two containing acidic and basic solutions respectively. If you are given only red litmus paper, how will you identify each sample in the test tube? (D)

46. HCl and HNO<sub>3</sub> etc. exhibit acidic properties in aqueous solution but compounds like alcohol and glucose do not exhibit acidic properties. Why? (D)

47. Rain water conducts electric current but distilled water does not. Why? (D)

48. The pH of fresh milk is 6. How does its pH change as it curdles? Explain? (D)

49. A milkman adds a small amount of baking soda to fresh milk. (D)

a. Why does he change the pH of fresh milk from 6 to slightly alkaline.

b. Why does this milk take so long to curdle?

#### **IV. Answer the following questions. (3 Marks)**

50. Draw the diagram of arrangement of the apparatus to show the reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning. Label the following parts :

i) Zinc granules ii) Delivery tube. (A)

APRIL 2019/ APRIL 2020/ SEP 2020/ MARCH 2022/ JULY 2022/ APRIL-2024/AUG 2024

51. Name the gas liberated when an acid reacts with metallic carbonate. Write the chemical equation of the reaction when this gas is passed through lime water. What is the colour of the precipitate obtained in this reaction ?

SUP-2019 (A)

52. There is no change in the colour of red litmus and blue litmus paper when introduced into an aqueous solution of sodium chloride. After passing direct current through the same solution, red litmus changes to blue colour. Which product is responsible for this change ? Mention any two uses of this product.

MAIN-2019 (D)

53. What is a strong acid ? Explain how tooth decay is caused. How can it be prevented ? SEP 2020 (E)

54. Write the molecular formulae and two uses of each of the following compounds : SEP-2020 (E)

a) Bleaching powder

b) Plaster of Paris.

55. What is neutralisation reaction ? Give an example. (E)

56. What is the common name of the compound that has molecular formula CaSO<sub>4</sub>.1/2 H<sub>2</sub>O. (E)

57. How are concentrated acids and weak acids different? State the precautions to be taken while concentrating an acid. (Supplementary exam) (A)

58. Name the salts used in the following situations and write their molecular formula: MAIN – 2023 (A)

a) To remove permanent hardness of water.

b) To make drinking water free from germs.

- c) To support fractured bones in their right position.  
 59. The pH values of four solutions are given in the below table.

(D)

<b>Solution</b>	<b>pH Value</b>
e	5
f	13
g	9
h	2

- a. Classify these into acidic and basic solutions :  
 b. Name the antacid used to neutralise excess of acid in the stomach. MAIN - 2023

60. Simultaneously red and blue litmus papers are dipped in the brine solution and in the aqueous product produced by subjecting that solution to electrolysis. What changes do you observe in litmus papers ? Support your answer with reasons.

April 2024 (D)

61. Observe the pH values of four solutions given in the following table and answer the questions below. (A)

Solutions →	pH value
P	10.0
Q	13.7
R	7.0
S	1.2

- i) Which solution can be used to prepare an antacid ? Why ?  
 ii) Which two solutions can be used to get a neutral salt ? Why ?

62. Name the acid present in the following substances. (E)

- i) Curd ii) Gastric juice

63. Solutions ‘A’, ‘B’, ‘C’ and ‘D’ are having pH values of 2, 6, 8 and 13 respectively. Then (A)

- i) which solution has more H + and which solution has more OH – ions concentration ? Why ? AUG 2024  
 ii) which solutions can be made to react each other to get neutral salts ?

**V. Answer the following questions. (4Marks)**

64. Name the products of chloro - alkali process. Write one use of each SUP-2019 (E)  
 65. NaOH, Ca (OH)<sub>2</sub> , H<sub>2</sub> and Cl<sub>2</sub> materials are given to you. By using which of these materials you can prepare bleaching powder ? Write the chemical name and one use of the bleaching powder. (A)

66. i) How do you identify a solution as basic solution by using blue litmus paper ? (D)  
 ii) Under what condition does a farmer treat the soil of his field with slaked lime

67. Write the differences between acid and base (E)

## UNIT 5: Life Processes

### LEARNING POINTS

- Nutrition,
- Autotrophic nutrition and heterotrophic nutrition
- How organisms obtain their nutrition
- Nutrition in humans
- Transportation in humans and transport in plants
- Excretion, excretion in humans, excretion in plants

### WEIGHTAGE TO DIFFICULTY LEVEL

Sl. No.	DIFFICULTY LEVEL	NO OF QUESTIONS	MARKS	PERCENTAGE
1	EASY	31	58	30%
2	AVERAGE	48	96	50%
3	DIFFICULTY	23	38	20%

#### I. Multiple choice questions:

Four alternative answers are given to the following questions or incomplete statements. Write the correct answer in alphabetical order along with the complete answer.

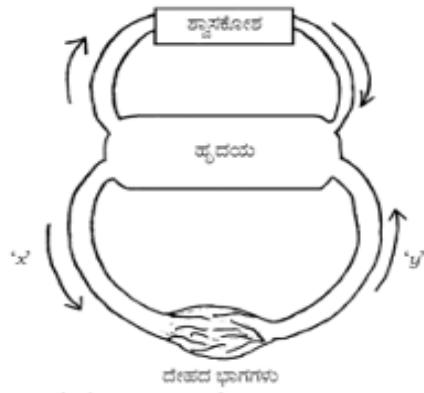
1. The correct statement regarding digestion that takes place in the small intestine is (JUNE 2019) (D)  
A. Acidic food becomes alkaline due to bile.  
B. Food becomes acidic due to hydrochloric acid.  
C. Starch is digested by the action of amylase.  
D. Protein is digested by the action of pepsin.
2. The place where carbohydrates, proteins and fats are completely digested. (SEP-2020) (JUNE-2020) (A)  
A. Stomach B. Large intestine C. Small intestine D. Liver
3. Blood vessels that carry blood from all parts of the human body to the heart (JUL-2021) (A)  
A. Arteries B. Capillaries C. Pulmonary arteries D. Veins
4. Blood vessels in the human body that carry deoxygenated blood from the heart to the lungs. (SEP2021) (A)  
A. Pulmonary veins                    B. Aorta C.                    Veins                    D. Pulmonary arteries
5. Transport of soluble photosynthesis products in plants (SEP-2021) (A)  
A. Evaporation                    B. Osmosis                    C. Diffusion                    D. Translocation
6. Important function of xylem in plants (JUN-2022) (E)  
A. Water transport    B. Food transport    C. Amino acid transport    D. Oxygen transport
7. The main function of the kidney in humans is (E)  
A. Nutrition                    B. Respiration                    C. Excretion                    D. Transport

8. The place where carbon dioxide and water are released from the breakdown of pyruvate is (A)  
A) cytoplasm      B) mitochondria      C) chloroplast      D) nucleus
9. Which of the following is a function of the kidney ? (A)  
A. Excretion of undigested food materials      B. Excretion of urea in the form of urine  
C. Excretion of carbon dioxide      D. Production of hormones
10. Function of stomata. (E)  
A. Exchange of gases      B. Transport of water      C. Transport of food      D. Transport of oxygen
11. Structural and functional unit of Kidney is (E)  
A. Neuron      B. Nephron      C. Cell      D. Muscle cell
12. A colourless, low-protein fluid in the circulatory system is (E)  
A. Red blood cells      B. Plasma      C. Lymph      D. Platelets
13. The blood vessel that carries oxygenated blood from the heart is (A)  
A. Pulmonary vein      B. Superior vena cava      C. Aorta      D. Small vessel
14. The important role of stomata in photosynthesis is (A)  
A. Creating upward tension      B. Absorbing carbon dioxide  
C. Releasing oxygen      D. Continuous transpiration.
15. Part of the excretory system that stores nitrogenous wastes dissolved in water (A)  
A. Kidney      B. Ureter      C. Urinary bladder      D. Urethra
16. Transpiration process in plant body ( SP-2024) (D)  
A. Balancing the amount of oxygen and water      B. To establish a water column in the xylem tissue  
C. To help in the transport of soluble photosynthesis products      D. To create osmotic pressure
17. Plants release excess water through this process. ( 2021) (A)  
A. Transpiration      B. Photosynthesis      C. Respiration      D. Metabolism
18. The need for suction pressure in plants is, (AUG-2024) (D)  
A. To overcome the difference in ion concentration between the root and the soil  
B. To transport food in two directions  
C. To carry water to higher parts  
D. To remove excess water from the leaves

## II. Answer the following questions (one mark questions)

19. When is lactic acid produced in muscle cells? (APR-2019) (A)
20. How is oxygen supply more efficient in birds and mammals? (D)
21. Name the products of anaerobic respiration. (JUNE -2019) (E)
22. Why do deer and rabbits have longer small intestines than tigers/lions? (D)
23. Why is the respiration rate of aquatic animals faster than that of terrestrial animals? (APR-2020) (A)
24. Write the function of the platelets. (A)
25. Name the type of transport where food material transported from the leaves to other parts ? (A)
26. What is transpiration? (E)
27. What is double circulation? (E)
28. What is excretion? (E)
29. What is the function of guard cells? (A)
30. When does stomata close? (A)
31. What is the function of the air sacs or alveoli in the lungs? (A)
32. "Osmotic pressure in the phloem tissues of plants helps in the transport of materials." Justify your answer (D)
33. "There is a time to absorb oxygen and release carbon dioxide at the beginning of respiration" Justify (D)
34. What are the finger-like structures in the small intestine called? (E)

35. Write the function of villi? (A)  
 36. Humans can't digest grass like plants. Give Reason. (D)  
 37. Diffusion is not enough to meet the oxygen requirement in multicellular organisms Why? (D)  
 38. Enzymes are biological catalysts Justify. (A)  
 39. What is life processes? (E)  
 40. Name the two types of respiration (E)  
 41. Name the product released when the 6-carbon molecule of glucose is broken down in cytoplasm? (E)  
 42. What is nutrition? (E)  
 43. Name the two types of vascular tissues in plants (E)  
 44. What is photosynthesis? (E)  
 45. What is cellular respiration? (E)  
 46. What are parasites? (E)  
 47. The haemoglobin content in the blood of two persons A and B is found to be 9gm/dl and 13 gm/dl respectively. (D)
- Which statement is correct regarding the oxygen supply in their body? (2016)  
 A) More in Person A than in B      B) More in Person B than in A
48. The schematic representation of blood circulation in the mammals is given below (APR-2024) (D)



- a) Name the blood vessels x and y.      b) Which blood vessel has a valve?

49. State the importance of transpiration in plants. (A)

### III. Answer the following questions (two marks questions)

50. Draw the diagram of open stomata and identify the following parts. (JUNE-2019) (MAY-2025) (A)
- i] Guard cells      ii] Stomatal pore

51. The approximate lengths of the small intestines of animals X and Y are given in the table. Observe  
The table and answer the questions (D)

Animals	Small intestine length
X	20 to 40 feet
Y	5 to 8 feet

Identify the herbivorous and carnivorous animals in the table and support your conclusions with scientific reasons. (JUNE-2019)

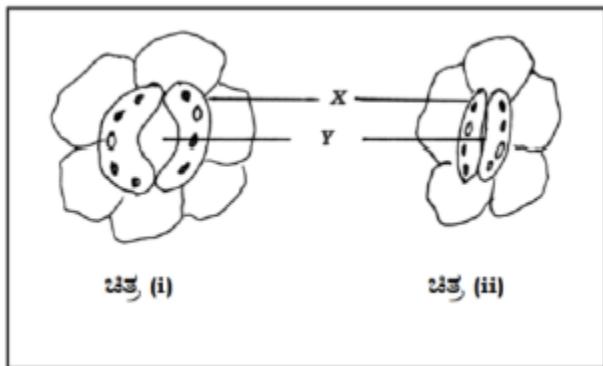
52. Chapati tastes sweeter when chewed slowly. Why? (SEP-2020) (D)  
 53. Give reason: (APR-2022) (A)

- a) The ventricles of the human heart have thick walls.  
 b) 'In mammals and birds, it is necessary to separate oxygenated and deoxygenated blood'

54. Name the enzyme present in Saliva. Write its function. (E)

55. Observe the pictures given below:

(D)



a) Which picture indicates a high rate of gas exchange? Why?

b) Name the parts X and Y and what is the function of the part X? (MARCH- 2023)

56. Draw a diagram of nephron and label the part 'Glomerulus'. (JUNE-2023) (A)

57. What is the function of bile juice? (E)

58. How oxygen and carbon dioxide are transported in humans? (A)

59. The body temperature of frogs and lizards depends on the environment temperature. Justify (MAR-2020) (D)

60. Why does the heart have different chambers? (A)

61. State the importance of double circulation. (A)

62. If humans had a three-chambered heart like a frog, then how would be the blood circulation? (D)

63. Herbivores like sheep have long small intestines, while animals like tigers have short small intestines. (D)

Write the reason for this difference?

64. Photosynthesis does not occur in plants growing in deserts as it does in normal plants. Give reason (D)

65. What is photosynthesis? What is the product released in this process? Write the function of this product. (MAR-2020) (A)

66. Lymph plays an important role in maintaining the body's immune system. Justify this statement. (MAR 2016) (D)

67. Write the difference between arteries and veins. (A)

68. What is the role of hydrochloric acid in our stomach? (A)

#### IV. Answer the following questions (Three marks questions)

69. Draw a diagram showing the section of the human heart. Identify the following parts. (A)

(i) Aorta (ii) Pulmonary veins (MAR -2020)

70. Explain the process of digestion that takes place in the small intestine of a human. (Apr-2019) (A)

71. Explain the process of transport of nutrients in plants. (Apr-2019) (A)

72. The pictures given below represent the hearts of three different animals. Observe them and answer the questions ( JUNE 2019) (D)



Which  
that



(2)



(3)

of these hearts is useful for an animal  
needs a lot of energy and why?

73. How are the functions of arteries, veins and capillaries related to each other in blood circulation? (E)  
Or

74. How is water transported to the higher parts of a plant? Explain, (SEP-2020)

75. State the differences between the circulatory systems of fish and humans. (A)

76.. Explain the stages of 'double circulation' in humans. (JUNE-2022) (E)

77. In plants, state the events that take place in photosynthesis. What are the methods used by plants to eliminate waste products? (A)

78. a) In what form do waste products accumulate in the old xylem of plants? (A)  
b) How are the products of photosynthesis transported to all parts of the plant?
79. Explain the structure and function of nephron. (MPQ 2023) (A)
80. Explain the mode of nutrition process in amoeba. (E)
81. How do the quantity of urine production in humans is controlled? (A)
82. In two animals P and Q, the small intestine is 85 feet and 15 feet long respectively, in which animal the digestion process is slow and fast? And why? Explain with suitable answer. (D)
83. What is the role of the following enzymes in the human digestive track? (APR-2025) (E)  
i) Trypsin      ii) Amylase      iii) Lipase
84. What are the differences between nutrition in autotrophs and nutrition in heterotrophs? (A)
85. Draw a schematic diagram showing the breakdown of glucose by various pathways. (A)
86. a) State any two methods used by plants to excrete waste products. (A)  
b) Which process helps in transporting water to the higher parts of the plant? (MAY-2025)
87. a) How is urine produced in the human body? Explain. (A)  
b) State the function of the following digestive juices in the human digestive track:  
i) Gastric juice    ii) Intestinal juice
88. State three ways in which parasite or heterotrophs consume food and utilize. Give 3 examples. (E)

#### V. Answer the following questions (4 marks questions)

89. In the first stage of cellular respiration, the glucose molecule is broken down into which molecule in the cytoplasm? Mention the types of respiration and write any two differences between them. (APRIL -2022) (A)
90. What are the elements required for photosynthesis? State the events that take place in this process. Express this process through a balanced chemical equation. (E)
91. a) Compare the functions of xylem tissue with those of phloem tissue. (JUNE-2023) (D)  
b) Explain the process of gas exchange in plants through stomata.
92. a). How does the structure of the human heart help in the transport of oxygenated and deoxygenated Blood? Explain. (D)  
b). How is digested food absorbed into the blood in humans? Explain the function of blood in the transport of essential substances.
93. Name the components of blood and write their functions. (E)
94. Briefly explain the role of haemoglobin pigments in our blood. (A)
95. a). Compare the air sacs in the lungs and the nephrons in the kidneys on the basis of structure and function. (D)  
b) The muscle cramps occur in the legs of a football player due to continuous practice. Give a suitable reason.
96. a) What is anaerobic respiration? What are the products produced in this process? (E)  
b) What is double circulation? How is this type of blood circulation useful in birds and mammals? (MAY-2025)
97. What are the advantages that terrestrial animals have compared to aquatic animals in terms of obtaining oxygen for respiration? (A)
98. How are the lungs designed in humans to increase the area for gas exchange? (D)

#### VI. Answer the following questions (5 marks questions)

99. a) How is glucose converted into energy molecules in aerobic respiration? (E)  
What is the role of stomata in the process of respiration in plants? (AUG-2024)  
b) What are the different excretion methods found in plants?

**UNIT - 6**  
**CONTROL AND CO-ORDINATION**

**Learning Objectives**

- **Animals – Nervous System**
- **Reflex action-reflex arc**
- **Co ordination in plants**
- **Hormones in plants and their functions**
- **Hormones in animals and their functions**

**Weightage to Difficulty Level**

Sl no	Difficulty level	Question number	Marks	Percentage
1	Easy	29	43	30%
2	Average	37	72	50%
3	Difficulty	15	29	20%

**I. Multiple choice questions:**

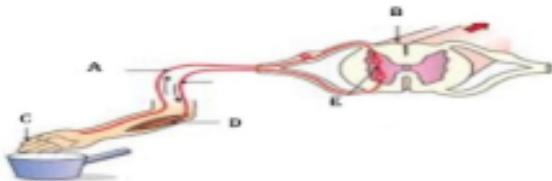
Four alternatives are given for each of the following questions/incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet. (1 Marks)

1. The brain is responsible for (A)
  - A. Thinking.
  - B. Regulating the heartbeat.
  - C. Balancing the body.
  - D. all of the above.
  
2. The incorrect statement related to thyroxin hormone among the following is (MAIN- 2020) (A)
  - A. it regulates fat metabolism
  - B its deficiency leads to goitre
  - C. it is secreted by parathyroid gland
  - D. iodine in the food is essential for its production.
  
3. The gap between two neurons is ( MAIN-2021) (E)
  - A.dendrite
  - B.axon
  - C.synapse
  - D. cell body
  
4. The following is an example of reflex action (E)
  - A. Folding the chair.
  - B. Pulling hand back when touching a sharp object.
  - C.Tasting food
  - D. Applause at the end of the program.
  
5. The centre of reflex action is (E)
  - A. Cerebrum
  - B. spinal cord
  - C.Cerebellum
  - D. Hypothalamus
  
6. The hormone that regulates carbohydrate, protein and fat metabolism in the human body. (A)
  - A. Testosterone
  - B. Adrenaline
  - C. Thyroxine
  - D. Insulin
  
7. If the roots of a plant grow towards an area of nitrate concentration, it is (A)
  - A. Phototropism
  - B. Hydro tropism
  - C.Thigmotropism
  - D. Chemo tropism
  
8. Which of the following is a mismatched pair? (A)
  - A. Adrenaline - Pituitary gland
  - B. Testosterone – Testis
  - C. Insulin - Pancreas
  - D.Thyroxine - Thyroid gland
  
9. Correct path of transmission of nerve impulses in the neuron (MAIN 2019 SUP- 2021) (D)
  - A. Dendrite→ nerve ending→cell body →axon
  - B. Dendrite→ Axon →Cell body →Nerve ending
  - C. Dendrite→Cell body→Axon→ Nerve ending

D. Nerve ending → Cell body → Axon → dendrite

10. Correct path of reflex arc in the figure given below

(D)



- A. A → B → C → D → E
- B. C → A → B → E → D
- C. C → A → B → D → E
- D. C → D → A → D → E

11. An example of positive geotropism in plants is

( SUP- 2022) (E)

- A. Growth of the stem
- B. Growth of roots deep into the soil
- C. Growth of shoots of veins
- D. Upward growth of roots

12. The part of the human brain responsible for the accuracy of voluntary actions and maintaining body posture and balance is

(E)

- A.Pons
- B. cerebrum
- C. Hypothalamus
- D. cerebellum

13.A pot that has growing seedling is kept in a dark room. A burning candle is placed near it for a few days. The top part of the seedling bends towards the light of burning candle. This is

(D)

- A. Chemotropism
- B. Phototropism
- C. Geotropism
- D. Hydrotropism

14. "A person immediately starts running soon after observing a snake." The correct transmission path of reflex impulse in this situation is ( MAIN- 2023)

(D)

- A.Receptor → Sensory neuron → Brain → Relay neuron → Motor neuron → Effector
- B.Receptor → Sensory neuron → Spinal cord → Relay neuron → Motor neuron → Effector
- C. Effector → Spinal cord → Sensory neuron → Relay neuron → Motor neuron → Receptor
- D. Effector → Motor neuron → Relay neuron → Brain → Sensory neuron → Receptor

15. Blood sugar level increases :Undersecretion of insulin hormone :: Swelling of the neck :

(A)

- A. Undersecretion of thyroxine hormone
- B. More secretion of insulin hormone
- C.More secretion of thyroxine hormone
- D. Excess intake of iodine.

16. The hormone secreted by the pancreas,

(EXAM -2,3 2024) (E)

- A. regulates metabolic activities
- B. regulates blood sugar level
- C. stimulates the growth in the body organs
- D. increases breathing rate

17. Which of the following is a plant hormone?

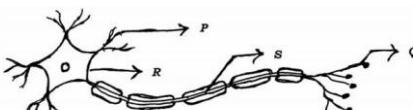
(E)

- A. Insulin
- B. Thyroxine
- C. Cytokinin
- D. Estrogen

18. The correct path of the movement of nerve impulses in the following diagram is

(MAIN-2019)

(D)



- A. Q → S → R → P
- B. P → Q → R → S

- C. S → R → Q → P  
D. P → R → S → Q

19. The part of the brain that controls activities such as Riding a bicycle, Writing with a pen grip is (A)  
A. Cerebrum B. Cerebellum C. Medulla D. Pans
20. This part of the brain is responsible for making your mouth water when you see tamarind. (A)  
A. Cerebrum B. Cerebellum C. Medulla D. Pans
21. The movement of pollen grains towards the ovary in plants. (A)  
A Phototropism B Geotropism C Hydrotropism D . Chemotropism
22. The plant hormone responsible for Phototropism in plants is (E)  
A. Auxin B Cytokinin C Abscisic acid D Gibberellin
23. The information sensed by receptors in the body is carried through (A)  
A Through electrical signals B Through blood C Through lymph D Through vessels
24. Upward growth of stem in plants (EXAM-2 2025) (D)  
A. Negative geotropism and positive hydrotropism  
B. Positive geotropism and negative hydrotropism  
C. Negative phototropism and positive gravity transduction  
D. Negative geotropism and positive phototropism
25. Identify the correct statement regarding plant hormones. (MP 2020) (D)  
A. Cytokinin promotes leaf wilting  
B. Auxin inhibits stem elongation  
C. Abscisic acid inhibits plant growth.  
D. Gibberelin promotes leaf abscission.
26. The pattern of root responses in plants (MP 2021) (D)  
A. Directed and negative phototropism  
B. Positive phototropism and negative geotropism  
C. Undirected and positive geotropism  
D. Growth-dependent and positive hydrotropism
27. The response that does not occur in plants based on their growth is, (D)  
A. Stems bending towards light  
B. Roots going down into the soil  
C. Leaves tingle when touched  
D. The shoots of a vine rising.

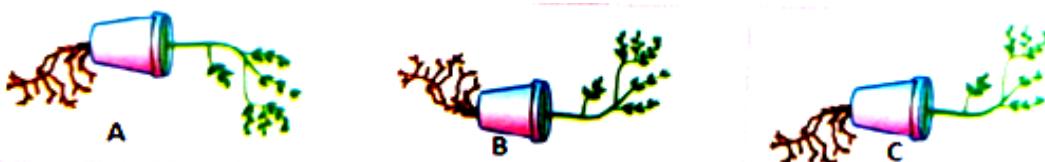
## II. Answer The Following (ONE MARK QUESTIONS)

28. What are the tropism movements necessary for growth in the roots and shoots of plants?(MP 2024) (E)
29. What is geotropism ? (MP 2019) (E)
30. What is neuron? (EXAM -1 2025) (E)
31. Which hormone inhibits the growth of plants? (SUP- 2022) (E)
32. What is reflex action? Give an example. (E)
33. How does chemical coordination occur in plants? (A)
34. Name the mineral necessary for the production of thyroxine hormone. (E)
35. What is the role of abscisic acid in plants ? (MAIN – 2023) (A)
36. What is the function of pancreas as an endocrine gland? (A)
37. How do muscle cells respond to nerve impulses? (A)
38. What is voluntary action? (E)
39. What is involuntary action? (E)
40. Name the parts of the human brain that control voluntary and involuntary actions. (E)

41. What is the role of receptors in our body? (E)  
 42. Name the plant hormones that promote growth. (E)  
 43. What is the difference between reflex action and walking? (A)  
 45. The folding up of leaves of sensitive plant (touch-me-not plant) on touching with a finger is not a tropism.  
 Why? (MODEL QP-1 -2025) (A)

### III. Answer The Following (TWO MARK QUESTIONS)

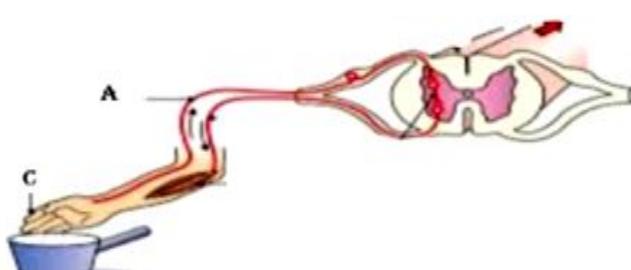
46. A doctor advises an elderly person to consume less sugar in the diet. What disorder is that person suffering from?.Name the hormone responsible for this condition. (D)  
 47. How is the function of thyroid gland helpful for balanced body growth in humans? (A)  
 48. A person's face has become pale and his breathing rate has increased due to fear. Analyse the process which enables the person to deal with this situation. (SUP-2020) (A)  
 49. How does chemical coordination take place in animals? (D)  
 50. Write two differences of functions between the endocrine glands and the nervous system (A)  
 51. Write the functions of medulla and cerebellum of the human brain. (MODEL QP-1 -2025) (A)  
 52. The part of a neuron that helps the nerve impulse pass through it is A. Towards the cell B. Away from the cell (A)  
 53. How does adrenaline help an athlete to prepare for a race? (A)  
 54. How does the movement of the leaves of the sensitive plant when touched? (A)  
 55. Phototropism is beneficial for plants. Justify your answer with suitable reasons.? (A)  
 56. What causes mouth watering at the sight of delicious food? Which part of the brain controls this? (A)  
 57. What causes a person who has consumed more alcohol to lose control over his body? (A)  
 58. What causes the stem of a plant to grow towards the light and the roots towards the ground? (E)  
 59. Which of the following figures shows the correct tropic movements and why? (D)



60. Write two differences between the central nervous system and the peripheral nervous system. (A)  
 61. Write two differences between the endocrine glands and the nervous system (A)  
 62. Mention the function of the following plant hormones :  
 i) Auxin ii) Cytokinin. (MAIN- 2022)  
 63) How do auxins promote the growth of tendrils of climbing plants around a support ?(EXAM -1 2025) (A)  
 64) How does our body respond when adrenaline is secreted into the blood ? (EXAM -1 2025) (A)

### IV THREE MARK QUESTIONS

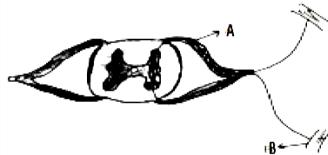
65. "Functioning of Reflex arc is more effective than thinking process of the brain" clarify this statement with scientific reason. (A)  
 66. In multicellular organisms chemical communication is more stable and continuous. Compared to electrical Communication. give reason. (A)  
 67. How is phototropism, Thigmotropism and chemo tropism coordinated in the apparent movement of creepers (climber plants) towards a particular direction?(MODEL QP-1 -2025) (D)  
 68. Name the structure given below. What is its common function? Mention the function of the part A and C. (E)



69. Draw a diagram of the structure of the human brain and label the parts. (A)  
**(Exam -1,2 2025,main 2023 , march -2022 june 2020)**
70. What is the role of insulin, estrogen and thyroxine hormones in our body? (MODEL QP-1 -2025)(E)
71. Imagine the following situations :(SUP-2019 ) (E)
- Clapping at the end of a programme.
  - Fluctuating blood pressure in the body.
- How these situations are functionally different? Give reason. (E)
72. "We withdraw our leg when stepped on thorn unknowingly." (SUP-2019) (D)
- Trace the sequences of events which occur in this action.
  - Which part of human nervous system controls this action?

#### V. Four Mark Questions

73. Name the hormones that control the following activities in humans. (E)
- Control the level of sugar in the blood.
  - Control the menstrual cycle.
  - Prepare the body to face the emergency situation
  - Control metabolism.
74. Name the structural and functional unit of nervous tissue. (E)
- Write the path of transmission of nerve impulses in this unit
  - State its function.
75. What is reflex arc ? Trace the sequence of events that occur in this structure, when a bright light is focused on our eyes. (MODEL QP-2 -2025) (E)
76. How is the movement of leaves of a touch me not plant different from the movement of a shoot towards light? (A)
77. Name the given structure. What is its general function? Mention the function of the parts labeled as A and B. These structures in animals are said to be efficient ways to give quick responses. Why? MAIN- 2020 (A)



78. a. As the growth advances in a climbing plant ( creeper ) that appears as the plant is moving towards a particular direction. How ?  
 b. Explain the necessity of chemical communication in animals. SUP-2023 (D)

#### VI. FIVE Marks question :

79. a) How do climbing plants ( creepers ) show directional movement ? Explain.  
 b). Mention the function of thyroxine and adrenaline hormones in the human body. (A)

# UNIT-11

## Electricity

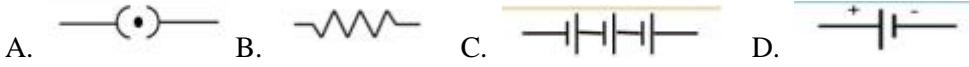
### Weightage-Difficulty level

Difficulty level	No.of Questions	No. of Marks	Percentage
Easy	32	43	30%
Average	43	71	50%
Difficulty	19	28	20%

#### Learning points

- Electric current, electric circuit ,electric potential, potential difference, electric charge, electric capacity and their SI units
- Electric circuit and their symbols
- Ohm's law and Joule's law of heat generation
- Resistance of a conductor, types of Resistors circuit, advantages and disadvantages of series and parallel circuits
- Series and parallel circuit connectins diagrams
- Thermal effects of electric current and its practical applications.

**I. Four alternatives are given for each of the following questions / incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet.**

1. SI unit of Electric current (MQP3-25) (E)  
A. Ampere (A)    B. ohm(  $\Omega$  )    C. Volt ( V )D.Watt ( W )
2. SI unit of Power (E)  
A. Ampere (A)    B. ohm(  $\Omega$  )    C. Volt ( V )    D. Watt ( W )
3. The property of the conductor that opposes the flow of charges through it is called (E)  
A. electric current    B. electric potential difference    C. electric resistance    D. electric power
4. Rate of flow of electric charges called (E)  
A. Electric current    B. Electric potential    C. Electric resistance    D. Electric power
5. The work done in bringing an unit charge from one point to another through conductor is called (A)  
A. electric current    B. electric potential C. electric resistance    D. electric power
6. Rate of consumption of energy is called (A)  
A. electric current    B. electric potential difference    C. electric resistance    D. electric power
7. The symbol used to represent Electric cell (A)  

8. The symbol for closed circuit in electric circuit. (A)  

9. The symbol used to represent dry cell in a circuit (A)  

10. symbol in electric circuit represents (A)  
A. resistor    B. ammeter    C. dry cell    D. voltameter
11. In an electric circuit the ammeter and voltmeter are generally connected like this (A)  
A. both are connected in parallel                      B. both are connected in series  
C. ammeter in series & voltmeter in parallel    D. ammeter in parallel & voltmeter in series
12. Formula that is not applicable to represent ohm's law is (A)  
A. $V/I = R$  B.  $V = IR$     C.  $I = V/R$  D.  $V = I/R$

13. The net resistance when  $2\ \Omega$  &  $4\ \Omega$  resistors are connected in series and a  $4\ \Omega$  resistor is connected in parallel is (D)

- A.  $2\ \Omega$
- B.  $2.4\ \Omega$
- C.  $4\ \Omega$
- D.  $10\ \Omega$

14.  $6\ \Omega$  The resistance of a conductor is  $27\ \Omega$ . If it is cut into three equal parts and connected in parallel, then its total resistance is (MAIN-2019) (D)

- A.  $6\ \Omega$
- B.  $3\ \Omega$
- C.  $9\ \Omega$
- D.  $27\ \Omega$

15. The net resistance when  $2\ \Omega$  &  $3\ \Omega$  resistors are connected in parallel and a  $2\ \Omega$  resistor is connected in series (D)

- A.  $3.2\ \Omega$
- B.  $2\ \Omega$
- C.  $3\ \Omega$
- D.  $1\ \Omega$

16. A piece of metallic wire of resistance  $R$  is cut into 3 equal parts. These parts are then connected in parallel. If the total resistance of this combination is  $R_1$ , then the value of  $R : R_1$  is (SEP-2019) (D)

- A.  $1 : 3$
- B.  $9 : 1$
- C.  $1 : 9$
- D.  $3 : 1$

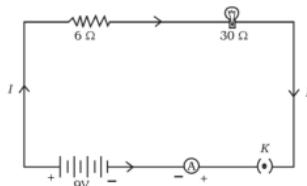
17. An electric circuit of  $6V$  potential difference does the work of  $24J$ , then the amount of charges flown (D)

- A.  $2C$
- B.  $4C$
- C.  $6C$
- D.  $10C$

18..If  $10C$  of charges flow through an electric circuit of  $4V$  potential difference , then the amount of work done is (D)

- A.  $10J$
- B.  $20J$
- C.  $40J$
- D.  $30J$

19.. An electric lamp whose resistance is  $30\ \Omega$  and a conductor of  $6\ \Omega$  resistance are connected in series to  $9V$  battery as shown in the figure. The total current flowing in the circuit is (MAIN- 2021) (D)



- A.  $4\ A$
- B.  $36\ A$
- C.  $0.25\ A$
- D.  $0.6\ A$

20.In a conductor if the amount of electric current is  $4A$  then the resistance is  $12\ \Omega$  . If the resistance is doubled then the electric current would be (D)

- A.  $2A$
- B.  $3A$
- C.  $4A$
- D.  $8A$

21.The resistance of a conductor of length  $4l$  is  $4\ \Omega$ , if the length becomes  $2l$  then the resistance will be (D)

- A.  $0.5\ \Omega$
- B.  $2\ \Omega$
- C.  $4\ \Omega$
- D.  $8\ \Omega$

22. Device used to measure the potential difference (E)

- A. Galvanometer
- B. ammeter
- C. Speedometer
- D. Voltmeter

23. The formula for electric power is (D)

- A.  $P = I \times R$
- B.  $VI = P$
- C.  $P = V \times R$
- D.  $V \times R = P$

24. The correct statement related to resistance is it is (E)

- A. directly proportional to potential difference but inversely proportional to current
- B. inversely proportional to potential difference but directly proportional to current
- C. inversely proportional to both potential difference and current
- D. directly proportional to both potential difference and current

25. The safety device used to avoid short circuit. (E)

- A. fuse
- B. switch
- C. resistor
- D. transistor

26. The formula used to measure electric current.....(A)

- A.  $E = VI t$
- B.  $E = Pt$
- C.  $E = RCt$
- D.  $E = Vt$

27. A device used to change the resistance in the electric circuit is (MAIN- 2021) (E)

- A. Voltmeter
- B. Ammeter
- C. Galvanometer
- D. rheostat

28. ‘Ohm’ is the SI unit of (MAIN- 2021) (E)  
 A. Electric Potential Difference    B. Resistance    C. Electric Current    D. Electric Charge
29. The metal used in the filament of an electric bulb is (MAIN- 2021) (E)  
 A. Manganese    B. Tungsten    C. Nickel    D. Chromium
30. The SI unit of electric potential difference is (SEP- 2021) (E)  
 A. Volt    B. Ampere    C. Ohm    D. Coulomb
31. The resistance of an electric heater coil is  $110\ \Omega$ . Then electric current, that an electric heater draws from a 220 V source is, (SEP- 2021) (A)  
 A. 0.5 A    B. 0.11 A    C. 2 A    D. 3 A
32. A device that is connected in series in an electric circuit is (SEP- 2021)  
 A. Voltmeter    B. Bar Magnet    C. Turbine    D. Ammeter
33. Observe the following table : (SEP- 2021)

<b>Material</b>	<b>Resistivity (<math>\Omega m</math>)</b>
K	$2.63 \times 10^{-8}$
L	$5.20 \times 10^{-8}$
M	$1.60 \times 10^{-8}$
N	$6.84 \times 10^{-8}$

The best conductor of electricity among these materials is

- A. N    B. M    C. K    D. L

34. The function of fuse in an electric circuit is that, it (SEP- 2021) (E)

- A. Reverses the direction of an electric current  
 B. Shows the direction of motion of the electric current  
 C. Measures the potential difference  
 D. Protects the electrical appliances

35. The correct formula that shows the relationship between potential difference, electric current and resistance in an electric circuit is ( MAIN- 2022) (A)

- A.  $I = V/R$     B.  $I = VR$     C.  $V = RI$     D.  $R = IV$

36. The device used to measure the rate of current in a circuit is. (MAIN – 2023) (E)

- A. Ammeter    B. Voltmeter    C. Galvanometer    D. Battery

37. The SI unit of resistivity is (SEP- 2022) (E)

- A. ohm    B. volt    C. watt    D. ohm-metre.

38. Ohm's law gives the relationship between (A)

- A. potential difference and electric charge                      B. potential difference and resistance  
 C. electric current and potential difference                      D. electric current and electric power (MQP1-25)

39. In an electric circuit to get an equivalent resistance  $R_s$  four resistors of  $2\ \Omega$  each are first connected in Series. Later to get an equivalent resistance of  $R_p$  the same resistors are connected in parallel. Then the Ratio of  $R_s/R_p$  is (D)

- A. 16:1    B. 2:1    C. 4:1    D. 8:1

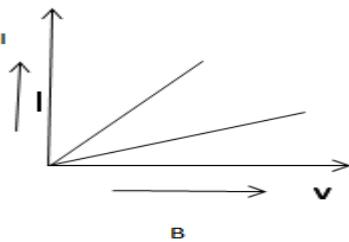
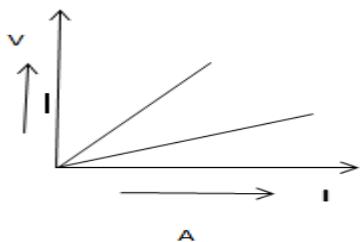
(Main-2024)

40. SI unit of electric charge is (E)

- A. Coulomb    B. Ampere    C. Joule    D. Volt

## II. One mark Questions :

41. Two connecting wires of same length and same diameter are made up of copper and iron. Among these two which is having more resistance? (A)
42. Two students A and B conduct experiment connecting  $R_1$  and  $R_2$  resistors in series and parallel and plot the graph of V-I as below. Who has plotted the graph correctly? (D)



46. How many joules does 1 unit (Kwh) have? (E)
47. Define 1 ohm? (E)
48. What is the meaning of 1 Ampere? (E)
49. How many electrons does 1 coulomb ( C ) have? (E)
50. “ The potential difference between two points of connecting wire is 1 volt” define the statement. (E)
51. Name the devices used to measure Electric current and potential difference. (E)
52. What is the Resistance of a conductor? (E)
53. When did the resistance of a conductor becomes  $1 \Omega$ ? (E)
54. Why the Nitrogen or Argon gas is filled inside the electric bulb? (A)
55. Name the commercial unit of electricity. (E)
56. How is fuse connected in an electric circuit? (E)
57. What are the uses of fuse in domestic electric circuit? (E)
58. Why Tungsten wires are used in electric bulb? (E)
59. Write the symbols for the following terms in electric circuit. (A)
- i) A wire joint ii) electric bulb.
57. Write the diagram of the symbol of resistors used in electric circuit ( Mar/Apr-2025) (A)
58. What is the SI unit of potential difference? Name the device used to measure the potential difference. (MAIN- 2020) (A)
59. Suggest any two measures to avoid overloading in domestic circuits. (SEP-2020) (A)
60. What are the reasons for occurring overload in an electric circuit ? (SEP- 2022) (A)
61. Write the symbols of the following components used in an electric circuit. (A)  
(MAIN – 2023,MQP4-25, SEP-2023) (A)
- i) Rheostat ii) Wires crossing without joining. (MAIN – 2023,MQP4-25, SEP-2023 MQP1-25, MQP3-25)
62. Write the symbols of the following components used in an electric circuit. i) Electric cell ii) Voltmeter (MQP3-25, May-2025) (A)
63. Draw the symbol diagram of two electric cells connected in series in an electric circuit. (MQP2\_25) (A)
64. Can an electric heater of 2KW capacity be connected to an electric circuit of 15A rating, 220V potential difference? Justify your answer. (Mar/Apr-2024) (A)
- III. Two mark Questions :**
65. What is electric circuit? Write the schematic diagram of an electric circuit comprising cell, electric bulb, ammeter & plug key. (Main-2022) (E)
66. In which of the below devices the electric energy is used maximum? (D)

electric devices	Electric power	Time used
t.v	250W	1hours

toaster	1200 W	10 Minutes
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67.  $.2\ \Omega$ ,  $3\ \Omega$  &  $4\ \Omega$  resistors are connected in parallel & then in series. In which connection does their total resistance will be less than their resistance? (A)
68. Resistivity of copper  $1.63 \times 10^{-8}\ \Omega\text{m}$  & its cross section is  $10.3 \times 10^{-5}\text{cm}^3$ . Calculate the length of wire needed to make a coil of  $10\ \Omega$  resistance. (A)
69. Electrical resistivity of some substances at  $20^\circ\text{C}$  is given below. (D)

Materials	Resistivity
silver	$1.60 \times 10^{-8}\ \Omega\text{m}$
copper	$1.63 \times 10^{-8}\ \Omega\text{m}$
tungsten	$5.2 \times 10^{-8}\ \Omega\text{m}$
nickel	$100 \times 10^{-6}\ \Omega\text{m}$

i) Among silver and copper which is the good conductor. Why?

ii) Which material is suitable for electrical heating. Why?

70. Explain the working principle of electric fuse. (A)

71. Define Electric resistance and resistivity. How are they interrelated?

(A)

72. Explain the working mechanism of an Electric bulb. (A)

73. In domestic electric circuit it is suitable to connect electrical devices in parallel.

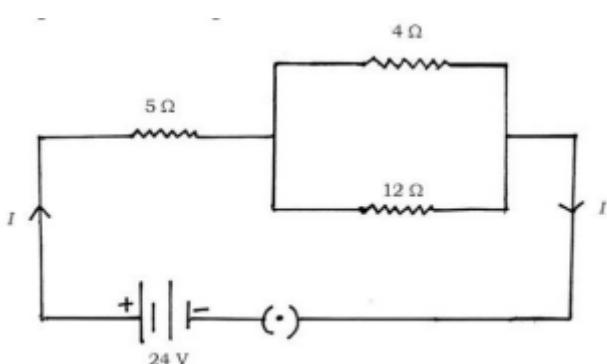
Mention two reasons for it. (A)

74. State Joule's law of heating. How fuse is connected in an electrical circuit. Mention the Metal used in a filaments of an electric bulb and the gas filled in the bulb (MARCH-2023) (E)

75. A bulb is marked  $220\text{ V}$  and  $40\text{ W}$ . Calculate the current flowing through the bulb and its resistance. (SEP-2019) (A)

76. The resistivity of manganese wire of length  $1\text{ m}$  is  $1.84 \times 10^{-2}\ \Omega\text{m}$  at  $20^\circ\text{C}$ . If the diameter of the wire is  $3 \times 10^{-4}\ \Omega\text{m}$ , what will be the resistance of the wire at that temperature? (MAIN- 2020) (A)

77. Observe the given circuit: (D)



Calculate the total resistance in the circuit and the total current flowing in the circuit.

78. An electric bulb with a resistance of  $50\ \Omega$  is connected to  $10\text{ V}$  battery in an electric circuit. Calculate the electric current flowing through the electric bulb and electric power of the bulb. (SEP- 2022) (D)

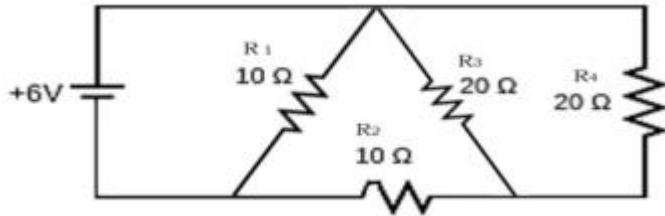
79.  $1000\text{ J}$  of heat is produced each  $2$  seconds in a  $5\ \Omega$  resistor. Find the potential difference across the resistor. (SEP-2023) (D)

80. A wire of given material having length ' $l$ ' and area of cross section ' $A$ ' has a resistance of ' $4\ \Omega$ '. Find the resistance of another wire of the same material having length  $l/2$  and area of cross-section ' $2A$ '. (SEP-2023) (D)

81. Placing a fuse in domestic electric circuits is essential. Why ? Explain. (A)

#### IV. Three mark Questions :

82. Find out amount of electric current flowing through below circuit. (D)



83. The value of resistors  $R_1$ ,  $R_2$  &  $R_3$  are  $5\ \Omega$ ,  $10\ \Omega$  &  $30\ \Omega$ . If they are connected to dry cell of  $12V$  potential difference . Caluculate (A)

- i) Electric current flowing through each resistor
- ii) Total electric current through circuit.
- iii) Total resistance of entire circuit.

84. A Refrigerator of  $400\text{ Watt}$  works  $10\text{ hrs}$  daily, an electric fan of  $80\text{ Watt}$  works  $6\text{ hrs}$  daily and an electric bulb of  $18\text{ Watt}$  glows  $6\text{ hrs}$  daily. If the rate of per unit is  $3$  rupees, Then what is the amount of electric bill the owner has to pay in the month of june? (A)

85. Among iron, silver and nichrome which one is utilised inside an electric iron box which works on the heating effect of electric current . Justify your answer with  $3$  reasons. (D)

86. A connecting wire of  $20\ \Omega$  resistance is drawn to double its length . caluculate the resistance in new situation. (D)

87. i) State ohm's law. (May-2025) (E)  
 ii) List the factors on which the resistance of conductor depends. (Main-2023, Main-2024, Sep-19(4M), Sep-22)

88. State Joule's law of heating. Explain the working of electric filament bulb. (A)

89. The resistors  $R_1$  ,  $R_2$  and  $R_3$  have the values  $10\ \Omega$ ,  $20\ \Omega$  and  $60\ \Omega$  respectively, which have been parallelly connected to a battery of  $24\text{ V}$  in an electric circuit. Then calculate the following : (MAIN – 2023) i) The current flowing through each resistor (A)

- ii) The total current in the circuit
- iii) The total resistance of the circuit.

90. Resistance of a metal wire of length  $2\text{ m}$  is  $28\ \Omega$  at  $20^\circ\text{C}$ . If the diameter of the wire is  $0.04\text{ mm}$  then what will be the resistivity of the metal at that temperature ? (MQP4-25) (A)

#### V. Four mark Questions:

91. a) Name any two devices that work on the application of Joule's law.  
 b) Why are the alloys like nichrome used in electrical heating devices? (SEP- 2022) (A)
92. a) A bread-toaster rated  $350\text{ W}$  is used for  $15$  hours a day. An electric iron box rated  $250\text{ W}$  is used for  $5$  hours a day. Calculate the cost of using these appliances for  $30$  days, if the cost of  $1\text{ kWh}$  is Rs.  $4$ .  
 b) In which method the resistors  $R_1$  and  $R_2$  could be connected so that the equivalent resistance of that electric circuit becomes low? What is the change in the value of current in the circuit by this type of connection? (SEP-2023) (A)
93. An electric heater connected to a  $220\text{ V}$  generator draws a current of  $10\text{ A}$ . What is the power of the electric heater ? If it is used for  $8$  hours a day then calculate the total cost of using it for  $30$  days at Rs. $5.00$  per  $1\text{ kWh}$ . (MQP1-25) (D)

#### VI. Answer the following questions. (5 Marks)

94. What is the meaning of the statement "The potential difference between two points is  $1\text{V}$ "?  
 i. Name the device used to measure potential difference.  
 ii. What is resistance of a conductor? (May-2025)  
 iii. What is electric power? Write three formulae used to find it. (SEP-2020)

## **UNIT - 12. Magnetic Effects of Electric Current**

### Learning points

- Magnetic field and magnetic lines of force
- Magnetic field due to a current carrying conductor
- Magnetic field due to current flowing in a straight conductor
- Right hand rule
- Magnetic field due to current in a circular conductor
- Magnetic field due to current in a solenoid
- Force on a current carrying conductor in a magnetic field
- Household electrical circuits

### **➤ Weightage to Difficulty Level**

SERIAL NO	Difficulty level	Number of questions	Marks Percentage	Percentage
<b>1</b>	Easy	<b>15</b>	<b>22</b>	<b>30</b>
<b>2</b>	Average	<b>23</b>	<b>36</b>	<b>50</b>
<b>3</b>	Difficulty	<b>10</b>	<b>14</b>	<b>20</b>

**I. Four alternatives are given for each of the following questions/incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet. (1 Marks)**

1. Observe the given figure

(Sept 2020) [D]



The magnetic poles represented by P and Q are

A) South (S) and South (S)      B) North (N) respectively and South (S)

C) North (N) and North (N)      D) South (S) and North (N)

2. Inside a solenoid, the magnetic lines of force are parallel straight lines. Therefore, the magnetic field inside the solenoid is

(Mar2021)[A]

A) Very high      B) Uniform      C) Zero      D) Caused by electric current.

3. Which of these is not a characteristic of magnetic lines of force?

(Sup 2021) [A]

A) Magnetic lines of force are dense near the poles.

B) Magnetic lines of force are closed networks.

C) Magnetic lines of force intersect each other.

D) Magnetic lines of force are emitted at the north pole and merge at the south pole.

4. Assume that you are holding a straight conductor carrying current with your right thumb pointing upwards. Then the direction of the magnetic force lines of the magnetic field. (June – 2023) [D]

- A) Downward.      B) Upward.      C) Anticlockwise.      D) Clockwise.

5. The magnetic field inside a long straight solenoid carrying an electric current is (June- 2024) [A]

- A) Downward and equal at all points      B) Zero  
C) Decreases as we move towards its end.      D) Increases as we move towards its end.

6. In Fleming's left hand rule, the direction in which the middle finger points is (Aug2024/June-2025) [E]

- A) Magnetic field      B) Electric current  
C) Motion of a conductor      D) Induced electric current

7. A rod carrying an electric current is placed between the poles of a horseshoe magnet. The angle between the direction of the current and the direction of the magnetic field for the maximum displacement of the rod is

(March 2025) [D]

- A)  $0^\circ$       B)  $45^\circ$       C)  $90^\circ$       D)  $180^\circ$

8. If the number of turns in a circular conductor carrying current is increased by 10 times, then the magnetic field produced increases by (June 2025) [D]

- (A) 100 times      (B) 10 times      (C) 20 times      (D) 1000 times

9. When a magnetic needle is brought near a current-carrying wire, it is deflected. The direction of deflection of the needle depends on [D]

- A) Length of the conductor      B) Amount of current in the conductor  
C) Direction of current in the conductor      D) Strength of the needle

10. If the density of magnetic lines of force is high, the strength of the magnetic field is [E]

- A) High      B) Low      C) Neutral      D) None

11. In Fleming's left hand rule, the finger that represents the magnetic field is [A]

- A) Index finger      B) Thumb      C) Middle finger      D) All

12. Safety method used to prevent damage caused by overload in domestic electrical appliances [A]

- A) Providing earthing system      B) Installing electrical transformers  
C) Use of fuses      D) Installing electricity meter

13. Which of the following electrical appliances is not suitable for use in circuits that allow 5A current to flow. [E]

- A) Bulb      B) Mixer      C) Fan      D) Geyser

14. In case of short circuit, the current in the circuit [A]

A) becomes very low.      B) remains neutral      C ) becomes very high.      D) changes continuously.

15. The part where the magnetic force is maximum in a bar magnet is [A]

A) At the N end      B) At the S end      C) Between N and S      D) At both ends

16. Which of the following correctly describes the magnetic field around a long straight wire? [A]

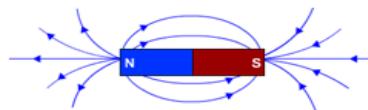
A) The magnetic field consists of straight lines perpendicular to the wire.

B) The magnetic field consists of lines parallel to the wire.

C) The magnetic field consists of lines like rays emanating from the wire.

D) The wire is the center of the concentric magnetic force lines of the magnetic field.

17. Which of the following conclusions does a student come to after observing the following picture [E]



A. Magnetic force lines are emitted at the north pole and merge at the south pole.

B. The strength of the magnetic field is greater when the density of magnetic lines is greater.

C. No two magnetic lines of force intersect each other

D. All of the above are correct

## **II. Answer the following questions (One Mark )**

18. Why do magnetic lines of force not intersect each other? (April-2022/March – 2025/June – 2025) [A]

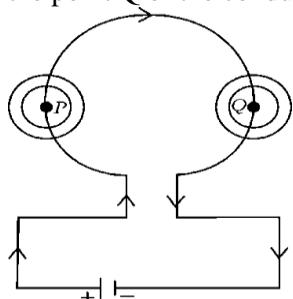
19. State any 2 measures to avoid overload in a domestic electrical circuit. (September-2020) [A]

20. What is the cause of overload in an electrical circuit? (July-2022) [A]

21. What does the thumb indicate in the right-hand thumb rule? ( March – 2023) [E]

22. Write the characteristics of the magnetic lines of force around a solenoid carrying current. ( March – 2023) [E]

23. Observe the circuit diagram given below. State the direction of the magnetic field around the point P and around the point Q of the conducting wire. (March – 2025) [D]



24. What is a magnetic field? [E]

25. What are magnetic lines of force? [E]

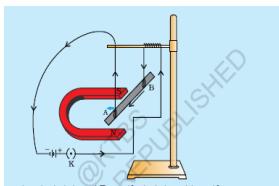
26. When does a current-carrying conductor experience a greater force when placed in a large magnetic field? [A]

27. Name some instruments using a current-carrying conductor and a magnetic field. [E]

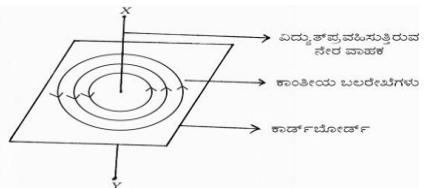
28. Why does a compass needle move when brought near a bar magnet? [A]
29. Draw magnetic lines of force around a bar magnet. [A]
30. List two methods of producing a magnetic field. [A]

### **III. Answer the following questions (Two Mark)**

31. What are the causes of overload and short circuit in an electrical circuit? (March – 2019) [A]
32. State two properties of magnetic lines of force. (March – 2019 / June – 2024) [E]
33. What are the reasons for overload in an electrical circuit? (June – 2022) [E]
34. Electrical appliances with a metal surface are connected to the earth wire. Why? (March – 2023) [D]
35. Observe the figure and state the direction of the force acting on the current carrying wire AB. Name the law that helped you to know the direction of the force. [D]



36. What is a solenoid? How can it be converted into an electromagnet? ( March – 2024) [E]
37. Observe the given picture and answer the questions given below. ( June – 2025) [D]



- i) Mention the direction of the electric current flowing in the conductor
- ii) State the rule that helps in determining the direction of the electric current.
38. What are the methods of increasing the magnetic field in a solenoid? . [E]

39. Draw a diagram showing the magnetic lines of force around a straight conductor. Identify these. [A]

- A) Direction of magnetic lines of force B) Direction of electric current.
40. List the magnetic lines of force and the characteristics of the magnetic field inside a solenoid. [E]

41. A microwave oven with a current rating of 5A and a power of 2 KW is used in a domestic electrical circuit (220V). What effect would you expect? [D]

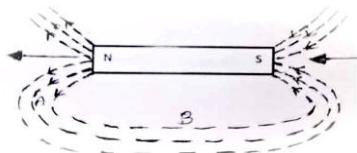
42. Write the rules used to determine the directions of the following. [A]

- A) Magnetic field around a current-carrying straight conductor.
- B) Force experienced when a current-carrying straight conductor is placed perpendicular to the magnetic field.

43. In the figure given below, are the poles marked as P and Q are the north pole or the south pole? Justify your answer.



44. A student who observes the magnetic field lines around a bar magnet as shown in the figure below states that the magnetic field at point A is greater than that at point B. Is the student's statement correct? Justify your answer [D]



#### **IV. Answer the following questions (Three Mark)**

45. How do you identify the magnetic field lines around a bar magnet using a compass? Explain.

(March – 2020/ June – 2024/ June – 2025) [A]

46. a) Which factor helps in determining the relative strength of a magnetic field?

b) State the right-hand thumb rule. Write any two characteristics of magnetic force lines. (March – 2024) [E]

#### **V. Answer the following questions (Four Mark )**

47. Explain the function of the earth wire. (March / june 2024) [A]

48. Explain an experiment to show that a conductor carrying an electric current experiences a force when it is placed in a magnetic field. (June – 2024) [A]

## Unit : 3 Metals and Nonmetals

### Weitage-Difficulty level

Difficulty level	No of questions	Marks
Easy 30%.	26	39
Average 50%	29	65
Difficulty 20%.	13	26

#### LEARNING POINTS:-

- \* Physical properties-metals and nonmetals
- \* Chemical properties of metals.
- \* What happens when metals are burned in air
- \* What happens when metals react with water
- \* What happens when metals react with acids
- \* Metals react with solutions of other metallic salts
- \* Reactivity series
- \*How metals and nonmetals react
- \*Alloys and their units
- \*Availability of metals, metallization, enrichment of ores
- \*Corrosion and prevention

I. Four alternative answers are given to the following questions or incomplete statements. Choose the appropriate answer from them and write the complete answer in alphabetical order:-

1. Which of the following pairs causes a displacement reaction. [D]
  - A. NaCl solution and copper metal
  - B. MgCl<sub>2</sub> solution and aluminum metal
  - C. FeSO<sub>4</sub> solution and silver metal
  - D. AgNO<sub>3</sub> solution and copper metal.
2. Which of the following methods is suitable for preventing rusting of iron tava pan.? [E]
  - A. Applying grease.
  - B. Painting.
  - C. Coating with zinc.
  - D. All of the above.
3. Food cans are coated with tin and not with copper. Reasons are [D]
  - A. Zinc is more expensive than tin
  - B. The melting point of zinc is higher than that of tin.
  - C. Zinc is more reactive than tin.
  - D. Zinc is less reactive than tin.
4. The gas released when metals react with acids. (MODEL PAPER.) [E]
  - A. H<sub>2</sub>
  - B. CO<sub>2</sub>
  - C. SO<sub>2</sub>
  - D. NO<sub>2</sub>
5. A green layer is formed when copper reacts with moist carbon dioxide in the air. (SUP. EXAM.) [E]
  - A. Copper carbonate
  - B. Copper chloride
  - C. Copper nitrate
  - D. Copper oxide
6. Which of the following pairs causes a displacement reaction? [D]
  - A. NaCl + Cu
  - B. MgCl<sub>2</sub> + Al
  - C. FeSO<sub>4</sub> + Ag
  - D. AgNO<sub>3</sub> + Cu
7. Observe the following equations and identify the correct statement. [D]
 
$$\text{CuSO}_4 + \text{Fe} \rightarrow \text{FeSO}_4 + \text{Cu}$$

$$2\text{AgNO}_3 + \text{Cu} \rightarrow \text{Cu(NO}_3)_2 + 2\text{Ag}$$
  - A. More reactive than iron and silver.
  - B. Iron is less reactive than copper and silver.
  - C. Copper is more reactive than silver but less reactive than iron.
  - D. Silver is more reactive than copper and iron.
8. The electron configuration of element X is 2, 8, 8, 1 and the electron configuration of element Y is 2, 8, 7. Then what is the type of bond formed between these elements? (MARCH 2019.) [A]
  - A. Covalent bond
  - B. Metallic bond
  - C. Hydrogen bond
  - D. Ionic bond
9. The correct order to write these metals in increasing order of reactivity is Al, Na, K, Ca, Mg. [D]
  - A. Al < Mg < Ca < Na < K
  - B. K < Mg < Ca < Na < Al
  - C. K < Na < Ca < Mg < Al
  - D. Al < Na < Mg < Ca < K
- 10.. A process used to convert metal sulfide ores into their oxides. [A]
  - A. Calcination
  - B. Roasting
  - C. Reduction
  - D. Electrolysis
11. Which metal displaces copper from copper sulphate solution (JUNE 2022) [A]
  - A. Mercury
  - B. Gold
  - C. Iron
  - D. Silver

12. Observe the following chemical reactions (JULY 2021)

[D]



The order of decreasing reactivity of the metals in the above reactions is

- A. Zn>Fe>Cu      B. Fe>Cu>Zn      C. Zn>Cu>Fe      D. Cu>Fe>Zn

13. Observe the equations of the following chemical reactions: (SEP2021)

[D]



The order of increasing reactivity of the metals in the above reactions is

- A. Fe < Zn < Al      B. Al < Zn < Fe      C. Zn < Fe < Al      D. Al < Fe < Zn

14. Aluminum, iron, magnesium and zinc metals reacted with concentrated hydrochloric acid. Write the reactivity of these metals in decreasing order. (JUNE 2024)

[JD]

- A. Mg > Al > Zn > Fe      B. Al > Mg > Fe > Zn

- C. Fe > Zn > Al > Mg      D. Fe > Mg > Zn > Al

15. Which of the following chemical reactions is possible? (APR 2019).

[A]



16. The electron configurations of elements A, B and C are 2, 8, 2; 2, 8 and 2,8,7 respectively. Among these, the elements which react with each other to form an ionic compound are (MQP2025)

[A]

- A. Elements A and B      B. Elements B and C

- C. Elements A and C      D. Elements A and C

## II. Answer the following questions:- One mark questions).

17.What are amphoteric oxides?

[A]

18.Name two metals that react with highly concentrated nitric acid.

[A]

19.Name the good conductors of heat and the poor conductors of heat.

[E]

20.Name the non-metal that conducts electricity.

[E]

21.What is ductility?

[E]

22.What are ionic compounds?

[E]

23.An iron ring needs to be plated with copper. How can this be done without using electricity? (April 2020)

[D]

24.What is thermite reaction?

[E]

25.Which metals do not corrode easily?

[E]

26.What is an alloy?

[E]

27.Name the metals that are found in the free state.

[E]

28.What is the chemical method used to obtain a metal from its oxide?

[E]

29. Ionic compounds have the highest melting points, why?

[D]

30. What is roasting in metallurgy? ( March / April -2019)

[E]

## III. Answer the following questions:- Two marks questions).

31.Which gas is released when concentrated hydrochloric acid is added to a reactive metal? Write the balanced chemical equation for the reaction of iron with concentrated  $\text{H}_2\text{SO}_4$

[E]

32.Write the balanced equation for the chemical reaction of aluminum oxide reacting with acid and base

[E]

33.Mention any 4 properties of ionic compounds. (June -2022)

[E]

34.Why does calcium metal do not ignite and burn even though it releases hydrogen gas when it reacts with water? Write its chemical equation. (April-2022)

[A]

35. Name two metals that react quickly with cold water. Write the products formed when these metals react with cold water.

[E]

36. Which physical properties of metals are used in the following situations? (April-2020)

[A]

- i. Gold is used in making jewellery.

- ii. Nickel is used in guitar strings.

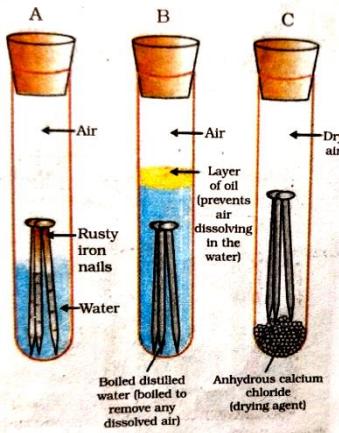
37. List any four physical properties of metals. (March-2025)

[E]

38. State any 4 physical properties of non-metals.

[E]

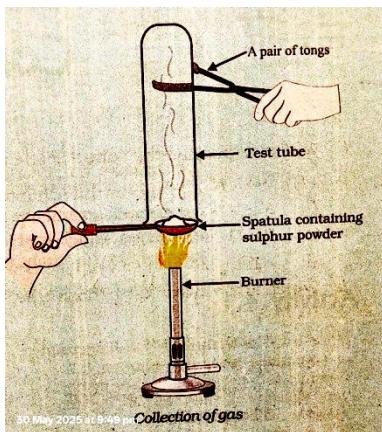
39. Name the metals that match the following physical properties. [E]
- It is liquid at room temperature –
  - It can be easily cut with a knife :-
  - It is a good conductor of heat :-
  - It is a poor conductor of heat :-
40. Write chemical equations for the following reactions. (SUP. EXAM/MQP2025). [E]
- Reaction of iron with steam
  - Reaction of calcium with water
41. Carbon cannot reduce oxides of metals like sodium, magnesium, aluminium etc. Why? Then how are these metals separated from their ores? [D]
42. Name two metals that displace hydrogen from concentrated acids and name two metals that do not displace hydrogen. [A]
43. In the electrolytic purification of metal 'M', which would you take as anode, cathode and electrolytic solution? [A]
44. Write the steps to be taken to prevent iron from rusting. ( MAR/APR 2025). [A]
45. 250 ml of water is taken in beaker A and beaker B. 5 grams of sodium metal is added to beaker A and 5 grams of calcium metal is added to beaker B. What is the reason for the observations made here? (2024, Exam – 3) [A]
- 46 i. When a metal reacts with concentrated nitric acid, hydrogen gas is not released. Give a reason.  
ii. Write a balanced chemical equation for the reaction of aluminium with concentrated hydrochloric acid.  
( June – 2019/MQP2025) [E]
47. What is galvanization? How does it help in preventing iron from rusting? [A]
48. A metal reduces iron oxide. This reaction is used in the repair of broken railway tracks. Name the metal and the reaction used here. Write the equation of this reaction. [A]
49. What are alloys? Name the constituent elements in bronze and solder. (JUNE – 2023) [E]
50. What are ores? Write the methods of converting sulphide ores of metals and carbon into their oxides in order.  
( June – 2023) [A]
51. State the difference between smelting and roasting. (STATE LEVEL PRE.EXAM/MQP2025). [E]
52. State the method of reducing cinnabar. [E]
53. Pieces of zinc, iron, magnesium and copper are taken in test tubes A B C and D respectively. The same amount of ferrous sulphate solution is added to these test tubes. In what quantities does the chemical reaction take place. Why? Write the chemical equations for the reaction taking place here. [D]
54. Observe the test tubes A,B& C in the pictures given below: (Exam-2, May-2025). [D]



- Which iron nail in which test tube rusts? Why?
- The iron nails in the other two test tubes do not rust? Why?.

#### IV. Answer the following questions (Three marks questions)

55. Give a scientific reason for these. (APRIL 2019) [E]
- Ionic compounds are electrical insulators when in solid state and good conductors of electricity when in liquid state.
  - Sodium/potassium metals are stored in kerosene.
  - Although aluminium is a reactive metal, it is used in the manufacture of cooking utensils.
56. A student took sulphur powder in a spoon used in the laboratory and stirred it. He inverted the test tube as shown in the figure and collected the gas released. [D]



A. How do the collected gases behave on these?

- Dry litmus paper
- Wet litmus paper

B. Write the balanced chemical equation of the reaction taking place here.

57. Draw a diagram showing the behaviour of steam on a metal and identify the following parts (JUNE 2019) [A]  
 a.Outlet    b. Hydrogen gas

58. Draw a diagram showing the electrolysis of copper and identify the following parts

- Cathode
  - Mud
- ( SEP 2020,MAR/APR 2025/MQP2025) [A]

59. How are metals in the middle of the reactivity series treated with their alloys? Explain. (APR – 2023) [A]

60. a) How do silver and copper objects lose their surface luster? (2024 exam -1) [A]  
 b) How does galvanization protect iron objects?  
 c) Aluminum oxide is a double oxide. Why? (MQP202)

#### V. Answer the following questions:- Four marks questions..

61. A. Show the formation of  $\text{Na}_2\text{O}$  and  $\text{MgO}$  by the transfer of electrons (APRIL 2023,JUNE 2019) [A]

B. What are the ions present in these compounds?

$\text{Na}_2\text{O}$  Sodium Oxide.  $\rightarrow \text{MgO}$  Magnesium Oxide.  $\rightarrow$

62. Pieces of four metals A, B, C and D are taken and placed one after the other in the following solution. The resulting solution is listed below. [D]

Metals	Iron II. Sulphate	Copper II. sulfate	Zinc sulfate	Silver nitrate
<b>A</b>	No reaction	Displacement		
<b>B</b>	Displacement		No reaction	
<b>C</b>	No reaction	No reaction	No reaction	Displacement
<b>D</b>	No reaction	No reaction	No reaction	No reaction

Using the above table, answer the following questions related to metals A, B, C and D.

A. Which is the most reactive metal?

B. What will you observe if B is placed in a solution of copper II. sulphate.

C. Write the metals A, B, C and D in the order of decreasing reactivity.

63.a) Draw the electron dot structure of sodium, oxygen and magnesium. [A]

b) Explain the following :-

- i. Minerals :-
- ii. Iron :-
- iii. Mud

64. In which cases can displacement reactions be observed when oxides of metals such as zinc, magnesium and copper are treated with the following metals? [D]

Metals	Zinc	Magnesium	Copper
Zinc Oxide			
Magnesium Oxide			
Copper Oxide			

65. Give reason :- (APRIL 2019) [E]

- A. Iron alloys are more useful than pure iron.
- B. Copper gradually loses its brown layer when exposed to air.
- C. Aluminium oxide is called amphoteric oxide.
- D. Hydrogen gas is not released when a metal reacts with concentrated nitric acid.

66. Express the formation of magnesium chloride with the help of electron dot pattern (MQP 2025) [A]

**VI. Answer the following questions:- (Five marks questions)**

67. State the difference between annealing and roasting. How are these processes used in the extraction of zinc?

Explain with the help of equations. Is reduction necessary to obtain zinc after these processes? Why?

( APRIL 2020/MQP2025) [A]

68. a) Explain the formation of ionic bond between sodium and chlorine atoms Sodium atomic number 11 Chlorine

atomic number 17. (June – 2022/MQP2025) [A]

b) List any four common features of ionic compounds. (MQP 2025)

## UNIT 4 :CARBON AND ITS COMPOUNDS

### Learning points

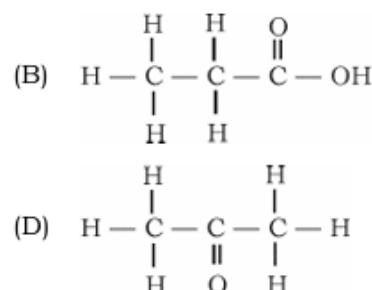
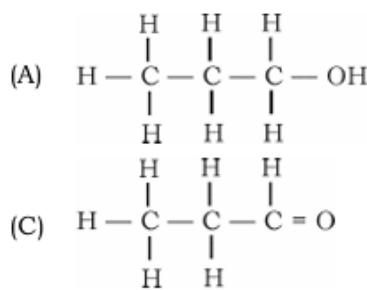
- Bonding in carbon-the covalent bond
- Versatile nature of carbon
- Saturated and unsaturated carbon compounds
- Chains, branches, and rings
- Functional groups
- Homologous series
- Nomenclature of carbon compounds
- Combustion
- Oxidation
- Addition reaction
- Substitution reaction
- Properties of ethanol
- Properties of ethanoic acid
- Soaps and detergents

### Weightage to difficulty level

Sl.No	Difficulty Level	Marks	Percentage
1.	Easy 30%.	16	29
2.	Average 50%	24	48
3.	Difficulty 20%.	15	19

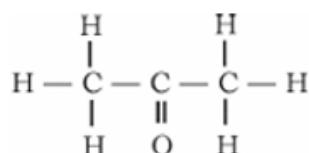
**I. Four alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet 1Mark each.**

1. The valence electrons that an atom of carbon has in its outermost shell [E]  
 A. 1                      B. 2                      C. 3                      D. 4
2. Diatomic molecule produced by the formation of double bond [E]  
 A. chlorine              B. oxygen              C. nitrogen              D. ammonia
3. The major component of bio-gas is (MQP2020-21,MAIN EXAM2021,SUP EXAM202) [E]  
 A. propane              B. butane              C. methane              D. ethane
4. Carbon can form bonds with other atoms of carbon giving rise to large molecules. This unique property of carbon is (MQP2020-21,2024-25) [E]  
 A. saponification      B. catenation      C. hydrogenation      D. esterification
5. An unsaturated compound in which double bond is found between Carbon-Carbon atoms [A]  
 A. methane              B. ethane              C. ethene              D. ethyne
6. Functional group found in halo-alkanes [A]  
 A.  $-\text{Cl}$  or  $-\text{Br}$       B.  $-\text{OH}$       C.  $-\text{CHO}$       D.  $-\text{COOH}$



7. The structural formula of propanal is ( MAIN EXAM2021) [D]

8. Name of this compound is



[A]

- A. propanone      B. propanol      C. propanal      D. propanoic acid
9. The number of single bonds and double bonds present in a structure of benzene molecule respectively (MQP2020-21, MAIN EXAM2021) [D]
- A. 6 and 6      B. 9 and 3      C. 7 and 5      D. 3 and 9
10. The number of single bonds present in the structure of a cyclohexane (MQP2020-2) [D]
- A. 12      B. 18      C. 24      D. 6
11. The number of carbon and hydrogen atoms that are present in the molecule of fifth member of alkene is (MQP2024-25) [D]
- A. five and ten      B. five and twelve      C. six and twelve      D. six and six
12. The molecular formula of both cyclohexane and hexane (MQP2020-21, SUP EXAM2021) [D]
- A.  $C_6H_{12}$       B.  $C_6H_{14}$       C.  $C_6H_{10}$       D.  $C_6H_6$
13. Difference between molecular formula of two successive compounds in homologous series [A]
- A.  $CH_2$       B.  $CH_4$       C.  $C_2H_2$       D.  $C_2H_4$
14. The group of compounds which are in homologous series is, (MQP2019-20,2020-21) [D]
- A.  $CH_4, C_2H_4, C_2H_2$       B.  $CH_4, CH_3OH, HCHO$   
 C.  $C_2H_2, C_2H_6, CH_4$       D.  $C_2H_2, C_3H_4, C_4H_6$
15. The correct group of saturated hydrocarbons (MQP2020-21, SUP EXAM2021) [A]
- A. methane, ethene, ethyne      B. ethane, propane, butane  
 C. ethyne, ethane, methane      D. ethyne, propene, butyne
16. General formula of alkyne (MAIN EXAM2019) [A]
- A.  $C_nH_{2n-2}$       B.  $C_nH_{2n+2}$       C.  $C_nH_{2n}$       D.  $C_nH_{2n+1}$
17. The molecular formula of three carbon compounds which are in homologous series are  $C_2H_6, C_3H_8, C_4H_{10}$ . The suitable general formula for these compounds is (MAIN EXAM2020) [D]
- A.  $C_nH_{2n}$       B.  $C_nH_{2n-1}$       C.  $C_nH_{2n-2}$       D.  $C_nH_{2n+2}$
18. Organic compounds obtained by the reaction between carboxylic acid and alcohol (EXAM-1 2024) [E]
- A. aldehydes      B. ketones      C. esters      D. halo-alkanes

## II. Answer the following questions (1 Mark each)

19. Write the electron dot structure of methane. (MQP2022-23, EXAM-1 2024, 2025) [A]
20. Mention the number of single bonds and double bonds present in the structure of  $C_2H_5COOH$  molecule. (MQP2022-23) [D]
21. Write the structural formula of ethene molecule.(MAIN EXAM2022) [E]
22. Name the below given organic compounds (MQP2024-25) [E]



23. Write the structural formula of the ketone having three carbon atoms. (MQP2024-25) [D]
24. In a homologous series, if the first member of hydrocarbon group has the molecular formula of  $C_2H_4$ , then find the molecular formula of fifth member. (MQP2024-25) [D]
25. Write the molecular and structural formula of benzene (MQP2024-25) [E]
26. Hydrocarbon compounds are usually used as fuels. Why? [A]
27. Give reason why addition reaction is used in hydrogenation of vegetable oils? [A]
28. Why ethanoic acid is known as glacial acetic acid? [A]
29. The solution of 5-8% acetic acid in water is called as? [D]
30. When ethanol reacts with sodium leads to evolution of gas. Name the gas and how will you test the presence of this gas? [A]
31. Name the compound which is produced when ethanoic acid reacts with base ? [E]

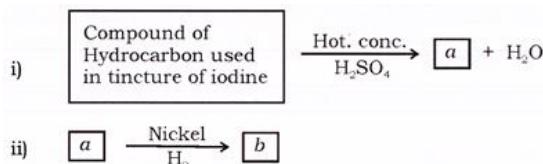
**III. Answer the following questions (2 Marks each)**

32. Give reason: [A]  
 a. The melting point and boiling point of covalent compounds are low  
 b. Covalent compounds are generally poor conductors of electricity
33. Write the two important factors that can be observed in carbon? [E]
34. Give reason: [D]  
 a. As the molecular mass increases in homologous series a gradation in physical properties are seen  
 b. Chemical properties determined solely by the functional group remain similar in homologous series
35. Write the electron dot structure of the following molecules : (MQP2024-25) [A]  
 i. Hydrogen      ii. Ethane
36. What are functional groups? Name the functional group present in propanal and propanol (MQP2024-25) [E]
37. What are functional groups? Write the structural formula of the compound obtained when one atom of hydrogen in ‘ethane’ is replaced by –CHO group. (SUP EXAM2017) [A]
38. In a specific group of unsaturated hydrocarbons, though the ratio of carbon and hydrogen atoms is 1:2, CH<sub>2</sub> is not the first member of those hydrocarbons. What is the reason for this? Write the structural formula of the first member of that hydrocarbon group. (SUP EXAM2017) [D]
39. The molecular formula of the first member of a certain group of organic compounds is CH<sub>2</sub>O HCHO.. Determine the name and the molecular formula of the third member of this group if the members of this group are in homologous series. What is the general name for this group of organic compounds?  
 (MAIN EXAM2018) [D]
40. CH<sub>4</sub> + Cl<sub>2</sub> → CH<sub>3</sub>Cl + HCl in the presence of sunlight. (MQP2018-19) [D]  
 State whether this reaction is addition reaction or substitution reaction. Justify your answer
41. What are alkynes? Name the first member of alkynes and write its molecular formula.  
 (SUP EXAM2019) [E]
42. Complete the following reaction and give reason why this reaction is called saponification reaction



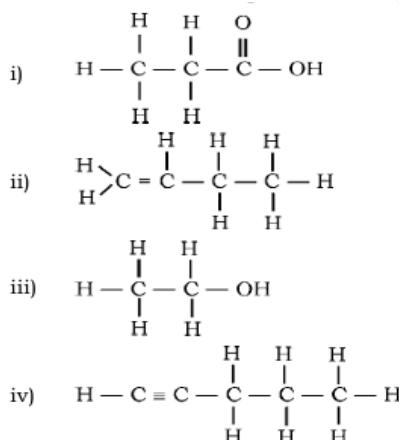
[A]

43. Observe the following chemical reactions. Answer the question. (MQP2024-25) [A]



Name ‘a’ and ‘b’ products. Identify saturated and unsaturated product in ‘a’ and ‘b’.

44. Name the carbon compounds having the following structures. (MQP2023-24) [A]



45. Write an activity to show the formation of ester. Explain how it can be detected? [A]  
46. Explain the reaction of ethanoic acid with sodium carbonate and sodium hydrogen carbonate using balanced chemical equations. [D]  
47. What is esterification? Mention the uses of esters. (MQP2024-25) [E]

**IV. Answer the following questions (3 Marks each)**

48. Generally large number of compounds are obtained due to interlinking of carbon atoms to each other in environment if so, [A]  
a) This property of carbon is called as?  
b) Give reason why this property is seen to the extent in carbon atoms?  
c) Name the arrangements of carbon atoms these compounds may have.  
49. a. What are saturated carbon compounds ? [E]  
b. Define the following :  
i. Homologous series  
ii. Esters. (MQP2023-24)  
50. a. What are micelles ? [E]  
b. What is covalent bond? Write any two properties of covalent compounds. (MQP2023-24)  
51. a. What are substitution reactions? (MQP2024-25) [E]  
b. Name the simplest hydrocarbon and write its molecular formula.  
c. What are oxidising agents?

**V. Answer the following questions (4 Marks each)**

52. a) The conversion of ethanol to ethanoic acid is an oxidation reaction. Why? [A]  
b) Write the characteristics of acetic acid  
53. What are structural isomers? Write the structural isomers of butane. [E]  
(MQP2022-23,2024-25,SUP EXAM2020, MAIN EXAM-2021, 2022, EXAM-1 2025)  
54. a) Explain the mechanism of cleaning action of soaps.  
b) Which are the salts responsible for hardness of water ? Detergents are effective even in hard water. Why? (MQP2024-25,SUP EXAM 2019) [A]  
55. a) Carbon atoms do not form C<sup>4-</sup> anion and C<sup>4+</sup> cation. Why? (MAIN EXAM2019, EXAM-1 2024) [A]  
b) Write the electron dot structure of nitrogen molecule and ethene molecule. (MQP2024-25) [A]

**VI. Answer the following questions 5 Marks.**

56. a) Write any two differences between saturated and unsaturated carbon compounds.  
(MQP2024-25,MAINEXAM2017,2019, SUP EXAM2022, EXAM-3 2024, EXAM-1 2025) [A]  
b) Write the molecular formula and structural formula for the following carbon compounds  
(MQP2021-22, EXAM-3 2024)  
i. propanoic acid      ii. cyclohexane      iii. pentane.

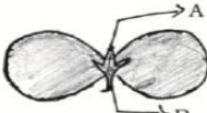
## UNIT -7 HOW DO ORGANISMS REPRODUCE ?

### Learning points

- Reproduction and the importance of Variation.
- Types of asexual reproduction : fission, budding , Fragmentation, Regeneration,
- Spore formation, vegetative reproduction.
- Sexual reproduction in flowering plants .
- Sexual reproduction in Male and female - Structure and function.
- What happens when egg is not fertilized?
- What happens when egg is fertilized ?
- Reproductive health.
- Sexually transmitted diseases.
- Methods of contraception.

Sl.No	Type of Qn.	No. of Qns.	Marks	Percentage
1	Easy	18	30	30%
2	Average	24	15	50%
3	Difficult	10	20	20%

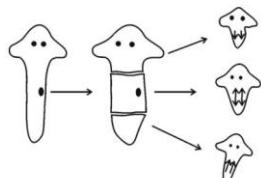
### I. Multiple Choice Questions:

- 1) The group of organisms that reproduce through fission only is (June-2019) [A]
- A. Amoeba, Hydra, Spirogyra      B.Leishmania, Amoeba, Yeast  
 C .Amoeba, Plasmodium, Planaria      D. Plasmodium, Amoeba, Leishmania.
- 2) In the given figure of Cotyledon the parts labeled as A and B respectively are (April-2020) [A]
- 
- A. fruit, shoot      B. primary shoot, primary root  
 C. secondary root, primary shoot      D. bud, leaf.
- 3) The type of reproduction found in Spirogyra is (Sept-2020) [E]
- A Budding      B Fragmentation  
 C Vegetative reproduction      D Spore formation.
- 4) The common passage for both sperms and urine in human male reproductive system is (July- 2021) [E]
- A.Urethra      B. Ureter      C. Vas deferens      D. Urinary bladder
- 5) The correct sequence found in the process of sexual reproduction in a flower is (July- 2021) [A]
- A pollination, fertilization, seed, embryo      B seed, embryo, fertilization, pollination  
 C embryo, seed, pollination, fertilization      D pollination, fertilization, embryo, seed
- 6) In the human female reproductive system, the egg is carried from ovary to the uterus through this part (Sept- 2021) [E]
- A cervix      B fallopian tube      C placenta      D vagina
- 7) A common bacterial infection that spreads through sexual contact in human beings is (Sept- 2021)
- AGonorrhoea      B AIDS      C Hepatitis-B      D Warts
- 8) In humans, sexually transmitted viral infection is (April- 2022) [E]
- A. AIDS      B. Syphilis      C Tuberculosis      D.Gonorrhoea.

9) The parts that develop into fruit and seed in a flower respectively are (Sept- 2021, June-2022) [E]  
A Stamen and ovary    B ovule and ovary    C ovary and ovule    D stamen and ovule

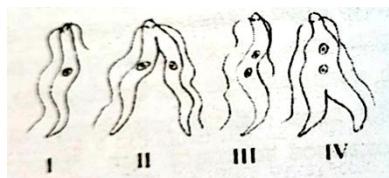
10) In humans, the testes are located outside the lower abdomen in the scrotum because (March- 2023) [A]  
A to protect testes from mechanical shocks  
B to increase the production of sperms  
C to maintain the secretion of testosterone hormone  
D to maintain the temperature required for sperm production.

11) Biological process that has been shown in the diagram is (Sept-2023) [D]



- A. production of progenies by fragmentation method  
B .production of progenies by multiple fission method  
C .regeneration of tissues by development in specialized cells  
D asexual reproduction by vegetative propagation.

12) The correct order of binary fission in Leishmania is (MQP-2019) [D]



- A. II, III, IV,      B. I, III, IV, II      C. IV, I, III, II      D. III, I, II, IV

13) AIDS : Virus :: Warts :\_\_\_\_\_ (March-2022) [E]  
A. Bacteria    B. Fungus    C. Protozoan    D. Virus

14) Part of flower that develops into fruit and part of the seed that develops into root respectively are (March 2019) [E]

- A. Ovary and Plumule    B. Plumule and radicle    C. Ovary and radicle    D. Ovary and ovule

15) The process that occurs in the production of new individuals of planaria is (Mqp 2024) [E]  
A. binary fission    B. regeneration    C. budding    D. fragmentation

16) The embryo gets nutrition from the mother's blood with the help of special part called (March-2021) [A]  
A. Fallopian tube    B. Ovary    C. Uterus    D. Placenta

17)



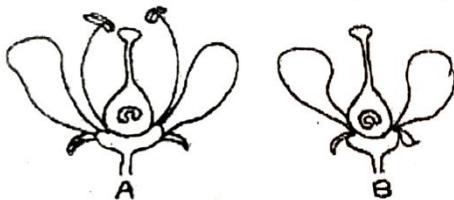
Observe the structures of the female reproductive system given in Figure-A and Figure-B. (Mqp 2025) [D]  
The correct statement regarding these figures is

- A. Fertilization of the egg is possible in both the structures

- B. Fertilization of the egg is possible only in the structure shown in Figure-B  
 C. Fertilization of the egg is possible only in the structure shown in Figure-A  
 D. Fertilization of the egg is not possible in both the structures

**II. Answer the following questions. (One mark)**

- 18) Write two examples for the organisms that reproduce by binary fission. (**March – 2023**) [E]  
 19) Is self-pollination possible in flowers that have only stamens? Justify your answer. (**Sept-2024**) [A]  
 20) What function do the testicles perform in humans? [A]  
 21) Sexual reproduction causes more variation in organisms. Why? (**SQP-2024**) [D]  
 22) Among the flowers A and B which flower undergoes self pollination? (**MQP-2020, May-2025**) [A]



- 23) What is sexual reproduction? [E]  
 24) Name any two viral infections that are transmitted through unprotected sexual contact. [E]  
 25) If a woman uses Copper-T, will it help protect her from sexually transmitted diseases? [A]  
 26) Sex determination at birth should not be done. Justify this statement. [D]

**III. Answer the following questions.(Two marks)**

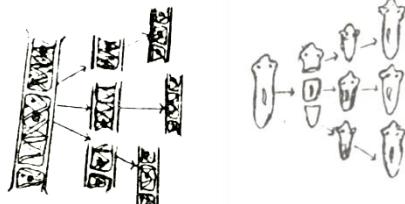
- 27) Growth of thread like structures along with the gradual spoilage of tomato can be observed when a cut tomato is kept aside for four days. Interpret the causes for this change. (**April-2019**) [A]  
 28) Why does menstruation occur? (**June-2020**) [A]  
 29) How does the uterus prepare to receive a fertilized egg in women?  
     What happens if the egg is not fertilized? Explain. (**June-2022**) [A]  
 30) How is the budding process in Hydra different from that of Bryophyllum? (**June-2020**) [A]  
 31) How do germ cell receive half the amount of DNA ? What is the need of this process? (**MQP-2023**) [A]  
 32) Draw the diagram showing the germination of pollen on stigma and label the parts, (**MQP-2019, June-2019, April-2020, March-2024, April-2025**) [E]  
 33) Explain the stages in which a fertilized egg develops into an embryo. (**Sept-2020**) [A]  
 34) How can pregnancy be prevented using surgical methods of contraception in humans? [E]  
     (**June-2020, Sept-2020**)  
 35) Is surgical contraception a better method of contraception than Physical contraception? (**MQP -2024**) [A]  
 36) How is pollination different from fertilization? Justify this statement. [A]

**IV. Answer the following questions (Three marks)**

- 37) In sustaining reproductive fertility of a person, (**June2019**) [A]  
     (a) position of the testis in the body  
     (b) secretion of the testosterone  
     (c) secretion of the prostate gland are supplementary to each other. Explain scientifically.  
 38) What is pollination? What are the changes that occur in the flower after pollination? (**March – 2023**) [E]  
 39) Justify the following statements: (**April-2025**) [D]

- a) Sexual type of reproduction leads to more variations.  
 b) In woman's uterus the role of placenta is significant for the development of foetus.  
 40) How is the reproductive process different in Hydra and Planaria? Explain. [A]  
 41) How does a fertilized egg in a female develop into an embryo in the uterus? How does this embryo get nourishment in the mother's womb? Explain. (Sept-2024) [A]  
 42) What are the advantages of sexual reproduction over asexual reproduction? [A]

43)



Spirogyra

Planaria

Are the reproductive methods shown in the above two pictures similar or different? [E]

Write a justification for your answer.

- 44) Distinguish between self and cross pollination.(June-2019) [E]  
 45) What are the changes that occur in a flower after fertilization? (March-2023) [A]  
 46) A student assumes that an organism reproduces through spores. How would another student evaluate whether this statement is true or false? [D]  
 47) What is DNA replication? How does the number of chromosomes rearrange in sexual reproduction? [A]  
 48) What is the placenta? What is its function? In the human body, the testicles are located outside the abdomen in the scrotum. Why? (May -2025) [A]

#### V. Answer the following questions: (four marks)

- 49) Explain the important function of each structure of the male reproductive system in humans.(April-2020) [A]  
 50) "Reaching sexual maturity is a necessary event for mammals such as humans." Justify this statement. (June-2023) [D]  
 51) Explain the structure and function of the female reproductive system in humans.(Sept-2023) [A]  
 52) In 'Human Reproduction', the placenta plays an important role in the development of a foetus into a child." Justify this statement. (March-2024) [D]  
 53) State the advantages of Vegetative reproduction. How it is favourable for farmers in agricultural field ? [A]

## UNIT - 8 HEREDITY

### Learning Points

- Combination of differences during reproduction
- Heredity- Inherited traits
- Traits Laws of Inheritance- Mendel's contributions
- Sex determination

**WEIGHATE TO DIFFICULTY LEVEL**

SL NO	Difficulty level	Number of questions	Marks	Percentage
1	Easy	16	20	30%
2	Average	17	33	50%
3	Difficulty	08	13	20%

### I. Multiple choice questions

1. He is called the father of modern genetics. [E]  
A). Mendeleev B). Gregor Mendel C). Lamarck D). Charles Darwin
2. The plant used by Mendel for his experiment [E]  
A). Rose B). Pea C). Hibiscus D). Sunflower
3. The ratio of tall and short plants obtained in Mendel's monotyping experiment was [E]  
A). 2 : 1 B). 9 : 3 : 3 : 1 C). 3 : 1 D). 1 : 1
4. When a pure tall (TT) plant in pea plants is crossed with a pure short plant, what is the ratio of pure tall plants to pure short plants in the second generation? [E]  
A). 1 : 3 B). 3 : 1 C). 1 : 1 D). 2 : 1
5. The transfer of many traits from ancestors to their next generation is called. [E]  
A). DNA replication B). Mutation C). Transposition D). Heredity
6. Factors that determine the sex of a male child [E]  
A). XX B). XY C). YY D). All are correct
7. When a tall pea plant is crossed with a short pea plant, all the plants obtained from the seeds are tall. Because  
A). The trait for height is dominant B). The trait for height is dominant [E]  
C). The trait for height is recessive D). None of the above
8. In one of Mendel's experiments, dwarf plants with white flowers were taken along with tall plants with purple flowers. All the offspring obtained from these have purple flowers. But half are dwarf. The genetics of a tall plant are [D]  
A). TTWW B). TTww C). TTww D). TtWw (MARCH 2023)
9. A trait that is found in many generations of offspring is (MQP 4 2025) [E]  
A). Dominant trait B). Weak trait C). Acquired trait D). Intermediate trait
10. The source of information for the production of proteins in the cell is (MARCH 2025) [E]  
A). Gene B). Chromosome C). DNA D). Ribosome
11. Mendel used the following types of reproduction in his experiments to obtain second generation varieties[A]  
A). Self-pollination B). Cross-pollination C). Fragmentation D). Asexual reproduction
12. In which of the following generations did Mendel use cross-pollination [A]  
A). F1 B). F2 C). F3 D). F4
13. A pure dominant pea plant producing round yellow seeds is crossed with a pure recessive pea plant producing wrinkled green seeds. The number of plants with round green seeds in the F1 generation of Mendel's experiment is (APRIL-2019) [D]  
A) 0 B) 1 C) 3 D) 9

14. When a round green pea plant (RRyy) is crossed with a wrinkled yellow pea plant, the seeds produced in the F generation are (rrYY) (MARCH 2021) [D]

- A) Round and green seeds      B) wrinkled and yellow seeds  
C) Round and yellow seeds      D) wrinkled and green seeds

15. Pea plants with round seeds (RR) are crossed with a wrinkled pea plant (rr). F, Percentage of plants with RR trait in generation [D]

- A) 25      B) 50%      C) 30      D) 75%

(MARCH 2024 A)

## II. Answer the following questions (One mark questions)

16. Observe the table below showing different forms of pea plants [A]

Seed colour	Flower position
Green (G)	Middle of stem (A)
Yellow (g)	Top of stem (a)

Write the indicator of the trait having green seeds and flowers at the top of the stem. (Jun-2019)

17. What is the sex of a child born with the X chromosome from the father? (JUNE 2022) [E]

18. Only the father is responsible for determining the sex of the child. Why? (MQP 4 2025) [A]

19. What is the ratio of the expressed form of the plants obtained in monotypic crossing? [E]

20. What is the ratio of the gene pattern of the plants obtained in monotypic crossing? [E]

21. Is cross-pollination possible in flowers with only stamens? Justify your answer? [A]

22. "In sexual reproduction, copies of offspring that are completely identical to the parent organism cannot be produced." Justify. (MQP 3 2025) [D]

23. What is a gene? [E]

24. Explain the meaning of heredity [E]

25. How is the sex of a male child determined in humans? [A]

## III. Answer the following questions (Two marks questions)

26. What is manohybrid cross ? What is the ratio of plants obtained in the F2 generation of Mendel's dimorphism experiment?. [A]

27. What is di hybrid cross? What is the ratio of plants obtained in the F2 generation of Mendel's dimorphism experiment? (APRIL 2022) [A]

28. According to Mendel, what are dominant and recessive traits? [A]

29. A tall pea plant with red flowers (TTRR) is crossed with a short pea plant with white flowers (ttrr). From these (MQP 3 2025) [A]

a) State the types of plants obtained in the F1 generation.

b) When the plants obtained in the F1 generation are crossed, write the ratio of plants obtained in the F2 generation and name the types of plants.

30. Explain that differences due to sexual reproduction are more efficient than differences due to asexual reproduction. [D]

31. Write the differences between male sex chromosomes and female sex chromosomes. (Apr-2019) [A]

32. Answer the given questions by observing the table below [A]

F2 Generation / Gamets	B (black coloured dog)	b (white coloured dog)
B (black coloured dog)	BB	Bb
b (white coloured dog)	Bb	bb

- a) What is the number of pure white dogs in the expressed ratio?
- b) Name the types of dogs found in the gene pattern

**VI. Answer the following questions (Three marks questions)**

- 33. A pure short pea plant ( $tt$ ) is crossed with a pure tall pea plant ( $TT$ ). Express the result obtained in the  $F_2$  generation of monocrossing on a checkerboard and state the ratio of the types of plants. (APR-2022,JUNE-2022,MQP 1,4,2025) [A]
- 34. Plants producing round yellow seeds ( $RrYy$ ) are self-pollinated  
Express the result obtained in the  $F_1$  generation of dicrossing with the help of a checkerboard  
State the types of plants obtained in the  $F_1$  generation.  
(APRIL A 2020, JUNE-2023 MQP 1,4, 2025) [D]
- 35. Mendel crossed plants with red flowers ( $TTRR$ ) with plants with white flowers ( $ttrr$ ) and produced offspring from them. The plants with red flowers obtained in the  $F_1$  generation were different from the plants with red flowers of the parent generation, why? Explain with reasons.[A]
- 36. Mendel crossed plants with red flowers ( $RR$ ) with plants with white flowers ( $rr$ ) and produced offspring from them. The plants with red flowers obtained in the  $F_1$  generation were different from the plants with red flowers of the parent generation, why? Explain with reasons. (Sep-2020, MQP1 2025) [A]
- 37. Explain “Chromosomes inherited from the father determine the sex of a child” [A]
- 38. How do Mendel’s experiments show that traits can be dominant or recessive? [D]
- 39. A pea plant with a dominant trait that produces round seeds is crossed with a pea plant with a recessive trait that produces dry seeds. Draw a checkerboard showing the results of the  $F_1$  generation and write the gene pattern ratio (SEP 2020) [A]
- 40. When Mendel crossed tall plants with round seeds ( $TTRR$ ) with short plants with flat seeds ( $ttrr$ ). Express the types of plants obtained in the  $F_2$  generation with the help of a chalk board? [A]
- 41. When Mendel crossed tall plants with yellow seeds ( $TTYY$ ) with short plants with flat seeds ( $ttyy$ ). Express the types of plants obtained in the  $F_2$  generation with the help of a chalk board? [A]

## UNIT - 9 Light Reflection and Refraction

### Learning Points

- Reflection of light
- Spherical mirrors
- Reflection by spherical mirrors
- Representing reflections by spherical mirrors using diagrams
- Conventional symbols for reflection by spherical mirrors
- Reflection formula and magnification
- Refraction of light - Refraction by a rectangular glass slab
- Laws of refraction and refractive index
- Refraction by spherical lenses
- Formation of images by lenses
- Lens formula and magnification
- Power of lens

### WEIGHATE TO DIFFICULTY LEVEL

SL NO	Difficulty level	Number of questions	Marks	Percentage
1	Easy	31	45	30%
2	Average	38	75	50%
3	Difficulty	21	29	20%

**I.**Four alternatives are given for each of the following questions or incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet .

1. In order to obtain an image smaller than the object in a concave mirror, the object should be placed.

(F=principal confluence, C=centre of curvature, P=pole)

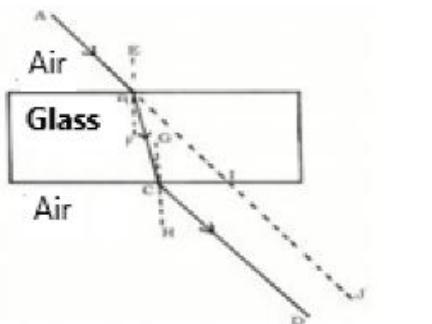
April-2019

[A]

- A) Between C and F
- B) Far from C
- C) Between P and F.
- D) At F2.

2 . Identify the emergent ray in this image.

[A]



- A) CD
- B) BC
- C) AB
- D) IJ

3. An object is placed in front of a concave mirror at the centre of curvature, what is the position and nature of the image formed? (April-2020) [A]

- (A) Between F and C and inverted
- (B) Behind the mirror and erect
- (C) Between F and P and erect
- (D) At the centre of curvature and inverted

4. The convergence distance of a lens is +0.50m . Then the power and type of the lens are. (APRIL- 2020) [D]

- (A) +2.0.D and a convex lens
- (B) +2.0.D and a concave lens
- (C) -2.0.D and a concave lens
- (D) -2.0.D and a convex lens

5. The nature and size of the image formed when an object is placed between the principal focus F<sub>1</sub> and the focal point O of a convex lens is (APRIL-2021) [D]

- (A) virtual , erect and large.
- (B) Real, inverted and small.
- (C) Virtual, inverted and small.
- (D) Real, inverted and large.

6. Observe the table below. (APRIL 2021) [D]

Material Medium	Refractive index
P	1.52
Q	1.44
R	2.42
S	1.33

In which material medium the velocity of light is high?

- A) Q
- B) P
- C) S
- D) R

7. Which of the following is a property of a convex lens? (APRIL 2021) [E]

- (A) Diverged light rays
- (B) Thick at the edges and thin in the middle
- (C) Produces a real and erect image
- (D) Thin at the edges and thick in the middle.

8. To obtain a small and real image of an object from a concave lens, the object should be placed

(MARCH 2022) [A]

- (A) At the principal focus F<sub>1</sub>
- (B) Between the principal focus F<sub>1</sub> and 2F<sub>1</sub>
- (C) Beyond than 2F<sub>1</sub>
- (D) Between the principal focus F<sub>1</sub> and the focal point O

9. Which of the following is the correct statement regarding your lens? (JUNE 2022) [A]

- (A) Converges light rays.
- (B) Diverges light rays.
- (C) Produces inverted image
- (D) Produces real image

10. A mirror produces erect and enlarged image of an object. Then the type of that mirror and the nature of that image is (JUNE-2023) [A]

- (A) Concave mirror and virtual image
- (B) Convex mirror and real image

- (C) Plane mirror and real image
- (D) Convex mirror and virtual image

11. If a ray of light enters a rarer medium from a denser medium, then the speed of that ray of light

(MARCH-2023)

[D]

- A). Decreases and bends towards the normal
- B). Increases and bends away from the normal
- C). Decreases and bends away from the normal
- D). Increases and bends towards the normal

12) Type of mirror used in the rear view mirror of a vehicle is (AUGUST-2024) [E]

- A) Plane mirror
- B) Convex mirror
- C) Concave mirror
- D) Plane Concave mirror

13) Convex mirrors are used in. (APRIL -2025) [E]

- A) Torches
- B) Rear view mirrors of vehicles
- C) Inspection lamps
- D) Shaving mirrors

14. The reflecting surface of a spherical mirror is

- A) Centre of curvature
- B) Pole
- C) Radius of curvature
- D) Aperture (MQP -1) [E]

15) Which of the following is the correct statement regarding a concave lens

- (JUNE 2022) [A]
- A) Converges light rays.
  - B) Diverges light rays.
  - C) Produces an inverted image
  - D) Produces a real image

16) The distance between the principal focus and the focal point of the lens is [A]

- A) Radius of curvature
- B) Focal length
- C) Object distance
- D) Image distance

17). The image formed by the concave mirror is virtual, real and larger than an object. Then the position of the object is [D]

- A) At C
- B) Between C and F
- C) At F
- D) Between F and O

18) The relationship between the centre of curvature and the principal focus distance is [A]

- A).  $R=2f$
- B).  $R=1/2f$
- C).  $f=2R$
- D).  $f=2/3R$

19).SI unit of power of the lens is [E]

- A). Meter
- B). Diopter
- C) Ohm
- D) Centimeter

20). The power of the lens prescribed by the ophthalmologist for vision correction is +2D . Then the focal distance of that lens is [A]

- A) 2 m.
- B) 0.2m
- C) 0.50m
- D) 5m

21) . The object distance and the image distance of an object placed in front of a lens are -60 cm and -20 cm respectively. Then the magnification of the image is [A]

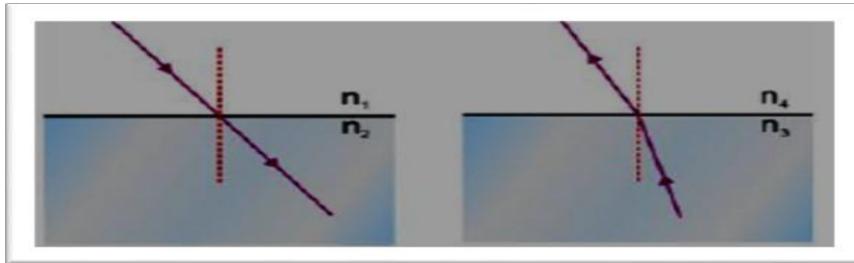
- A). -0.33      B). +3 .      C). +0.33      D). +4.0

22). The refractive index of some media is given. In which medium the speed of light is minimum and maximum respectively [D]

- K -1.62      L -1.81      M -1.94      N- 2.43

- A). K and N      B). N and K      C). N and L      D). M and N

23) .Which of the following is correct regarding the optical density of the transparent media in the figure below? [D]



- A).  $n_1 = n_2$  &  $n_3 > n_4$       B).  $n_1 > n_2$  &  $n_3 > n_4$   
 C).  $n_1 = n_2$  &  $n_3 < n_4$       D).  $n_1 = n_2$  &  $n_3 = n_4$

24). The focal lengths of 4 convex lenses P,Q,R and S are 20 cm, 15 cm, 5 cm and 10 cm respectively. The lens with the highest power is [D]

- A) . Q      B). P      C) . R      D). S

25) The position of an object that produces the image obtained at infinity in a convex lens is [D]

- A). Beyond  $2F_1$       B) . Between  $2F_1$  and  $F_1$       C). At  $F_1$       D). Between  $F_1$  and O

26) In the process of refraction of light the angle between the incident ray and the perpendicular drawn to the point of incidence is  $40^0$  but the angle between the reflected ray and the mirror surface is [D]

- A)  $40^0$       B)  $50^0$       C)  $60^0$       D)  $90^0$

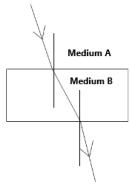
27) If a spherical mirror with a focal length of 30 cm is to be considered for an experiment, its aperture should be [D]

- A) 30 cm      B) 40 cm      C) 60 cm      D) 25 cm

28) A student is standing in front of a plane mirror at a distance of 2 m. The distance between the student and his image is [D]

- A) 2 m.      B) 3 m.      C) 4 m.      D) 6 m.

29) [E]



The correct statement regarding the above image is

- A) The speed of light is higher in medium A.      B) The speed of light is higher in medium B  
C) A is optically rarer medium                    D) B is optically denser medium  
30). The image of the English letter L in a concave mirror looks like this. (September-2020) [E]



- 31). The magnification of the image formed by a mirror is 1.73 then the nature of this image is (MQP 3) [D]



- 32) The power of a lens is - 2.5 D. Then the focal length and type of the lens are. (SUP 2021) [A]

- (A) + 0.40 m and convex lens      (B) - 0.40 m and convex lens  
(C) + 0.40 m and concave lens      (D) - 0.40 m and concave lens

- 33) Which of the following is a property of concave lens [A] (SUP 2021)



- 34) The focal length of a lens is + 0.50 m Then the power and type of the lens is (MAR-2021)

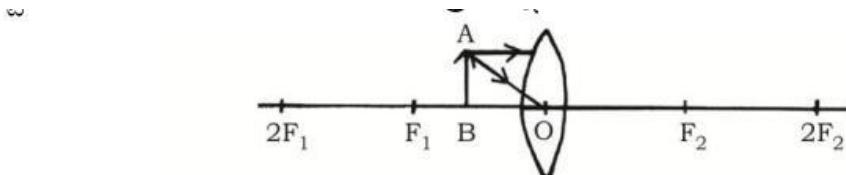


**II. Answer the following questions. (1 mark questions)**

- 35). Why is a convex mirror generally used as a rear view mirror of vehicles? (April-2019) [E]

- 36). What is the centre of curvature of a spherical mirror? (June-2019) [E]

- 37). Observe the given incomplete diagram and complete the diagram by drawing the rays of refraction and show the image formed. (September-2020) [A]



- 38). Find the power of a convex lens with a focal length of + 0.5 m. (JUNE 2022) [A]

- 39). Find the radius of curvature of a spherical mirror whose focal length is 25 cm. (MQP 2) [A]

- 40). What is reflection of light? [E]

- 41). What is lateral inversion? [E]

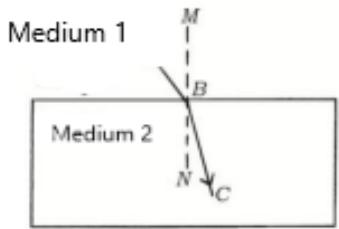
- 42) What is spherical mirror? [E]
- 43) Define the principal focus of a concave mirror. [E]
- 44) Define the principal focus of a convex mirror [E]
- 45) What is an aperture of a spherical mirror? [E]
- 46) What is Refractive index? Write the formula to find the focal length of a mirror. [E]
- 47). When light passes through two different media having the same refractive index, it does not undergo refraction. Why? [E]
- 48) In the experiment on refraction of light from a rectangular glass slab, the incident ray and the emergent ray are parallel. Why? [D]
- 49) How does the position of the image change as an object is brought from an infinite distance to pole of a mirror in convex mirror? [A]
- 50) What is the Principal focus of a convex lens? [E]
- 51) What is the Principal focus of a concave lens? [E]
- III . Answer the following questions. (2 marks questions)**
- 52) State the two laws of reflection of light. [E]
- 53) The focal distance of a concave lens is 30 cm. How far should the object be placed from the lens so that the image is formed at a distance of 20 cm from the lens? Find the magnification produced by the lens.  
(April-2019/ June 2019) [A]
- 54). Draw the diagram of the image formed when an object is placed at the following positions of a convex lens.
- i) Between  $F_1$  and  $2F_1$     ii) When placed at  $2F_1$ . (June 2019) [A]
- 55). The object distance and image distance of a lens are - 30cm and -10cm respectively. Find the magnification and determine the type of lens used and the nature of the image. [D]
- 56). An object is placed 25 cm in front of a mirror with a focal length of 15cm. How far should the screen be raised from the mirror to obtain a clear image? [D]
- 57) how far should the object be placed from the concave lens so that the image is formed at a distance of 10 cm from the lens. (March-2022) [A]
- 58). Light is entering benzene from air with refractive index of 1.50. Calculate the speed of light in benzene.  
(Speed of light in air :  $3 \times 10^8$  m/s) (MARCH-2023) [D]

- 59) A concave lens of focal length 12cm. How far should the object be placed from the lens so that the image is 9cm away from the lens? [D]
- 60) Define the following with respect to a lens: [E]
- i] Focal point ii) Aperture
- 61) What is the refraction of light? State Snell's law of refraction (JUNE-2022) [E]
- 62) Write any two differences between a convex mirror and concave mirrors. (JUNE-2022) [A]

- 63). What are spherical mirrors? Write its 2 types. [E]
- 64). List the uses of concave mirror [E]
- 65). Write any two differences between a convex lens and a concave lens. [E]
- 66). Write the difference between real and virtual images?. [E]
- 67). The refractive index of ice is 1.31 and the refractive index of water is 1.33. In which of the two media does light travel faster? [A]
- 68) State two rays that can be considered to determine the position of the reflection while drawing diagrams of reflections caused by spherical mirrors. [E]
- 69) Why does a pencil partially immersed in water appear to be displaced? What is the name of this phenomenon? [A]
- 70) Draw any two rays that can be considered while drawing diagrams of reflections caused by convex lenses. [E]
- 71) Write the nature of image formed by a plane mirror. [E]
- 72) The ratio between the refractive indices of two transparent media P and Q is 1.82 and the speed of light in medium Q is  $2.25 \times 10^8$  m./s. Then findout the speed of light in medium P. (Speed of light in air C =  $3 \times 10^8$  ms<sup>-1</sup>) [E]

**IV . Answer the following questions. (Three marks questions)**

- 73). The magnification of the image formed by a spherical mirror is -1. If this mirror forms an image of an object at a distance of 50 cm.) [E]
- i) What is the type of mirror? ii) At what distance is the object placed? iii) State the nature and size of the image.
- 74) Draw a diagram of the image formed when an object is placed at the following positions of a convex lens. (JUNE-2019) [A]
- i) At the principal focus F<sub>1</sub>.  
ii) beyond 2F<sub>1</sub>, (JUNE-2023/MAR-2023)
- 75). An object is placed on the principal axis in front of concave mirror with a focal distance of 12cm. If the object is 18cm away from the mirror, calculate the distance of the image formed and determine the nature of the image by finding the magnification caused by the mirror. (APRIL 2020) [D]
- 76). Draw a diagram of the image formed when an object is placed at the following positions of a convex lens. i) Between F<sub>1</sub> and 2F<sub>1</sub> (APRIL 2020) [E]
- 77). A doctor has prescribed a corrective lens of power -0.5 D to a person. Find the focal distance of the lens. Is it a converging lens? or a diverging lens? Give a reason. How this property of the lens is used in correcting eye defects? (APRIL 2020) [A]
- 78). a) Explain the laws of refraction of light. [A]



b) In the given figure, AB is the incident ray, BC is the curved ray and MN is the perpendicular drawn at the point of incidence. Which medium is denser? Why? (SEP-2020)

79) Write any 3 new Cartesian symbols for spherical mirrors. [A]

80) Draw a diagram of the image formed when an object is placed between C and F in front of concave mirror. Find out the position and nature of the image with the help of the diagram. [A]

81) Draw a diagram of the image formed when an object is placed at C in front of a concave mirror. Find out the position and nature of the image with the help of the diagram. [A]

82) Draw a diagram of the image formed when an object is placed beyond C in front of concave mirror. Find out the position and nature of the image with the help of the diagram. [A]

83) Draw a diagram of the image formed when an object is placed at F in front of concave mirror. Find out the position and nature of the image with the help of the diagram. [F: Principal confluence of the mirror; C: Centre of curvature of the mirror] [A]

84. Draw a diagram of the image formed when an object is placed between F and P in front of concave mirror. Find out the position and nature of the image with the help of the diagram. [F: Principal confluence of the mirror; P is the polar of the mirror] [A]

85). Draw the diagram and position nature of the image formed when an object is placed between F<sub>1</sub> and O in front of a convex lens. [A]

86) If the magnification of the image formed by a convex mirror is 0.5 and the object is 15 cm away from the mirror, find the focal length of the convex mirror and write the nature and size of the image. [A]

87. Explain the activity of a convex lens converges parallel light rays. [A]

88. Explain the activity of finding the approximate focal length of a concave mirror. [A]

#### **V . Answer the following questions. (Questions of four marks)**

89. Explain the activity of refraction of light by a rectangular glass slab. [A]

90. Draw a diagram of the image formed when an object is placed at the following positions of a convex lens. Write the image distance, nature of the image and size of the image.

i) at 2F<sub>1</sub>

## UNIT : 10 HUMAN EYE AND COLOURFUL WORLD

### Learning points

- Human Eye
- Accommodative Ability of the Eye
- Visual Defects and Their Solutions
- Refraction of Light through a Plate
- Refraction of Light through a Glass Plate
- Scattering of Light - Tyndall Effect, Why is the Color of a Clear Sky Blue?

WEIGHATE TO DIFFICULTY LEVEL

SL NO	Difficulty level	Number of questions	Marks	Percentage
1	Easy	22	27	30%
2	Average	26	46	50%
3	Difficulty	09	18	20%

**I . Four alternatives are given for each of the following questions/incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet. (1 Marks)**

1. The area where the image is formed in the eye [E]  
A. cornea      B. retina      C. iris      D. lens
2. The part of the eye that forms an inverted real image of the object on the retina [E]  
A. eye lens      B. pupil    C. iris      D. cornea
3. The lens used to correct near sightedness: [E]  
A. biconvex lens    B. plano-convex lens    C. concave lens    D. none of the above
4. In old age , some times the eye lens becomes cloudy and whitish like milk.This condition is called [E]  
A. hypermetropia      B. myopia      C. presbyopia      D. cataract
5. A person can only see objects clearly that are between 40cm and 80cm from there eyes what is the default [A]  
A. nearsightedness and use of concave lens    B. farsightedness and use of appropriate convex lens  
C. presbyopia and use of appropriate bifocal lens    D. eye surgery
6. Structure that controls change in focal length of the eye lens [E]  
A. Ciliary muscles      B. Eyelid    C. Retina      D. Iris
7. Why the sun is visible two minutes before actual sunrise and after actual sunset [A]  
A. Refraction of light      B. Reflection of light

C. Scattering of light

D. Dispersion of light

8. Colour of the sky seen from the surface of the moon is

[A]

- A. Blue      B. Red      C. Black      D. Violet

9. Colour that bends the least in a glass prism:

[A]

- A. Violet      B. Blue      C. Green      D. Red

10. The following change in the eye takes place while viewing distant object

[A]

A. Decrease in focal length of the eye lens

B. Increase in curvature of the lens

C. Increase in focal length of the eye lens

D. Relaxation of ciliary muscles

11. The correct statement regarding scattering of light and particle size is ( April-2024)

[A]

A. small particles scatter red light

B. Large particles scatter blue light

C. Large particles scatter violet light

D. Very large particles scatter all colours equally

12. Nature of the image formed by the eye lens on the retina (MP – 2023)

[A]

A. Real and inverted      B. Virtual and upright

C. Real and upright      D. Virtual and inverted

13. The colour that is least scattered by fog and smoke is [E]

- A. orange      B. blue      C. red      D. violet

14. Identify the wrong statement among the following statements regarding refraction and dispersion of light.

A. Stars twinkle      (June- 2024) [A]

B. sky appears blue to an astronaut flying at very high altitudes

C. the sun is visible to us about two minutes before the actual sunrise

D. planets do not twinkle

## II. Answer the following questions (One mark )

15.What is the near point of the eye? State the value of near point of the normal eye. [E] .

16.What is the far point of the eye? State the value for normal eye. [E]

17.What is the spectrum of white light? [E]

18. What are common defects of vision? [E]

19.What is the angle of deviation? [E]

20.What is the angle of prism? [E]

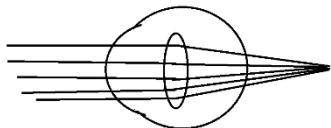
21.What is the emergent angle? [E]

22. Name eye part of the following: [E]

a) It forms the transparent bulge on the front surface of the eyeball

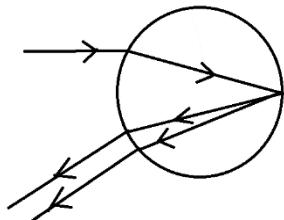
b) It is a dark muscular diaphragm

23. Identify the eye in the image and mention its remedy. [A]



24. What is light dispersion? [E]

25. Can this phenomenon be observed on the moon? Justify your answer. [D]



26. What are the near point and far point of a person with normal vision? (June 2019,March 2024) [A]

27. Name any two atmospheric phenomena caused by light refraction (March 2019,2024) [E]

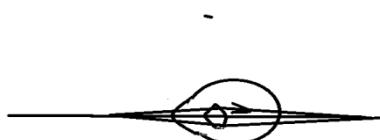
28. What is accommodation of the eye? (June 2019) [E]

29. What colour is used in danger signals and why? [A]

30.A student at the back bench struggle to read the blackboard. What is the defect and how can this defect be corrected?

(June 2024) [D]

31. Identify the eye defect shown in the image and suggest a remedy? [A]



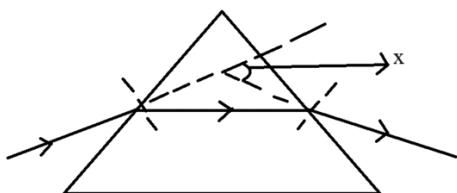
32.What is the function of the pupil in the human eye?

(June 2019)

[A]

33.Observe the below figure showing the refraction of light through a glass prism.

[D]



Name the angle represented as angle X and give reason for the formation of that angle

34.What is cataract?

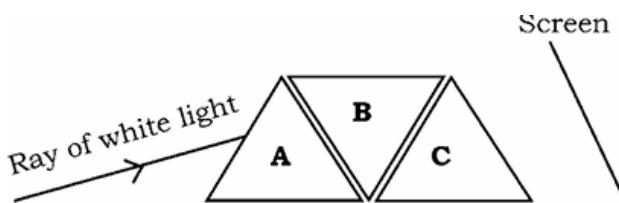
(March -2024)

[E]

35.After the light is split in a prism , state the colour of the light that is least bent and the colour of the light that is most bent.  
(March 2019,2023, June 2019)

[E]

36.Glass prisms A, B and C are arranged as shown in the figure below. When a beam of white light is passed through the prism A, will a spectrum of light be produced on the screen? Give the reason. ( May 2025) [A]



### III. Answer the following questions (Two mark)

37.What is hypermetropia ? What are its causes?

( June 2019)

[E]

38.What is myopia ? What are its causes?

[A]

39.Explain the formation of a rainbow in nature

( March 2023,June 2023)

[A]

40. Explain the experiment that Newton did to determine that white light consists of seven colors. (March 2020) [A]

41.Describe newton's experiment to show the recombination of white light. ( March 2020,April 2025) [A]

42.Write the differences between the myopic eye and hypermetropic eye. ( April 2025) [E]

43. Identify and justify the type of eye shown in the diagrams: normal, nearsightedness, farsightedness [A]

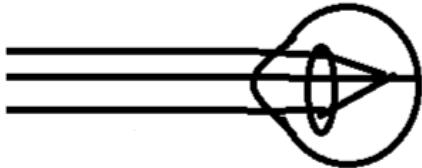


44. A person with eye defect purchases spectacles with a lens power of -2.0 D . which lens is suitable for the given eye defect? analyze  
( April 2024) [D]

45. Explain how the human eye lens adjust for viewing near and distant objects.

( March 2023, June 2023, August 2024) [A]

46. Observe the given figure. Identify the eye defect indicated in this figure (March 2019, 2023 ,MP2023) [A]



- a) presbyopia
- b) hypermetropia
- c) myopia
- d) cataract

#### IV. Answer the following questions (Three mark)

47.What is the Tyndall effect? Give two examples [A]

48.Why the clear sky is blue in colour ? Explain (A)

49.Draw the diagram to show the recombination of white light. (June-2024) [A]

50.Why do stars twinkle but planets do not? Explain. (August – 2024) [A]

51.What is presbyopia? What are its causes? Mention the remedy [A]

52. A doctor prescribes a lens with power -0.5 D. Find its focal length. Is it a converging and diverging lens? Justify. How does a concave lens correct nearsightedness ( March -2020) [D]

53.a) Why can't we see objects clearly closer than 25cm with normal eye? [D]

b) Explain the relationship between the colour of light scattered in the atmosphere and the size of the scattering particles.

54 1). a) What is the reason for the whiteness of the sun's rays on the scalp in the afternoon? [D]

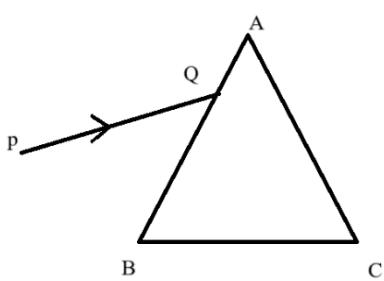
b) What is the working principle of the human eye?

2) Write the main function of each of the following

- a) iris
- b) pupil
- c) cornea

55. A short beam of white light PQ passes through a glass prism as shown in the figure.

[D]



D  
E

Redraw this and draw the resulting ray path that can be viewed on the DE screen.

- a) Name the phenomenon seen here      b) Write the reasons.

**V. Answer the following questions ( Four mark )**

56. a) Explain the phenomenon of formation of the rainbow in the atmosphere.

- b) Why do stars twinkle? (May 2025)

[A]

57. a) What is near-sightedness (myopia)? Mention the causes for this defect.? How can this defect can be corrected

- b) What is power of accommodation of the eye? What are the changes that occur in the eye while seeing the distant objects? (May 2025)

## UNIT-13

### OUR ENVIRONMENT

#### Learning points

- Ecosystem – what are its components
- Food chains and food webs
- How do our activities affect the environment
- Ozone layer and how it is getting depleted
- Waste management

#### Weightage to Difficulty Level

Sl.no.	Difficulty level	Question number	Marks	Percentage
01	Easy	12	21	30
02	Average	23	35	50
03	Difficulty	09	14	20

#### I. Multiple choice questions;

**Four alternatives are given for each of the following questions/incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet. (1 Marks)**

1. Observe the food chain given below:

(SUP-2019) [D]

Grass → Grass hopper → Frog → Snake → Eagle.

If the energy available at first trophic level is 5000 J, then the amount of energy available for snake is

A. 500 J      B. 5 J      C. 0.5 J      D. 50 J.

2. The correct statement with respect to biodegradable substances among the following. These substances [A]

A. undergo recycling naturally in the environment

B. harm various organisms in the ecosystem

C.increase the density of harmful chemicals in different trophic levels

D.remain inert in the environment for a long time(MAIN- 2021)

3. The materials that change slowly their form and structure in the environment are (SUP- 2021) [E]

A.Plant fibers

B.Peels of vegetables

C. Waste papers

D.Used tea leaves

4. Atmospheric layer that absorbs ultraviolet radiations coming from the sunlight is made up of this molecule.

(MAIN- 2022) [A]

A. N<sub>2</sub>B. H<sub>2</sub>C. O<sub>3</sub>D. O<sub>2</sub>.

5. Primary consumers in any food chain are always

(SUP- 2022) [A]

A.carnivores    B.herbivores    C. higher carnivores    D. producers.

6. Producers of aquatic eco-system are

(SUP-2023) [A]

A. algae    B. small fishes    C. larvae D. protozoa.

7. The second trophic level of a food chain consists of

[A]

A. Producers                          B. Herbivores

C. Secondary consumer              D.Primary carnivores

(2025-MODEL-4)

8. Algae → Small insects → Large insects → Small fish → Large fish → Humans [A]

The arrangement of trophic levels in this food chain is

A. In the order of increasing energy availability.

B. In the order of increasing both energy availability and accumulation of harmful chemicals.

C. In the order of increasing accumulation of harmful chemicals.

- D.In the order of decreasing both energy availability and accumulation of harmful chemicals.
9. Which of the following groups contain only biodegradable materials [A]  
 A.Grass, flowers and leather      B.Grass, wood and plastic  
 C.Fruit peel, cake and lemon juice.    D.Cake, tree and grass
10. Which of the following can form a food chain [A]  
 A. Grass, wheat and mango                  B.Grass, goat and human  
 C.Goat, cow and elephant                  D.Grass, fish and goat.
- 11.Which of the following are eco-friendly practices [D]  
 A.Carrying cloth bags to store the items purchased while shopping.  
 B.Switching off unnecessary electric lights and fans.  
 C.Walking instead of taking your mother's two-wheeler to school.  
 D.All of the above.
12. The flow of energy in an ecosystem is unidirectional. [A]  
 A. The number of predators is constant  
 B. The number of organisms is less  
 C.The available energy is used completely by predators  
 D. The loss of energy is more than the amount of energy available.
- II.Answer the following questions (One Mark Question)**
13. Micro-organisms like bacteria are called decomposers. Why ? (SUP-2019) [A]
14. What is the role of decomposers in an ecosystem ? (MAIN- 2022) [A]
15. Nowadays Chloroflorocarbon (CFC) free refrigerators are being manufactured. Why?  
 (SUP- 2022) [D] (SUP- 2022,2023) [E]
16. What is 'biological magnification'? (SUP- 2022,2023) [E]
- 17.“Though ozone is a deadly poison, it is essential for life on the earth.” Justify this statement. (2024 –exam-1A) [E]
- 18.“The number of organisms decreases by reaching hightrophic level of a food chain in an ecosystem.” Why ?  
 (2024 -exam-1A) [A] (2024 -exam-1A) [E]
19. What is a food chain? [E]
20. State the 10% law? [E]
21. The use of CFCs in refrigeration units is mandatory banned. Why? [A]
- III Aswer the following questions ( Two Mark Questions)**
22. A food chain in a polluted aquatic ecosystem is given. Observe and answer the following questions.  
 Fresh water → Algae → Fishes → Birds. (MAIN-2019) [A]
- (i) Which organisms are disturbed more due to biomagnification ?Why ?  
 (ii) This ecosystem will be destroyed gradually due to biomagnification. Why ?
23. A student places a piece of cucumber, a glass piece, a banana peel and a plastic pen in a pit and closes it. What changes can be observed in these materials after a month ? Give scientific reason for these changes.  
 (MAIN-2019) [D]
24. “As energy moves progressively through various trophic levels of food chain it is no longer available to the previous level.” Give reasons. (MAIN- 2020) [D]
25. Mention any two effects of non-biodegradable substances on the environment. (SUP- 2022) [E]
26. Mention any two methods that reduce the problems caused while disposing the wastes. [E]
27. Give an example for a food chain of grassland ecosystem. If there is an increase in the number of organisms in the second trophic level, how does this affect on that food chain ? (MAIN – 2023) [A]
28. In an aquatic eco-system the organisms such as fishes,chain using these organisms. If 10 calories of energy isavailable to the tertiary consumers in this food chain, whatamount of energy was produced in the first trophic level ?  
 ( 2024-EXAM-2 A) [A]
- 29 .Observe the given food chain and answer the following questions: [E]  
 Green plants→ Deer →Tiger  
 T1                T2                T3
- i) What is the amount of energy do green plants have ifthe energy available to the tiger is 700 kJ ?

- ii) The organism of which trophic level has the maximum accumulation of harmful chemicals ?Why ?  
(2024-EXAM-3A)
30. Construct a food chain using the organisms ; snake, frog, grass and grasshopper. Which organism has more accumulation of harmful chemicals in this food chain ? (2025-EXAM-1) [A]
31. Use of non-biodegradable substances should be minimised. Why? (2025-MODEL 1) [D]
32. How is ozone layer formed ? Protection of ozone layer is necessary. Why ? (2025-MODEL-1) [D]
33. State the impact of biodegradable substances on the environment. [E]
34. Food chains usually consists of only three or four levels. Why? [D]
35. What will happen if we kill all the organisms in a trophic level? OR  
Will the effect of removing all the organisms in a trophic level be different in different trophic levels? [D]
36. If all the wastes we produce were biodegradable, would it not have any impact on the environment? [D]
37. Why is the damage to the ozone layer a cause for concern? What steps are being taken to limit this damage? [A]
38. How can you help reduce waste disposal? Mention any two ways. [A]
39. What is an ecosystem? What are its components? [A]
40. Why does a interconnection between food chain occur in an ecosystem? [A]
41. How does energy flow in a food chain? [A]
- III Answer the following questions (Three marks questions)**
42. Give reason: [A]  
a) Food chains generally consist of only three or four steps.  
b) Decomposers play an important role in an ecosystem.  
c) Protecting of ozone layer is necessary. (SUP-2020)
43. What is trophic level ? Flow of energy in an ecosystem is always unidirectional. Why ?  
Explain. (MAIN- 2022) [A]
44. Differentiate between biodegradable and non biodegradable materials . [A]

## Model Key Answer

### Unit -1 Chemical Reactions and Equations

#### I. Multiple Choice Questions.

1. C. Rusting of iron
2. C. Change in Shape
3. C. Displacement reaction
4. A.  $\text{BaCl}_2$  and  $\text{Na}_2\text{SO}_4$
5. C. Endothermic reaction
6. A. Double displacement reaction
7. B.  $\text{H}_2 + \text{CuO}$
8. A. Silver chloride decomposes to form silver.
9. C. Hydrogen: Oxygen:: 2 : 1
10. B. Exothermic reaction
11. B. Hydrogen
12. C.  $2\text{AgNO}_3 + \text{Cu} \longrightarrow \text{Cu(NO}_3)_2 + \text{Ag}$
13. A. Hydrogen gas and iron chloride are formed
14. D. Iron
15. B. Loses water molecules
16. B. To prevent chips from getting oxidized.

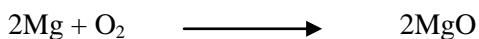
#### II. Answer the followings One mark questions.

17. A process that involves the rearrangement of atoms and molecules to form a new substance with different properties.
18. Chemical equation is a symbolic representation of a chemical reactions using chemical formulas and symbols
19. To remove Oxide layer deposited on Magnesium ribbon.
20. To justify the law of conservation of mass OR  
The total mass of reactants must be equal to the total mass of products

21. Because in both the processes, the heat is liberated. Hence they are exothermic reactions
22. The reaction in which insoluble substance product. is produced is called the Precipitationreaction.  
$$\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$$
23. When a metal is attacked by substances around it such as moisture, air, acidetc this phenomenon is called corrosion OR Corrosion is the gradual deterioration of metals Caused by action of air, moisture or acid.
24. To prevent rancidity / to prevent chips from getting oxidized.
25. To prevent rusting of Iron.
26. Undesirable change in the smell and taste of food containing oil and fats due to oxidation is called rancidity. OR  
Theprocess by which oil and fat items oxidize and change their smell and taste.
27. Using antioxidants like nitrogen  
Keeping the food in air tight containers.
28. ZnO is reduced  
C is Oxidized
29.  $\text{SO}_4^{2-}$  and  $\text{Ba}^{2+}$  ions.
30. Calcium hydroxide /  $\text{Ca(OH)}_2$  any one.
31. Combination reaction /Oxidation reaction.

#### III. Answer the following questions Two Mark Questions.

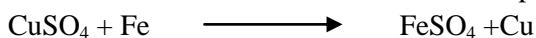
32. i. Change of state  
ii.Change of colour  
iii. Evolution of gas  
iv. Change in temperature
33. A chemical reaction in which two or more reactants react to give a single product.



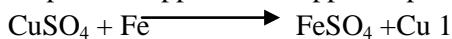
34. A reaction in which single reactant breaks down to give two or more products is called decomposition reaction



35. A reaction in which a more reactive element displaces a less reactive element from its compound.



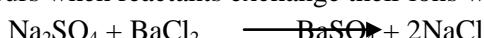
36. Iron displaces Copper from copper sulphate.



37. No. Because

Iron is more reactive than Copper OR Copper is less reactive than Iron

38. A reaction in which the reactants exchange their ions mutually to produce New compounds/ A chemical reaction that occurs when reactants exchange their ions with each other.



39. Yellow precipitate.

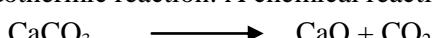
Lead iodide. /PbI<sub>2</sub>

Double displacement.

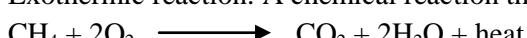
40. Nitrogen dioxide



41. Endothermic reaction: A chemical reaction that releases heat.

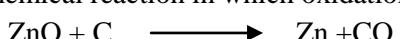


Exothermic reaction: A chemical reaction that absorbs heat.



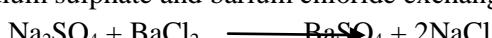
Thermal decomposition reaction.

43. A chemical reaction in which oxidation and reduction reactions take place simultaneously.

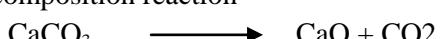


C is oxidized. ZnO is reduced..

44. Sodium sulphate and barium chloride exchange their ions with each other.



45. Decomposition reaction



46. The process by which metals are attacked by their surroundings such as moisture, acids etc.

- Painting
- Greasing
- Oil-coating
- Anodizing
- Galvanization
- Alloying any two

47. i. X element –Copper

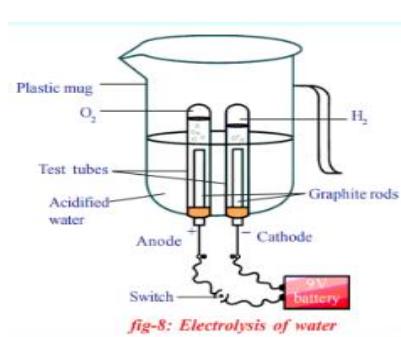
ii. Copper oxide/ CuO

48 Fe

Because the reactivity of iron Fe. is higher than that of silver Ag).



49.



IV. Answer the following questions Three marks questions.

50.

- i. Barium sulphate / $\text{BaSO}_4$
- ii.  $\text{SO}_4^{2-}$  and  $\text{Ba}^{2+}$
- iii. Double displacement reaction.

51. The chemical reactions occur in test tubes A and C.

Because iron Fe is less reactive than zinc Zn. and magnesium Mg./ magnesium and zinc are found above the reactivity series.



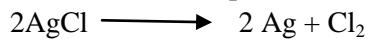
52. a. Chemical reaction that takes place using heat.

calcium carbonate on heating gives calcium oxide and carbon dioxide.

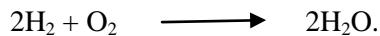


b. Chemical reaction that takes place using light.

Silver chloride is split into silver and chlorine.



c. Chemical reaction that takes place using electricity.

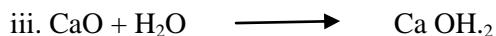


53. Silver chloride. Silver bromide.



54. i. Z is calcium oxide.

ii. Molecular formula CaO



55. Displacement reaction

Iron nail reacts with copper sulphate blue colour. to displace copper.



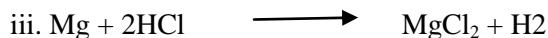
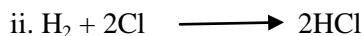
56.

Double displacement

The reactants exchange their ions with each other.

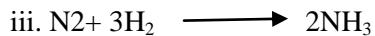
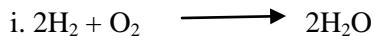


57.

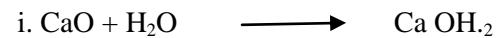


58.

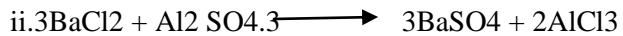
Balance the following chemical equations.



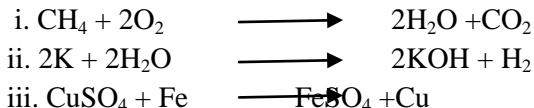
59.



60.



61.



62. Oxidation : addition of oxygen



Reduction : Removal of Oxygen



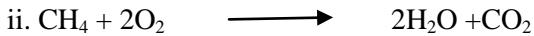
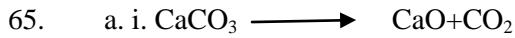
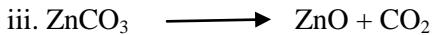
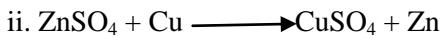
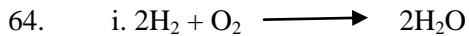
**Answer the following questions. Four Mark Questions.**



ii. PbI<sub>2</sub>/ Lead iodide.

iii. Yellow

iv. Double displacement reaction.



b i. Copper objects react with air in the atmosphere to form

Copper oxide CuO. OR Copper carbonate CaCO<sub>3</sub>. OR Copper is oxidized OR

Copper undergoes corrosion Any one.

ii. A displacement reaction has taken place OR

Iron displaces copper from copper sulphate solution

## UNIT : 2 ACIDS, BASES AND SALTS

### MODEL KEY ANSWERS

1. (C)  $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$

2. (C) basic property increases and number of OH<sup>-</sup> ions increases

3. (A) Aluminium Oxide

4 (A) Carbon dioxide

5. (D) Gastric juice

6. (A) Methanoic acid

7. :A) Sodium carbonate

8.A) 0-7

9. D) reduces acidity

10. C) Hydrogen

11.C) Metal oxide & hydrogen gas

12.B) Ca(OH)<sub>2</sub>

13. C) Copper hydroxide

14. A) Exothermic and may explode.
15. The reaction between an acid and a base to produce salt and water is called neutralization
16. Metallic oxides that show both acidic and basic behavior are called amphoteric oxides
17. Plaster of Paris is used in :  
➤ Supporting fractured bones  
➤ Making toys  
➤ Decorative materials  
➤ Making smooth surfaces. ( Any two )
19. Acidic —  $\text{H}^+$  /  $\text{H}_3\text{O}^+$  / Hydrogen / Hydronium
20. i) In glass, soap and paper industries. ii) In the manufacture of sodium compounds such as borax.
21. It is a basic salt.  
because sodium hydroxide is a strong base.
22. By adding the acid slowly to the water with constant stirring.
23. Blue litmus paper turns red when dipped in acid./ Red litmus paper does not change colour when dipped in acid.
- 24 A solution with a pH value ranging from 0 to 7 is called an acid.
25.  $2\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$
- 26 Calcium carbonate ( $\text{CaCO}_3$ )
27. Carbon dioxide
28. A metal oxide is called a primary oxide because it reacts with an acid like a primary acid to form a salt and water.
29. Non-metal oxides react with an acid like an acid to form a salt and water.
- 30 . Have hydroxide ions
31. Hydronium ion ( $\text{H}^+$ )
- 32 The basicity of the solution increases. Or the pH value increases.
- 33 Less than 5.5.
- 34 Calcium oxychloride
- 35:  $\text{Ca(OH)}_2 + \text{Cl} \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$
- 36 Baking powder is an edible mixture of baking soda and tartaric acid.
37.  $\text{NaHCO}_3$  - Sodium hydrogen carbonate
- 38  $\text{NaHCO}_3$  - Sodium hydrogen carbonate
39. Because baking soda reacts with water to produce carbon dioxide gas

40. If water is added to concentrated acid the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive local heating. ( Any one )  
(ii) Otherwise, it reacts with moisture and changes to gypsum which is a solid mass.

41:

- Plants require a specific pH range for their healthy growth.
- Soil of his land is acidic.
- Lime powder is a base.
- So adding lime powder to the soil, decreases the acidic property / soil is neutralised.

42. The solution A is acidic because the more concentration of hydrogen ions.

43. Properties of Acids

- Acids have a sour taste
- Turns blue litmus paper red
- Have hydrogen ions
- Acids are good conductors of electricity

44. Properties of Bases

- Bases have a bitter taste
- Turns red litmus paper to blue
- Have hydroxide ions,
- These are insulators

45. First dip the litmus paper one by one in a test tube and take it out and wash it in neutral water before dipping it in another test tube.

1. If the colour does not change, then distilled water is neutral
2. If the red litmus turns blue, then it is a base
3. If the blue litmus paper turns red, then it is an acid)

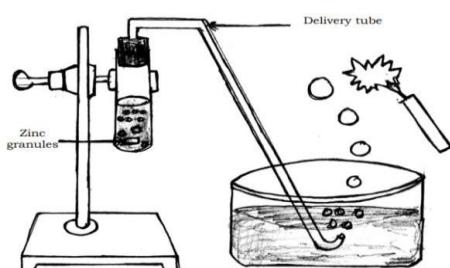
46. HCl HNO<sub>3</sub> etc. produce hydrogen ions in aqueous solution Compounds like alcohol and glucose contain hydrogen, so they do not produce hydrogen ions, so they do not exhibit acidic properties.

47. In solution, electric current is carried by ions. Rainwater contains dissolved salts which dissociate into ions and carry electric current, but in distilled water, no electric current flows as ions are not formed.

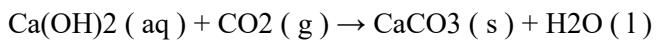
48. As milk curdles, its pH decreases because as milk curdles, the lactose in the milk is converted to lactic acid. Acids have a low pH.

49. To increase the shelf life of milk, the pH of fresh milk is changed to alkaline. Since milk is slightly more alkaline, it takes longer.

50.



51. Carbon dioxide ( or CO<sub>2</sub> )



White precipitate

52 Sodium hydroxide / NaOH.

(i) De-greasing metals (ii) Soaps and detergents (iii) Paper making (iv) Artificial fibres.

53. Acid that gives rise to more + H ions is said to be strong acid. .

Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating. So the pH in the mouth decreases and the tooth enamel gets corroded.

Using toothpastes which are generally basic, for cleaning the teeth.

54.a) Bleaching powder : CaOCl<sub>2</sub>

Uses

- for bleaching cotton and linen in the textile industry,
- for bleaching wood pulp in paper factories and for bleaching washed clothes in laundry.
- as an oxidising agent in many chemical industries
- to make drinking water free from germs. ( Any two uses )

b) CaSO<sub>4</sub>.1/2 H<sub>2</sub>O

Uses

- for making toys
- making materials for decoration
- for making surfaces smooth. ( Any two uses )

55.a) Reaction between acids and bases to form salt and water is called neutralisation reaction.

Base + Acid → Salt + water.

Ex :NaOH + HCl → NaCl + H<sub>2</sub>O.

[ Consider any suitable example ]

56. Calcium sulphate hemihydrate or Plaster of Paris.

57. An acid that contains more water and less acid is called a concentrated acid. Acids that produce fewer H<sup>+</sup> ions are also called weak acids.

Be careful when adding acid to water. Always add acid slowly to water with constant stirring.

58. a. sodium hydroxide  
b. bleaching powder  
c. plaster of paris

59. Acidic solutions- e h

Basic solutions -h g

b) Milk of magnesia / Magnesium hydroxide / Mg (OH)<sub>2</sub>

60 No colour change is observed in the litmus papers dipped in the brine solution. Because it is a neutral solution. Red litmus paper dipped in aqueous product obtained by electrolysis of brine solution turns to blue colour. Because it is a basic solution

61. Solution ‘P’ can be used to prepare an antacid. Because it is a mild base.

ii) Solution ‘Q’ and ‘S’ can be used to get a neutral salt. Because ‘Q’ is a strong base and ‘S’ is a strong acid

62. i) Curd : Lactic acid

ii) Gastric juice : Hydrochloric acid HCl

63: i) Solution ‘A’ has more H<sup>+</sup> ions concentration. Reason : If pH value is less, then H<sup>+</sup> concentration is more.

Solution ‘D’ has more OH<sup>-</sup> ions concentration. Reason : As the pH value increases from 7 to 14, there is an increase in OH<sup>-</sup> ions concentration.

ii) Solutions ‘A’ and ‘D’. Solutions ‘B’ and ‘C

64. (i) The reaction between an acid and a base to give a salt and water is known as a neutralisation reaction.

(ii) The products of chlor-alkali process are :

- hydrogen
- chlorine
- brine containing NaOH.

Uses of hydrogen :

- used as a fuel
- margarine
- ammonia for fertilisers ( Any one )

Uses of chlorine :

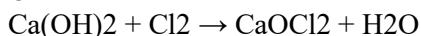
- used in water treatment
- used as a cleaning agent in swimming pools
- used in making PVC, CFCs
- used as a disinfectant
- used as a pesticide. ( Any one )

Uses of NaOH :

- used for degreasing metals
- used for making paper
- used for making soaps and detergents
- used for making artificial fibres

65.a) Bleaching powder is produced by the action of chlorine on dry slaked lime.

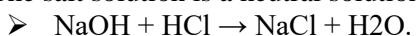
OR



Uses :

- For bleaching cotton and linen in the textile industry, wood pulp in paper factories. For bleaching washed clothes in laundry
- As an oxidising agent in chemical industry
- to make drinking water free from germs. ( Any two )

b) The salt solution is a neutral solution.



66. i) The blue litmus paper does not change its colour in basic solution.

ii) When acidic property of soil increases When pH value of soil decreases When the concentration of H<sup>+</sup> / H<sub>3</sub>O<sup>+</sup> ions in soil increases. ( any one )

67.

Acids	Bases
Acids have a sour taste	Bases have a bitter taste
Turns blue litmus paper red	Turns red litmus paper blue
Contains hydrogen ions	Contains hydroxide ions
Acids are good conductors of electricity	These are insulators

## UNIT 5: Life Processes

### KEY ANSWERS

#### I. MULTIPLE CHOICE

1. A. Acidic food becomes alkaline due to bile.
2. C. Small intestine
3. D veins
4. D pulmonary arteries
6. A. Water transport
7. C Excretion
8. B Mitochondria
9. B Excretion of urea in urine
10. A Exchange of gases
11. B Nephron
12. C.Lymph
13. C. Aorta
14. A. Creating upward tension
5. C. Urinary bladder
16. B. To organize water column in xylem tissue
17. A.Evaporation
18. C .To carry water to higher places

#### I. Answer the following questions (one mark questions) Key answers

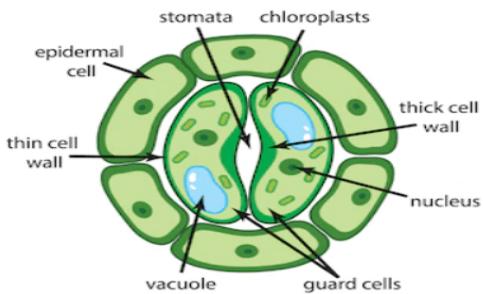
19. Lactic acid is produced when there is a lack of oxygen in muscle cells.
20. The left and right sides of the heart are separate, so oxygenated and deoxygenated blood do not mix.
21. In anaerobic respiration (in yeast cells), a molecule of glucose is broken down to produce ethanol and carbon dioxide.
22. To digest cellulose
23. The amount of oxygen in water is less than the amount of oxygen in air.  
Therefore, aquatic organisms breathe faster to get more oxygen.
24. Blood clots in injured areas and stops the leakage
25. Translocation.
26. The loss of water in the form of vapor from plant parts exposed to the atmosphere is called transpiration
27. Blood passes through the heart twice to circulate completely through the body once. This is called double circulation.
28. The process by which organisms remove waste products produced by their metabolic processes from the body.
29. The opening and closing of stomata perform the function
30. The stomata close when carbon dioxide is not needed for photosynthesis.
31. The exchange of carbon dioxide and oxygen gases between the blood and the cells.
32. Osmotic pressure in plants causes materials to move from the phloem to tissues of lower pressure, thereby transporting food.
33. The lungs always retain a small amount of air as they inhale and exhale during the respiratory cycle.

34. Villi
35. Villi increase the surface area needed to absorb digested food.
36. Because humans do not have the enzyme cellulase to digest starch or the enzyme to digest cellulose
37. In multicellular organisms, not all cells can be in contact with the surrounding environment
38. Enzymes are called biological catalysts because they help in the conversion of complex food into simpler forms so that it can be absorbed by the digestive tract.
39. The maintenance processes that take place in living organisms are called life processes
40. 1. Aerobic respiration 2. Anaerobic respiration
41. Pyruvate
42. The process of consuming, digesting and utilizing food is called nutrition.
43. Xylem and Phloem
44. The process by which plants make food using carbon dioxide, water, sunlight, and chlorophyll is called photosynthesis.
45. The process by which glucose reacts with oxygen in a cell to release energy.
46. Organisms that depend on other organisms for their food are called parasitoids.
47. A) Person A is more likely to be in B than in A
48. 1) x = artery y = vein  
 2) Veins have valves
49. i) Excreting excess water in plants  
 ii) Helping in the upward movement of water

### **III. Answer the following questions (two marks questions) Key answers**

50

#### **Open Stomata**



51. Animal x = Herbivorous Animal AnimalY = Carnivorous Animal

The length of the small intestine in herbivorous animals is longer than that in carnivorous animals

52. a) The saliva released while chewing chapati contains the enzyme amylase  
 b) This enzyme breaks down the starch in chapati and converts it into simple sugar.

53. a) Because the heart has to pump blood to several organs  
 b) Because it requires a lot of energy to maintain its body temperature.

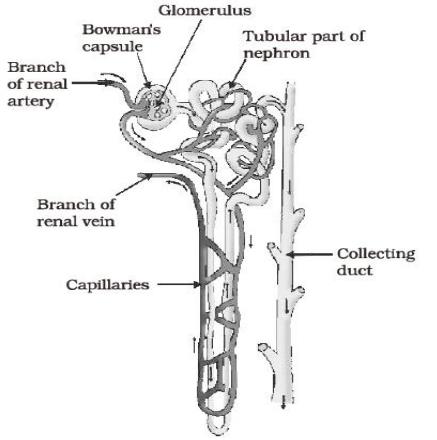
54. Amylase is an enzyme found in saliva.

Function: Breaks down the complex molecule starch and releases sugar.

55. a) Figure (1) / Open stomata Since stomata are open

b) X – Guard cell Y – Stomata

56.



57. \* Alkalizing food and

\* Breaking down large fat particles into smaller particles to increase the efficiency of enzymes

58. \* Hemoglobin in red blood cells has a high affinity for oxygen, which carries oxygen from the lungs to other parts of the body.

\* Carbon dioxide is more soluble in water than oxygen, so it is transported to the lungs through the blood plasma

59. \*They have a three-chambered heart.

\* Oxygenated and deoxygenated blood mix to some extent.

60. \*Since both oxygen and carbon dioxide must be transported through the blood,

\*the heart has separate chambers to prevent oxygen-rich blood from mixing with carbon dioxide-depleted blood.

61. \* Double circulation helps in the rapid delivery of oxygenated blood to all parts of the body. This enables organisms to meet their high energy needs.

\* Double circulation in mammals and birds helps regulate body temperature

62.\* The blood circulation was incomplete, as pure and impure blood was mixed.

\*Double blood circulation was not observed

63. \*Herbivores that eat grass have a long small intestine to digest cellulose.

\*But carnivores like tigers digest meat easily. So carnivores have a short small intestine

64. \*As plants growing in deserts face water scarcity, stomata close in the morning, preventing transpiration.

\*At night, they take in carbon dioxide and produce an intermediate substance, which is then absorbed by chlorophyll during the day and the energy acts on this substance.

65. \*The process by which green plants make food using carbon dioxide and water with the help of sunlight and chlorophyll (a pigment in leaves) is called photosynthesis.

\* Carbohydrates | Glucose

\*Carbohydrates are used to meet energy needs in plants.

66. A) Produces antibodies. B) Lymphocyte cells eliminate bacteria and unnecessary substances

67.

Artery	Vein
* Carries blood away from the heart.	*Carries blood to the heart
*Have thick walls	*Have thin walls
*Does not have valves	*Does have valves

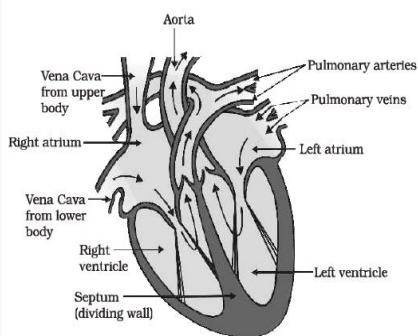
(Any two)

68 \* Creates an acidic environment to promote the action of the enzyme pepsin.

\* Destroys microorganisms that enter the stomach with food.

#### IV. Answer the following questions (Three marks questions) Key answers

69



70. \*The small intestine is the place where proteins, carbohydrates, and fats in food are completely digested.

\*Enzymes in intestinal juice convert proteins into amino acids, fats into fatty acids, and complex carbohydrates into glucose.

\* Villi in the inner wall of the small intestine absorb digested food.

71.\*The translocation of food substances in plants takes place in the phloem tissue.

\* The translocation of food and other substances takes place in both upward and downward directions with the help of the lateral companion cells of the phloem

\* This action is achieved by Osmotic pressure.

72 \*Heart -

\* Oxygenated and deoxygenated blood are transported separately.

\* Provides maximum oxygen to the body.

73\* Arteries carry blood from the heart to various organs of the body. Once an artery reaches a tissue, it divides into smaller vessels to bring the blood into contact with each cell.

\* The exchange of substances between the blood and the surrounding cells takes place through the thin walls of very small vessels called capillaries. The capillaries then join together to form veins.

\*Arteries carry blood away from an organ or tissue. Veins collect blood from different organs and bring it back to the heart.

74. \*Cells in contact with the soil or in the roots actively absorb ions. This creates a difference in the concentration of ions between the roots and the soil.

\*To overcome this difference, water moves from the soil to the roots. There, the constant movement of water within the xylem of the roots creates a column of water that continually pushes water upward.

\* In transpiration, water molecules evaporating from the stomata of leaves cause absorption, which draws water from the xylem cells of the roots.

75.

Fish	Human
* Two-chambered heart	* Four-chambered heart
*Double blood circulation is not seen	*Double blood circulation is seen.
*Blood containing acid moves directly from the gills to the body parts	*Blood containing oxygen is supplied to the heart through the respiratory system and then reaches the body parts

76. Stages of blood transport in the heart:

- i) Oxygen-rich blood enters the left atrium from the lungs.
- ii) When the left atrium relaxes and contracts, the left ventricle dilates and blood is pumped out.
- iii) When the left ventricle contracts, blood is pumped into the body through the aorta.
- iv) Deoxygenated blood enters the right atrium through the superior vena cava and the inferior vena cava.
- v) When the right atrium contracts, blood is pumped into the right ventricle.
- vi) When the right ventricle contracts, the blood reaches the lungs to be oxygenated.

77. \*Absorption of solar energy by chlorophyll.

- \*Conversion of light energy into chemical energy / decomposition into water, oxygen and hydrogen molecules.
- \* Carbon dioxide is converted into starch. Wastes generated in plants such as: excess water is removed by evaporation. Oxygen and carbon dioxide gases are released through stomata.
- \* Wastes and dead cells in the alders shed leaves/bark.
- \* Resins and gums accumulate in old Xylems
- \*Some excrete wastes into the soil around them. (Any three items)

78. a) Waste materials accumulate in the form of resins and gums in the old xylem of plants.

b) \*Transferring a substance like sucrose to the phloem tissue using energy from ATP.

\* Then the convective pressure of the tissue increases and water enters it. This pressure causes substances to move from the phloem to tissues with lower pressure.

79. \*Nephrons are the structural and functional units of the kidneys.

\* Nephrons are the blood-purifying units of the kidney, consisting of the glomerulus, Bowman's capsule, and the loops of Henle.

\* These are the kidneys that remove nitrogenous wastes such as urea or uric acid from the blood.

80 \* Amoeba ingests food using temporary finger-like cell surface protrusions.

\*These structures engulf and fuse food particles, forming a food sac

\*In the alimentary canal, complex food substances are broken down into simple food substances, which are then diffused into the cell membrane. The remaining undigested substances move to the cell surface and are excreted.

81.\* The amount of urine excreted is less than the amount of urine produced in Bowman's capsule

\* The amount of urine produced depends on the water content of the body.

\* The more water content in the body, the more urine produced. .

82. Digestion is slow in animal P. This is because this animal is herbivorous and cellulose needs time to digest in the small intestine.

The digestive process is faster in animal Q. Because this animal is a carnivore, meat is easily digested in the small intestine.

83. i) Digests protein in food.

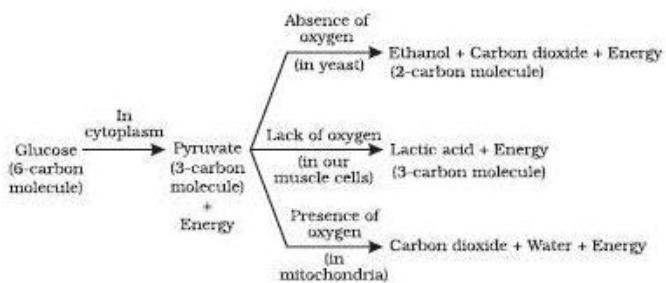
ii) Breaks down complex molecules called starch and releases sugar.

iii) Breaks down emulsified unsaturated fats

84.

Nutrition in autotrophs	Nutrition in heterotrophs
*Producing their own food	*Depends on other organisms for food
*Organic food is made from inorganic sources.	*Organic food is obtained from plant and animal sources.
*Autotrophism occurs in all green plants.	*heterotrophism occurs in non-green plants and all

85.



86. a) \* Accumulation of waste in the form of glue and resins in old xylem

- \* By shedding leaves
- \* By releasing wastes into the soil around them
- \* Increased water loss through evaporation
- \* Oxygen through photosynthesis
- \* Carbon dioxide through respiration

b) Evaporation

(Any two )

87. \* Filtration of blood by a group of blood capillaries in the goblet cells of the nephron.

\* The filtered fluid contains sugars, amino acids, salts, and excess water reabsorbed by the nephron's tubule.

\* The remaining water and salts are excreted in the urine.

b) i) \* Hydrochloric acid creates an acidic medium and helps the action of peptidase enzyme.

ii) \* Protein breakdown by peptidase enzyme

\* Converting proteins into amino acids

\* Converting carbohydrates into glucose

\* Converting fats into fatty acids and glycerol

(Any two factors)

88. \* Some organisms break down food substances outside the body and then absorb them

Ex: Bread mold, yeast

\* Some organisms consume food and break it down within their bodies.

Ex: Humans and higher animals

\* Some organisms obtain nutrition from plants and animals without killing them. E.g. lice, leeches

#### V. Answer the following questions (4 marks questions) Key answers

89. Pyruvate is broken down into molecules.

Two types :i) Aerobic respiration ii) Abiotic respiration

Aerobic respiration	AnAerobic respiration
*Atmospheric oxygen is used	*Atmospheric oxygen is not used
* With high energy, carbon dioxide and water are released.	* With low energy, ethanol and carbon dioxide are released

* Occurs in mitochondria.	* Occurs in cytoplasm
*Found in higher organisms	*Found in lower organisms such as yeast.

90. The elements required for photosynthesis are:

Carbon dioxide, water, minerals, sunlight, and (leaf) chlorophyll.

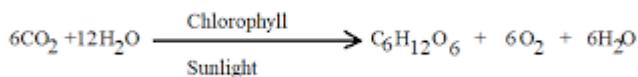
Events that occur in photosynthesis

i) Absorption of light energy by chlorophyll.

Light energy is converted into chemical energy

ii) Water molecules are split into hydrogen and oxygen molecules.

iii) Carbon dioxide is reduced to carbohydrates.



91.

Xylem	Phloem
*Transports water and salts/inorganic substances.	*Transports food/organic substances
*One-way flow of materials	*Two-way flow of materials
Xylem vessels and phloem transport materials from the root to the stem	*Sieve vessels and companion cells transport materials from the leaves to all parts
*Operation by suction pressure	*Operation by Osmotic pressure

92. \* Large intercellular spaces in plants allow all cells to be in contact with air, so that carbon dioxide and oxygen can be exchanged by diffusion. That is,

\* These gases move in and out of the cell into the atmosphere/air.

or

a) \* The heart has different chambers.

\* Valves between the chambers prevent the backflow of blood.

\* Has a dividing wall called a septum.

\* A structure called a septum creates separate

pathways for the transport of oxygenated and deoxygenated blood.

b)\* Absorbed by finger-shaped structures called villi in the small intestine.

\* Blood plasma - transports food, carbon dioxide, and nitrogenous wastes.

\* RBC - transports oxygen

Blood carries many other substances, such as salts.

1) Amylase: Converts the complex molecule starch into sugar

2) Pepsin: Digests protein

3) Trypsin: Digests protein

4) Lipase: Fat emulsification

93. \* Plasma: Transport of food, carbon dioxide and nitrogenous wastes

\* Red blood cells: Transport of oxygen

\* White blood cells: protect the body from pathogenic microorganisms

\* Platelets: help blood clot 1

94. a) \*Hemoglobin pigment gives blood its red color and is highly attracted to oxygen.

\*It dissolves in blood and supplies oxygen to all the cells of the body through blood circulation.

- b)\*Excess water is removed through evaporation.  
 \* Plant waste products accumulate in the cell sap.  
 \* Waste products accumulate in the leaves and fall off.  
 \* Waste materials accumulate in the form of resins and glues in old trees.  
 \* Plants release some wastes into the soil around them.

95. a)

Air sacs	Nephrons
*Functional units of the lungs	*Functional units of the excretory system
*Function: Exchange of gases	*Function: Separation of nitrogenous wastes from the blood
*Has a large surface area and blood supply	*Has a large surface area and blood supply

b) His legs are deprived of oxygen due to constant exercise and lactic acid builds up.

96. a) \* Respiration in the absence of oxygen is called anaerobic respiration.

\* Alcohol, carbon dioxide and energy

b ) \*To provide the body with pure blood, the blood passes through the heart twice. This is called double circulation.

\* To provide more energy.

\* To maintain a constant temperature in the body.

97. \* Aquatic organisms use oxygen dissolved in water.

\* Terrestrial organisms use free oxygen in the environment.

\* The amount of oxygen in the land area is more than the oxygen dissolved in water.

\* Since it is free oxygen, it does not require any further modification in the body

98 \* Lungs The trachea branches into bronchioles

\* The bronchioles eventually become balloon-like structures called air sacs.

\* These air sacs provide a surface

\* The walls of the alveoli have an extensive network of blood vessels. Here gas exchange takes place

#### VI. Answer the following questions (5 marks questions) Model answers

99. \* The six-carbon molecule glucose is broken down into three-carbon molecules pyruvate in the Cytoplasm.

\*Pyruvate is broken down in the mitochondria to produce carbon dioxide and water

\*The energy released during respiration is used to synthesize a molecule called ATP.

\*Glucose      Cytoplasm      Pyruvate  
 $\xrightarrow{\hspace{1cm}}$

\*Pyruvate      Mytochondria      CO<sub>2</sub>+H<sub>2</sub>O+energy  
 $\xrightarrow{\hspace{1cm}}$

\*ADP + P      Energy      ATP  
 $\xrightarrow{\hspace{1cm}}$

The walls of the air sacs have a network of blood vessels, providing a surface for gas exchange.

b) \* Excess water is released by plants through transpiration.

\* Plant waste products are stored in the cell sap.

\* Waste materials accumulate in the leaves and they fall off.

Waste materials accumulate in the form of resin and mucus in old leaves.

\* Plants use tissues with dead cells for waste, losing parts such as leaves

\* Plants also release some waste products into the soil around them.

(Any four)

## UNIT – 6 CONTROL AND COORDINATION

### KEY ANSWER

#### I. Multiple choice

1. D . All the above
2. C. it is secreted by parathyroid gland
3. b) synapse
4. b) b) Pulling hand back when touching a sharp object.
5. b) spinal cord
6. c) Thyroxine
7. d) Chemotropism.
8. a) Adrenaline - Pituitary gland
9. c) Dendrite → Cell body → Axon → Nerve ending
10. b) C → A → B → E → D
11. b) Growth of roots deep into the soil c) Dendrite → Cell body → Axon → Nerve ending
12. B) cerebellum
13. B. Phototropism
14. B. Receptor → Sensory neuron → Spinal cord → Relay neuron → Motor neuron → Effector
15. A. Undersecretion of thyroxine hormone
16. B. regulates blood sugar level
17. C. Cytokinin
18. (D) → P → R → S → Q
19. C. cerebellum
20. C. Medulla
21. D . Chemotropism
22. A. Auxin
23. A Through electrical signals
24. D. Negative geotropism and positive phototropism
25. C. Abscisic acid inhibits plant growth.
- 26.C. Undirected and positive geotropism
- 27.C. Leaves tingle when touched

#### II. ONE MARK QUESTIONS

29. Geotropism and phototropism.
30. The movement of plant part in response to gravity is called geotropism.
31. The structural and functional unit of nervous system / nerve tissue
32. A sudden response for stimulation is called Reflex action .  
Eg: With holding hands when touching sharp or hot objects.
33. chemical coordination takes place by the production of hormones in plants.
34. Iodine
35. Inhibits growth. Example – wilting of leaves
38. Pancreas produces insulin hormone which helps in controlling blood sugar level.
39. Muscle cells contain special proteins that cause movement by changing both their shape and composition within the cell in response to electrical impulses from nerves.
40.  
➤ The part of the brain that controls voluntary actions – the cerebrum

- The part of the brain that controls involuntary actions – the medulla
41. Receive stimulus in our body.
42. Growth promoting plant hormones –auxin, gibberellin, cytokinin
- 43.

Reflex action	Walking
Voluntary action is controlled by the cerebellum of the brain.	An involuntary response to a stimulus.it is controlled by the spinal cord.

44. This movement is independent of growth and non directional.

### III. TWO MARK QUESTIONS

45. The person suffers from diabetes.

This disease is caused by low secretion of the hormone insulin.

46. Thyroid gland produces thyroxine hormone. Thyroxine regulates carbohydrate, protein and fat metabolism in our body and helps in balanced growth of human body.

47. Adrenaline hormone prepares the body to deal with fear, anger, stress situations. The adrenal gland produces the hormone adrenaline.

48. In animals, chemical adaptation occurs through hormones secreted by the endocrine glands, which diffuse directly into the blood and help to produce an appropriate response to a stimulus.

- 49.

Nervous system	Hormones coordination
Communication takes place through electrical impulses	Communication takes place through chemicals
Only reaches connected cells	Reaches every cell in the body
Cannot continuously generate and transmit electrical impulses	Communication is continuous and more consistent

50. Medulla : Controls involuntary actions. –Cerebellum: Controls posture and balance. –

- 51 A. Towards the cell – dendrite

- B. Away from the cell – axon

52. Adrenaline increases the heart rate, which results in more oxygen being delivered to the muscles, preventing them from tiring.

It also dilates the blood vessels in the legs, allowing blood from the stomach to be supplied to the muscle cells in the legs.

53. If touched, the sensitive plant moves its leaves in response to the touch.

These plant cells change their shape by changing the amount of water inside them. As a result they change their shape by bulging or folding.

54. When growing plants detect light, a hormone called auxin, synthesised at the shoot tip, helps the cells to grow longer.

When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot.i.e.phototropism.

55. Since salivation is an involuntary action, the mouth waters as soon as the sight of delicious food appears.

The part of the brain that controls this action is the medulla oblongata.

56. The

cerebellum, which is responsible for the accuracy of voluntary actions and maintaining body posture and balance, is not functioning properly as a result of alcohol consumption, causing the person to lose control over body.

57. Positive phototropic movements causes a plant stem to respond by growing towards the light, while negative phototropic movements causes a plant root to respond by growing towards the ground.

- 58.

.Figure C shows the correct tropical movement of plants,

plant roots

towards grow towards gravity, which is positive geotropism. Similarly, stem growth is growth against gravity, which is negative geotropism.

59.

Central nervous system	Peripheral nervous system
Includes the brain and spinal cord.	Contains 12 pairs of cranial nerves and 31 pairs of spinal nerves
They receive information from all parts of the body and integrate it.	The peripheral nervous system facilitates communication between the central nervous system and the rest of the body.

60

Endocrine glands	Nervous system
Messages are carried through specific chemicals..	Messages are carried through nerve impulses.
The long-term effect is that messages are transmitted slowly. And reactions occur slowly.	The short-term effect is that messages are transmitted very quickly. And reactions occur very quickly.

61.i) Auxin : Helps the cells in the stems and the cells in the many parts of the plant body to grow longer.

ii) Cytokinin : Promotes cell division in fruits and seeds • Helps in promoting overall growth of plants.  
( any one)

62. When growing plants detect light, auxin is synthesised at the shoot tip and it helps the cells to grow longer.

- When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from the light.

63. Adrenaline is directly secreted into the blood. The blood to the skin is reduced due to contraction of muscles around small arteries.

- The breathing rate increases because of the contractions of the diaphragm and the rib muscles. The heart beats faster, resulting in supply of more oxygen to the muscles.

#### IV. THREE MARK QUESTIONS

64)" Immediate response to the stimuli is called reflex action. This process is controlled by spinal cord .

- Thinking is a complex activity and reflexive arcs have naturally evolved by spinal cord in animals because the brain's thinking process is not fast enough.
- Therefore, they arise spontaneously in the spinal cord. So the performance is very fast and the responses are quick. It helps organisms to respond quickly to environmental changes.

65) Advantage of chemical communication in multicellular organisms, electrical communication is more stable and continuous.

There are some limitations of electric communication –

- They reach only the cells in the animal body that are connected by nerve cells.
- Cells cannot continuously generate and propagate electrical impulses.
- But chemical communication reaches all the cells of the body. This can be done consistently and continuously.

66) When growing plants perceive light, auxin hormone synthesis at the tip of its stem helps the cells to grow longer.

- When light coming from one side of the plant, auxin diffuses towards the shady side of the stem (photo tropism). This stimulates the cells in the stem to grow longer, making the plant appear bent towards the light ie photo tropism.

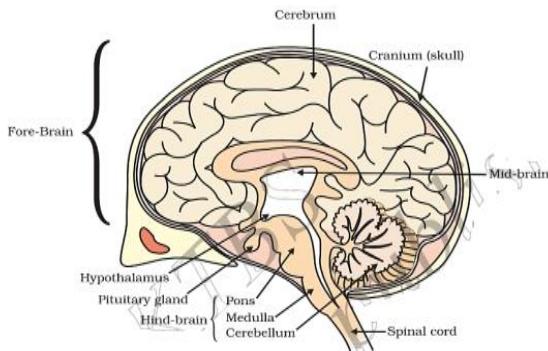
- The auxin concentration increases in the cells opposite to the apex where the tendrils of the creepers come into contact and grow longer so that the tendrils wrap around the base in a circle and adheres to it. Thus photo tropism, thigmo tropism and chemo tropism are coordinated in the orientational movement of vine plants.

67) The above structure is reflex arc-

C: sensory nerve : carries messages (stimuli) to the brain stem

A - Effector: expresses the appropriate impulse response

68) Diagram of brain



69) Insulin – regulates the blood sugar level.

Estrogen – changes associated with puberty in females, regulates menstrual cycle.

Thyroxin - regulates carbohydrate, protein and fat metabolism.

70)i) Voluntary action :

Based on deciding what to do next ( Action performed based on thinking )

Controlled by forebrain.

ii) Involuntary action :

Action without thinking control Controlled by hind brain.

71. a. (i) Receptors receive the stimulus of pain

1. (ii) Messages reach spinal cord through sensory neuron.
  2. (iii) Responses reach motor neuron through association neuron.
  3. (iv) Responses reach effector through motor neuron.
  4. (v) Muscles withdraw the leg.
- (b) Spinal cord / reflex arc.

## V. FOUR MARK QUESTIONS

72) The hormones that control the following activities in humans.

- a. Controlling blood sugar levels. – Insulin
- b. Controlling the menstrual cycle - Estrogen
- c. Preparing the body to face the situation - Adrenaline
- d. Controlling metabolism. – Thyroxine

73)

a) Neuron

b) Dendrite → cell body → axon → nerve terminal

Neuron transmits nerve impulses from the brain to all parts of the body, enabling the process of consciousness.

74)

Reflex Arc :The pathway of nerve impulses in a reflex action.

- Receptors in the eye receive the stimulus of bright light.
- Messages reach spinal cord through sensory neuron.
- Responses reach motor neuron through association neuron.

- Responses reach effector through motor neuron.
- Muscles of eye close the eyelid.

75)

	<b>Movement of leaves of a sensitive plant</b>	<b>Movement of a shoot towards light</b>
1	It does not depend on the direction of stimulus applied.	Depends on the direction of stimulus applied.
2	Thigmotropism	Phototropism
3	Touch is the stimulus	Light is the stimulus
4	Caused by the sudden loss of water from the swellings at the base of leaves	Caused by the unequal growth on the two sides of the shoot.
5	Not a growth movement	Growth movement
6	Occurs very fast	Occurs slowly

76)

Reflex arc It gives sudden action in response to the event happening in the environment.

A. Sensory neuron : It conducts the impulse of stimulus from receptor to the spinal cord.

B. Effectors : Which shows the sudden visible response.

Reflex arcs have evolved in animals because the thinking process of brain is not fast enough in many animals.

Meanwhile many animals have very little of the complex neuron network needed for thinking. So it can function in the absence of true thought process and increase the chance of survival.

77) a.) For a touch / thigmotropism, when the tendrils of creeper plants come in contact with a support, the plant circles around it and grows faster.

- When tendrils get attached to a support then, tips of the plant synthesize auxin hormone at higher concentration and stimulates the elongation of cells, then the plant shows directional movement / growth towards light.

b. In animals chemical communication is necessary. In animals electrical impulses will reach only the cells that

- are connected by nervous tissue but not each and every cell.
- Nerve cells cannot create and transmit electrical impulses continuously therefore, chemical communication is necessary in transmitting stimulus continuously to each and every cell.

## VI. FIVE MARKS QUESTIONS

78. A. When the tendrils of creeper plants come in contact with a support, the plant circles around it and grows faster. When tendrils get attached to a support then, tips of the plant synthesize auxin hormone at higher concentration and stimulates the elongation of cells, then the plant shows directional movement.

B. Thyroxine - Regulates carbohydrate, protein and fat metabolism.

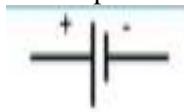
Adrenaline - Increase heart beat, blood pressure, breathing rate, and prepare the body to face the situation.

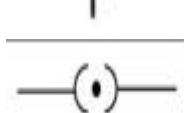
## UNIT – 11 ELECTRICITY

### MODEL KEY ANSWER

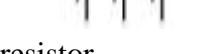
#### I. Multiple Choice Questions :

1. A. Ampere (A)
2. D. Watt ( W )
3. C. Electric resistance
4. A. Electric current
5. B. Electric potential difference
6. D. Electric power



7. D. 

8. A. 

9. C. 

10. a) resistor
11. c) ammeter in series & voltmeter in parallel
12. d)  $V = I/R$
13. b)  $2.4 \Omega$
14. (B)  $3 \Omega$
15. a)  $3.2 \Omega$
16. (B) 9 : 1
17. b) 4C
18. c) 40 J
19. C. 0.25
20. a) 2 A
21. b)  $2 \Omega$
22. a) Voltmeter
23. b)  $VI = P$
24. a) resistance directly proportional to potential difference but inversely proportional to current
25. a) fuse
26. b)  $E=Pt$
27. D. Rheostat
28. B. Resistance
29. B. Tungsten
30. A. Volt
31. C. 2 A
32. D. Ammeter
33. B. M
34. D. Protects the electrical appliances
35. D.  $R = \frac{V}{I}$
36. A. Ammeter
37. D. ohm-metre
38. C. electric current and potential difference
39. A. 16:1
40. A. Coulomb

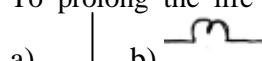
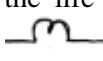
#### II. One mark Questions :

41. Iron because the resistivity of Iron is more compared to Copper.

42. Both are correct. .  $\Delta V/\Delta I = R$ . The resistance is more in series and less in parallel.  
 43.  $3.6 \times 10^6$  J  
 44. If the potential difference across the two ends is 1V & the current through it is 1A then the resistance is said to be  $1\ \Omega$ .  
 45. Flow of one coulomb of charge per second is 1 Ampere.  
 46.  $6 \times 10^{18}$  electrons.  
 47. Means that when 1 Joule of work is done to move a charge of 1 coulomb from one point to another.  
 48. Electric current - Ammeter  
 potential difference- Voltmeter

49. It is the property of the conductor to resist the flow of charges through it.  
 50. If the potential difference is 1V & the current through it is 1A then the resistance becomes  $1\ \Omega$ .  
 51. To prolong the life of filament.

52. Kilo watt per hour(**kwh**)  
 53. In series.  
 54. Fuse melts when excess of current flows through the circuit due to heating effect of electric current ensures the safety of electric devices.  
 55. Due to its high resistivity it is used in electric bulb.  
 56. To prolong the life of filament the gases like nitrogen or argon is filled inside the bulb.

57. a)   
 b) 



58.

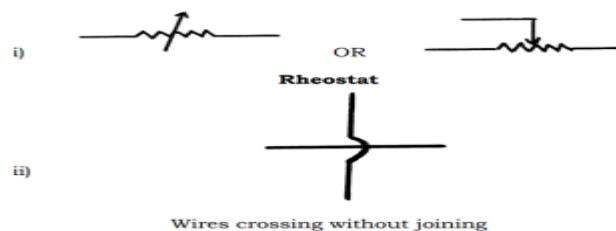
59. Volt (V), Voltmeter  
 60. • Live and neutral wires should not come into direct contact.

OR

- There should not be any short-circuit in the circuit.
- Too many appliances should not be connected to a single socket.
- Should always use quality wires and good quality electrical appliances. (Any two)

- Accidental hike in the supply voltage
  - Connecting too many appliances to a single socket
  - When live wire and neutral wire come into direct contact. ( Any two )

61.



62.



63.

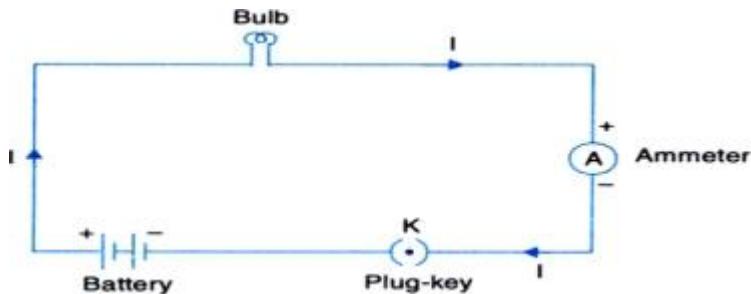


64. Yes,

Because the circuit rating is less than 15 A

### III.Two mark Questions :

65. A continuous and closed path of an electric current.



$$66. TV - 250 \text{ W} \times 1 \text{ h} = 0.25 \text{ Kwh}$$

$$\text{Toaster- } 1200 \text{ W} \times 10 \text{ min} = 1.2 \text{ Kw} \times 0.16 \text{ h} = 0.192 \text{ kwh}$$

therefore Tv consumes more energy.

$$67. \text{ Resistors connected in series} = 2\Omega + 4\Omega + 3\Omega = 9\Omega$$

$$\begin{aligned} \text{Resistors in parallel } 1/R_p &= 1/2\Omega + 1/4\Omega + 1/3\Omega \\ &= 6/12\Omega + 3/12\Omega + 4/12\Omega \\ &= 13/12\Omega \\ \text{Therefore } R_p &= 12/13\Omega = 0.92\Omega \end{aligned}$$

$$68. \rho = 1.63 \times 10^{-8} \Omega m, A = 10.3 \times 10^{-5} \text{ cm}^2 = 10.3 \times 10^{-5} \times 10^{-3} \text{ m}^2, R = 20\Omega, I = ?$$

$$\begin{aligned} \text{Formula } R &= \rho l/A \quad \text{Therefore } l = R A / \rho \\ &= 20 \times 10.3 \times 10^{-5} \times 10^{-3} / 1.63 \times \\ &= 20 \times 10.3 \times 10^{-8} / 1.63 \times 10^{-8} = 126.38 \text{ m} \end{aligned}$$

69.i) silver because its resistivity is more.

ii) Nichromebecause it is having high resistivity.

70. If a current larger than the specified value flows through the circuit the temper of the fuse wire increases. This melts the fuse wire and breaks the circuit. Connect to live wire in meter board

Because as soon as electric current overflows the fuse melts and makes the circuit to break.

71. a) It is the property of the conductor to resist the flow of charges through it.

b) It is the characteristic property of the material which is a constant of proportionality.

Resistance measures how much it opposes the flow of current . whereas resistivity is an intrinsic property of material.

72. The melting point and resistivity of tungsten are very high. It does not melt readily at a high temperature. The electric lamps glow at very high temperature. Hence tungsten is mainly used as heating element of electric bulbs.

73. In domestic electric circuits, the different electric components need widely different electric current values to operate properly. When one component fails, the circuit is broken and none of the components works. Therefore the series arrangement is not used for domestic electric circuits.

- The appliances connected in series need currents of widely different values to operate properly.

- In a series circuit, if one component fails, the circuit is broken and none of the components work.

- But in a parallel circuit current divides through the electrical gadgets.

- This is helpful particularly when each gadget has different resistance and requires different current to operate properly / Each electrical appliance can be operated separately.

74.

75.

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

$$= \frac{40}{220}$$

$$I = \frac{2}{11} \text{ A (OR } 0.18 \text{ A)}$$

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

$$= \frac{220}{\frac{2}{11}}$$

$$= \frac{220 \times 11}{2}$$

$$R = 1210 \Omega \quad (\text{OR } 1222 \Omega)$$

76. Resistance

14

$$R = \frac{\rho \times l}{A}$$

$$= \frac{1.84 \times 1 \times 14 \times 10^{-6}}{99 \times 10^{-8}}$$

$$= \frac{25.76 \times 10^2}{99}$$

$$= 26.02 \Omega$$

77. Here,  $R_1 = 5 \Omega$ ,  $R_2 = 4 \Omega$ ,  $R_3 = 12 \Omega$ ,  $V = 24 \text{ V}$ .

Total resistance of the circuit  $R_T = ?$

Total current flowing through the circuit,  $I = ?$

OR

Total resistance of the circuit,	$R_T = R_1 + \left[ \frac{1}{R_2} + \frac{1}{R_3} \right]$
$= R_1 + \left[ \frac{R_2 \times R_3}{R_2 + R_3} \right]$	$= 5 \Omega + \left[ \frac{1}{4\Omega} + \frac{1}{12\Omega} \right]$
$= 5 \Omega + \left[ \frac{4\Omega \times 12\Omega}{4\Omega + 12\Omega} \right]$	$= 5 + \left[ \frac{3+1}{12} \right]$
$= 5 + \frac{48}{16}$	$= 5 + \frac{4}{12}$
$= 5 + 3$	$= 5 + \frac{1}{3}$
$\therefore R_T = 8 \Omega$	$= 5 + 3$

Total resistance of the circuit,	$R_T = R_1 + \left[ \frac{1}{R_2} + \frac{1}{R_3} \right]$
$= 5 \Omega + \left[ \frac{1}{4\Omega} + \frac{1}{12\Omega} \right]$	$= 5 + \left[ \frac{3+1}{12} \right]$
$= 5 + \frac{48}{16}$	$= 5 + \frac{4}{12}$
$= 5 + 3$	$= 5 + \frac{1}{3}$
$\therefore R_T = 8 \Omega$	$= 5 + 3$

1

\* Total current flowing through the circuit,  $I = \frac{V}{R_T}$

$$= \frac{24 \text{ V}}{8 \Omega}$$

$$\therefore I = 3 \text{ A.}$$

78.

$$\begin{aligned}R &= 50 \Omega \\V &= 10 \text{ V} \\I &=? \\P &=? \\V &= IR \\I &= \frac{V}{R} \\&= \frac{10}{50} \\&= 0.2 \text{ A}\end{aligned}$$

Electric current flowing through bulb is 0.2 A

$$P = VI$$

$$P = 10 \times 0.2$$

$$P = 2 \text{ W}$$

Power of bulb = 2 watt = 2 W.

79.

$$\begin{aligned}\text{Solution : } H &= 1000 \text{ J} \\R &= 5 \Omega \\t &= 2 \text{ seconds} \\V &=? \\H &= I^2 Rt \\∴ I &= \sqrt{\frac{H}{Rt}} \\&= \sqrt{\frac{1000 \text{ J}}{5 \Omega \times 2 \text{ s}}} = \sqrt{\frac{1000}{10}} \\I &= 10 \text{ A}\end{aligned}$$

Potential difference across the resistor

$$\begin{aligned}V &= IR \\&= 10 \times 5 \\V &= 50 \text{ V}\end{aligned}$$

80.

Solution : For first wire

$$R_1 = \rho \frac{l}{A} = 4 \Omega$$

Now for second wire .

$$R_2 = \rho \frac{\frac{l}{2}}{\frac{A}{2}}$$

$$= \frac{1}{4} \cdot \rho \frac{l}{A}$$

$$R_2 = \frac{1}{4} \cdot R_1$$

∴ The resistance of the another wire is

$$\frac{1}{4} \cdot 4 = 1 \Omega$$

81. Fuse is a safety device which protects electric circuits and electric appliances by stopping the flow of any unduly high electric current. It is a piece of wire made of a metal or an alloy of appropriate melting point, placed in series

with the device. If current larger than the specified value flows, the temperature of fuse wire increases. This melts the fuse wire and breaks the circuit. Thus placing of fuse is must in electric circuits

#### **IV. Three mark Questions :**

82.. R<sub>1</sub> and R<sub>3</sub> are in series. R<sub>s1</sub> = R<sub>1</sub> + R<sub>3</sub> = 10 Ω + 20 Ω = 30 Ω .

$$\begin{aligned} R_s1 &\text{ & } R_2 \text{ are in parallel connection } 1/R_p = 1/R_{s1} + 1/R_2 = 1/30 \Omega + 1/10 \Omega \\ &= 1/30 + 3/30 = 4/30 \Omega \end{aligned}$$

Therefore R<sub>p</sub> = 30/4 = 7.5 Ω

R<sub>p</sub> and R<sub>4</sub> are in series. Their total resistance R<sub>s2</sub> = R<sub>p</sub> + R<sub>4</sub> = 7.5Ω + 20Ω = 27.5 Ω

Current flows through the circuit is I = V/R = 6/V = 6/27.5 = 0.218 A

83. R<sub>1</sub> = 5Ω , R<sub>2</sub> = 10Ω , R<sub>3</sub> = 30Ω.

Voltage between each resistor is , v=12 v .

Electric current through R<sub>1</sub> is I<sub>1</sub> = V/R<sub>1</sub> = 12 v/5Ω = 2.4 A

Electric current through R<sub>2</sub> I<sub>2</sub> = V/R<sub>2</sub> = 12 v/10Ω = 1.2 A

Electric current through R<sub>3</sub> I<sub>3</sub> = V/R<sub>3</sub> = 12 v/30Ω = 0.4 A

$$\begin{aligned} \text{Total electric current through } I &= I_1 + I_2 + I_3 \\ &= 2.4 \text{ A} + 1.2 \text{ A} + 0.4 \text{ A} = 4 \text{ A} \end{aligned}$$

$$\begin{aligned} \text{Total resistance } 1/R_p &= 1/R_1 + 1/R_2 + 1/R_3 = 1/5 + 1/10 + 1/30 \\ &= 6/30 + 3/30 + 1/30 = 10/30 = 1/3 \Omega \end{aligned}$$

Therefore R<sub>p</sub> = 3 Ω

84. Refrigerator 400 W = 0.4kw unit = kwh = 0.4 X 10 = 4 kwh

Electric fan 80w = 0.08kw , 0.08 X 6 = 0.48kwh.

Electric bulb 18w = 0.018kw, 0.018 X 6 = 0.108 kwh.

4 kwh + 0.48kwh + 0.108 kwh = 4.588 kwh .

3 days in June 30 X 4.588 = 137.64 kwh.

3 rupees per unit 137.64 X 3 = 412.92 rupees.

85. Using Nichrome .Because: i) due to high resistivity high amount of heat is produced.

ii) high melting point .

iii) In high temperature it will not melt easily.

86. R = 20 Ω

$$R = \rho l/A$$

L<sub>1</sub>=2l

$$R_1 = \rho l_1 / A_1 = 4\rho l / A$$

A<sub>1</sub>=A/2

$$R_1 / R = 4/1$$

$$R_1 = 80 \Omega$$

87. a)The potential difference across the wire in an electric circuit is directly proportional to the

current flowing through it provided if the temperature remains the same.

b) The Resistance of the conductor depends on

i) its length ii) area of crosssection

iii) nature of the material iv) its temperature.

88. Joule's law of heating : H=I<sup>2</sup> RT

Heat produced by the Resistor is directly proportional to the

i) Square of the current for a given resistor.

ii) Resistance for a given current.

iii) time taken to flow the current through the resistor

Working of Electric filament bulb:

In an incandescent type of bulb an electric current is passed through a thin metal filament heating the filament until it glows and produces light. filament has a lot of resistance to electricity. As a result of their

resistance, the filament heats up & starts glowing by converting electrical energy to light energy

- Tungsten • Nitrogen / N OR Argon / Ar

89.

$$\text{i) } I_1 = \frac{V}{R_1} = \frac{24 \text{ V}}{10 \Omega} = 2.4 \text{ A}$$

$$I_2 = \frac{V}{R_2} = \frac{24 \text{ V}}{20 \Omega} = 1.2 \text{ A}$$

$$I_3 = \frac{V}{R_3} = \frac{24 \text{ V}}{60 \Omega} = 0.4 \text{ A}$$

$$\text{ii) } I = I_1 + I_2 + I_3$$

$$= (2.4 + 1.2 + 0.4) \text{ A}$$

$$= 4 \text{ A}$$

$$\text{iii) } \frac{1}{R_p} = \frac{1}{10} + \frac{1}{20} + \frac{1}{60} = \frac{1}{6}$$

$$\frac{1}{R_p} = \frac{1}{6}$$

$$R_p = 6 \Omega$$

90. Given -  $R = 28 \Omega$ ,  $d = 0.04 \text{ mm}$ ,  $l = 2 \text{ m}$ ,  $\rho = ?$ .

$$r = d/2 = 0.04/2 = 0.02 \text{ mm} = 2 \times 10^{-5} \text{ m}$$

$$A = \pi r^2 = 3.14 \times (2 \times 10^{-5})^2 = 12.56 \times 10^{-10} \text{ m}^2$$

$$R = \rho l/A \Rightarrow \rho = RAl = 28 \times 12.56 \times 10^{-10} / 2 = 175.84 \times 10^{-10} = 1.758 \times 10^{-8} \Omega \text{m}$$

91. a) The heat produced in a resistor is

i) directly proportional to the square of current for a given resistance

ii) directly proportional to the resistance for a given current

iii) directly proportional to the time for which the current flows through the resistor

$$H = I^2 Rt [1 \text{ mark can be allotted for formula}]$$

The devices that work on this law are Electric Toaster, Electric Oven, Electric Kettle, Electric Bulb, Electric Fuse ( Any two )

b) Resistivity of alloys are more than / higher than that of metals. Alloys do not oxidise ( burn) readily at high temperature. Alloys have high melting point. ( Any two )

92. a) Solution :

$$\begin{aligned} \text{The energy consumed by the bread-toaster in 30 days} &= 350 \text{ W} \times 15 \text{ hours} \times 30 \text{ days} \\ &= 157500 \text{ Wh} = 157.5 \text{ kWh} \end{aligned}$$

The energy consumed by the iron box in 30 days =  $250 \text{ W} \times 5 \text{ hours} \times 30 \text{ days} = 37500 \text{ Wh} = 37.5 \text{ kWh}$  1 The total cost of energy at the rate of Rs. 4.00 for 1 kWh for 30 days. =  $(157.5 + 37.5) \text{ kWh} \times 4$

$$= 195 \times 4 = \text{Rs. 780}$$

b) Parallel connection.

93.  $V = 220 \text{ V}$ ,  $I = 10 \text{ A}$ ,  $P = ?$ ,  $E = ?$

$$P = VI = 220 \times 10 = 2200 \text{ W} = 2.2 \text{ kw}$$

Total energy consumed by the electric heater in 30 days would be

$$2.2 \text{ W} \times 8 \text{ hours/day} \times 30 \text{ days} = 528 \text{ kWh}$$

Thus the cost of energy to operate the refrigerator for 30 days is =  $528 \text{ kWh} \times \text{Rs. 5.00 per kWh}$  1  
= Rs. 2640.

## VI.

94. • If 1 Joule ( 1J ) of work is done to move a charge of 1 Coulomb ( 1C ) from one point to another point in a current carrying conductor, the potential difference between the two points is 1 volt

• The device used to measure it is voltmeter.

- The property of a conductor to restrain or to retard the motion of electric charges flowing through it is called resistance of a conductor.
- The rate at which electric energy is dissipated or consumed in an electric circuit is called electric power.
- Three formulae used to find electric power are  $\rightarrow P = VI$  or  $P = IV / R$   $\rightarrow P = W/t$   $\rightarrow P = I^2R$   $\rightarrow P = V^2/R$

## **Chapter-12. Magnetic Effects of Electric Current Points**

### **Key Answers**

#### I. Multiple Choice Questions

1. A. South (S) and South (S)
2. B. Uniform.
3. C. Magnetic lines of force intersect each other
4. A. Direction of induced current in a conductor
5. C. Anticlockwise
7. A. Same at all points
6. B. Electric current
7. C.  $90^\circ$
8. B. 10 times
9. C. Direction of electric current in a conductor
10. A. High
11. A. Index finger
12. C. Use of fuses
13. D. Geyser
14. D. Very high.
15. D. At both ends
16. D. The wire is the center of the concentric magnetic lines of force of the magnetic field
17. D. All of the above are correct

### **II. One Mark**

18. At the point of intersection, the needle of the compass should point in both directions but this is not possible.
19.
  - It should be ensured that both the live wire and the neutral wire do not come into direct contact.

- Several appliances should not be connected to the same socket
- Good quality wire and electrical appliances should be used ( Any one)

20. Sudden increase in the supply voltage. Connecting many appliances to the same socket. Overload occurs when both the live wire and the neutral wire come into direct contact

21. Direction of electric current

22.

- At the ends / poles of a solenoid, the magnetic force lines appear as concentric circles.
- At the center / inside the solenoid, the magnetic force lines appear as parallel straight lines.

23. At point P, it is anticlockwise.

At point Q, it is clockwise.

24. The area of magnetic force around a bar magnet.

25. The imaginary lines representing the magnetic field around a magnet are called the lines of force of the magnet

26. The electric current experiences the greatest force when its direction is perpendicular to the direction of the magnetic field.

27. Electric motors, electric generators, loudspeakers, microphones and electrical meters. etc.

28. A compass is a small bar magnet, the magnetic fields of the compass and the bar magnet interact, so that when the compass is brought near the bar magnet, it moves.

29.



30 i) Permanent magnet method

ii) Electromagnetic method

### III. Two Mark Questions

31. Reasons for short circuit :-

- When the live and neutral wires in the circuit come into direct contact.
- When the insulating covering on the wires is damaged.
- When there is a fault in the electrical appliances.
- When many appliances are connected to the same socket.

32. Properties of magnetic lines of force :-

- No two magnetic lines of force intersect each other.
- The density of magnetic lines of force is higher at the magnetic poles.
- Magnetic lines of force are emitted at the north pole and merge at the south pole.

- Inside the magnet, there are magnetic lines of force from the south pole of the magnet to the north pole. Magnetic lines of force are a closed network

33. Overload can occur when both the live wire and the neutral wire come into direct contact.

- This happens when the insulating covering on the wires is damaged or there is any fault in the electrical equipment.
- This can happen due to a sudden increase in the supplied voltage
- Overload can occur when the current in the circuit suddenly increases too much.

34. The earth wire connected to the metal surface creates a path of low resistance for the electric current.

- Thus, if any kind of electrical leakage occurs to the equipment having a metal surface, its potential difference equalizes to the earth potential difference and the user does not get a severe electric shock

35. Left. (or) is towards the magnet (or towards the north pole of the magnet)

- Rule:- Fleming's left hand rule

36. A solenoid is a cylindrical coil of copper wire with many turns wound around it. A piece of soft iron, a magnetic material, can be placed inside a current-carrying solenoid to make it an electromagnet.

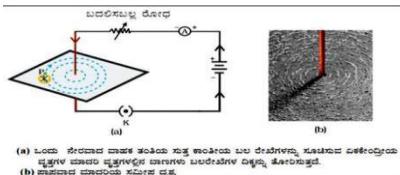
37. i) Figure (B) shows the direction of the magnetic field correctly.

ii).“Right-hand thumb rule”

38.

- The number of turns of the coils Increasing.
- Increasing the current flowing in the coil.

39.



40.

- At the ends/poles of a solenoid, the magnetic field lines appear as concentric circles.
- In the center/inside of the solenoid, the magnetic field lines appear as parallel lines
- The magnetic lines of force inside the solenoid are parallel to each other.
- This shows that the magnetic field is equal at each point inside the solenoid. (Uniform).

$$41. P = 2\text{KW} = 2000\text{W} \quad V = 220\text{V} \quad I = P/V = 2000/220 \quad I = 9.09\text{A}$$

The rating of the circuit is 5A. However, a current of 9.09A is flowing in it. Since the current is flowing more than the capacity, it causes overload and generates more heat.

**42.A).** Maxwell's right hand law

B). Fleming's left hand law.

43. P and Q are north poles, because the magnetic lines of force are repulsive.

44. The student's statement is correct, since the density of magnetic lines of force is higher at the poles of the magnet, the magnetic field at end A is higher than at end B.

#### IV. Three-mark questions

45.

- Take a small compass and a bar magnet. Place the bar magnet on a white sheet attached to a drawing sheet and mark the boundary around the bar magnet.
- Place the compass near the north pole of the bar magnet and mark the position of the two ends of the compass.
- The compass should be moved so that the south pole of the compass occupies the position previously occupied by the north pole of the compass.
- Similarly, the compass should be continued until it reaches the south pole of the bar magnet. The marked points should be joined by a smooth curve. This represents the magnetic lines of force.
- By repeating the above procedure, we can measure a sufficient number of lines of force

46. a) The magnetic field produced in a solenoid by an electric current is the same as the magnetic field produced around a bar magnet.

The magnetic field is uniform inside the solenoid.

Two ways to increase the magnetic field in a solenoid:-

b) Right-hand thumb rule:- When a current-carrying conductor is held in the right hand, the thumb indicates the direction of the current. The fingers are wrapped around the conductor in the direction of the magnetic field. Law of magnetic force lines:- Magnetic force lines are emitted at the north pole and merge at the south pole.

- They are closed networks.
- Have direction and magnitude.

No two magnetic lines of force intersect each other.

The density of magnetic lines of force is higher at the magnetic poles. Magnetic lines of force are emitted at the north pole and merge at the south pole.

Inside the magnet, magnetic lines of force are present from the south pole of the magnet to the north pole.

#### V.Four Mark Questions

47. Functions of earth wire:-

- It is used for the safety of electrical appliances having a metal surface in the domestic electrical circuit.
- It creates a path of low resistance for electric current.
- If there is any kind of electrical leakage in the appliance, its potential difference is equal to the potential difference of the earth and the user does not get a severe electric shock.

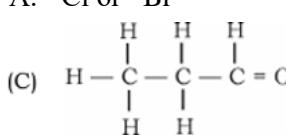
48.

- A small rod of aluminium is suspended with the help of two conducting wires.
- Take a powerful horseshoe magnet and place it between the two poles with its magnetic field facing upwards. The aluminium bar is connected in series to a battery, switch and rheostat.
- Now, current is passed through the aluminium bar in a particular direction.
- The bar is displaced in one direction.
- When the direction of the current in the bar is changed, it is displaced in the opposite direction.
- Therefore, a bar carrying an electric current experiences a force perpendicular to its length in a magnetic field

## UNIT - 4 CARBON AND ITS COMPOUNDS

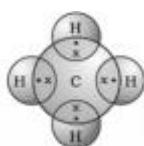
### Model key answer

#### I. Multiple choice questions 1Mark each.

1. D. 4
2. B. oxygen
3. C. methane
4. B. catenation
5. C. ethene
6. A.  $-Cl$  or  $-Br$
7. (C) 
8. A. propanone
9. B. 9 and 3
10. B. 18
11. C. six and twelve
12. A.  $C_6H_{12}$
13. A.  $CH_2$
14. D.  $C_2H_4$ ,  $C_3H_6$ ,  $C_4H_{10}$
15. B. ethane, propane, butane
16. A.  $C_nH_{2n-2}$
17. D.  $C_nH_{2n+2}$
18. C. esters

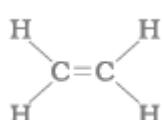
#### II. Answer the following questions 1 Mark each.

19.

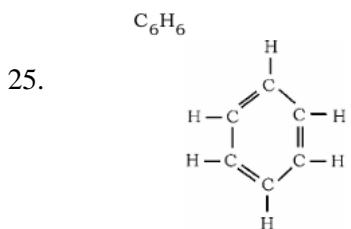
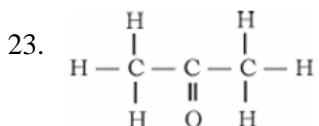


20. Nine single bonds and one double bond / 9 and 1

21.



22. i. Methanal  
ii. Bromoethane



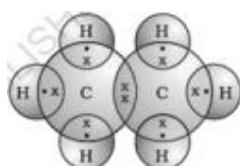
26. Hydrocarbon compounds are usually used as fuels because in combustion reaction they release large amount of heat and light.
27. Generally vegetable oils contain unsaturated carbon chain compounds these compounds can be converted into saturated carbon chain compounds by addition reaction therefore it is used in hydrogenation.
28. The melting point of pure ethanoic acid is 290 K hence it often freezes during winter therefore it is called as glacial acetic acid.
29. Vinegar
30. Hydrogen  
If we bring a burning candle near the gas it will burn with a pop sound.
31. Salt and water are produced / $\text{NaOH} + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$   
any one of the above.

### III. Answer the following questions 2 Marks each.

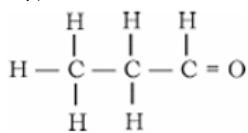
32. a. The inter molecular forces are low in covalently bonded molecules therefore they have low melting and boiling points  
b. Covalently bonded molecules do not have charged particles therefore they are generally poor conductors of electricity.
33. i. Carbon atoms form bonds with other atoms of carbon in catenation process to produce large molecules  
ii. Carbon has a four valency therefore it is capable of bonding with four other atoms to form compounds with specific properties.
34. i. The melting and boiling points increase with increasing molecular mass therefore a gradation in physical properties is seen in homologous series  
ii. If there is a same functional group in the compounds of homologous series then the chemical properties are similar therefore there is no change in chemical properties.
35. i. Hydrogen



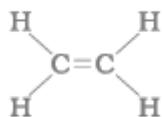
ii. Ethane



36. The heteroatoms and group containing these confer specific properties to the compound regardless of the length and nature of the carbon chain these are called functional groups. 1 ketone and alcohol /  $-CHO$  and  $-OH$ .
37. The heteroatoms and group containing these confer specific properties to the compound regardless of the length and nature of the carbon chain these are called functional groups.



38. The tetravalent property of carbon is not satisfied / carbon cannot form double bond with hydrogen atom



39.  $C_2H_5OH$  /  $C_2H_6O$

These two compounds have difference of one  $CH_2$  group  
therefore, these two compounds are in homologous series.

40. Substitution reaction.

In this reaction chlorine takes the place of hydrogen atom in  $CH_4$  molecule therefore it is substitution reaction.

41. The unsaturated hydrocarbons which contain one or more triple bonds are called alkynes.

Ethyne / acetylene  
 $C_2H_2$

42.  $CH_3COOC_2H_5 + NaOH \rightarrow C_2H_5OH + CH_3COONa$

this reaction is known as saponification because it is used in the preparation of soap.

43. i. 'a'- ethene-unsaturated

ii. 'b'-ethane-saturated

44. i. Propanoic acid

ii. Butene

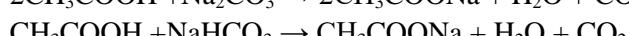
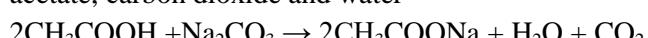
iii. Ethanol

iv. Pentyne

45. Take 1 mL of ethanol absolute alcohol. and 1 mL glacial acetic acid along with a few drops of concentrated sulphuric acid in a test tube and heat the mixture in a water bath for at least five minutes the ester will be formed.

Pour the product into a beaker containing 20-25 mL water and smell the resulting mixture if it has sweet-smell then ester is confirmed.

46. Ethanoic acid reacts with sodium carbonate and sodium hydrogen carbonate to give rise to a sodium acetate, carbon dioxide and water



47. The reaction in which carboxylic acids react with an alcohol to give rise to esters is called esterification. 1 Esters are used in making perfumes and flavouring agents.

#### **IV. Answer the following questions 3 Marks each.**

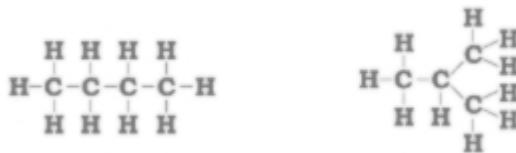
48. a. Catenation  
b. The carbon-carbon bond is very strong and stable hence catenation in carbon atoms is seen to the extent  
c. i. Long chain

- ii. Branched chain
  - iii. Ring chain.
49. a. The compounds of carbon having only single bond between the carbon atoms are known as saturated carbon compounds.
- b. i. Series of carbon compounds having similar chemical properties but in between successive members molecular formulae one  $\text{CH}_2$  unit difference is found these are generally known as homologous series.
- ii. Esters are sweet-smelling compounds formed by the reaction of carboxylic acids and alcohol.
50. a. The molecules of soap are Sodium or Potassium salts of long-chain Carboxylic acids in this molecule the ionic end of soap interacts with water while the Carbon chain interacts with oil these structures are called as micelles.
- b. Bond which is formed by the sharing of an electron pair between two atoms is known as covalent bond.
- covalent compounds,
- i. have low melting and boiling points
  - ii. are generally poor conductors of electricity.
51. a. The reactions in which hydrogen atoms of hydrocarbons can be displaced by other atoms or group of atoms is called as substitution reactions.
- b. Methane
- $\text{CH}_4$
- c. The substances those can add oxygen to others are called as oxidising agents.

#### V. Answer the following questions 4 Marks each.

52. a. In this reaction ethanol is converted into ethanoic acid by adding oxygen therefore, it is oxidation reaction.
- b. \* Ethanoic acid belongs to the group of acids called carboxylic acid  
 \* The melting point of ethanoic acid is 290K
53. Compounds with identical molecular formula but different structures are called structural isomers.

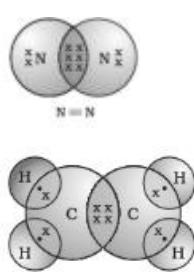
structural isomers of butane,



54. a. The molecules of soap are Sodium or Potassium salts of long-chain Carboxylic acids in this molecule the ionic end of soap interacts with water while the Carbon chain interacts with oil thus, it forms micelles this forms emulsion in water after that using excess water micelles removes dirt by pulling it.

2

- b. Calcium and magnesium salts,  
 Usually, detergents do not form precipitate in hard water like soap it cleans effectively therefore it is effective in hard water.
55. a. It is difficult for nucleus of carbon atom to hold gained four extra electrons and it is so difficult to remove four electrons from carbon atom therefore it cannot form  $\text{C}^{4-}$  anion or  $\text{C}^{4+}$  cation.
- b.

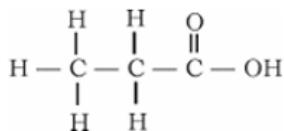


**VI. Answer the following questions 5 Marks.**

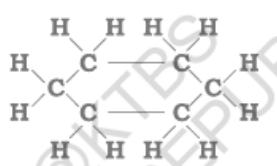
56. a.

Saturated carbon compounds	Unsaturated carbon compounds
Have single bond between carbon-carbon atoms	Have double or triple bond between carbon-carbon atoms
Less reactive	More reactive
Undergo substitution reaction	Undergo addition and substitution reaction
Gives blue flame on combustion	Gives yellow / red flame on combustion

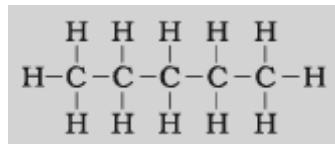
b. i.  $\text{C}_2\text{H}_5\text{COOH}$



ii.  $\text{C}_6\text{H}_{12}$



iii.  $\text{C}_5\text{H}_{12}$



**UNIT - 7 HOW DO ORGANISMS REPRODUCE?**

**KEY ANSWER**

**I. Multiple Choice Questions:**

- 1) D. Plasmodium, Amoeba, Leishmania
- 2) B. primary shoot, primary root
- 3) B. Fragmentation
- 4) A. Urethra
- 5) D. pollination, fertilization, embryo, seed
- 6) B fallopian tube
- 7) A Gonorrhoea
- 8) A. AIDS
- 9) C. ovary and ovule

- 10) D to maintain the temperature required for sperm production.
- 11) C. regeneration of tissues by development in specialized cells
- 12) B. I, III, IV, II
- 13) A. Bacteria
- 14) C. Ovary and radicle
- 15) B. regeneration
- 16) D. Placenta

17) C Fertilization of the egg is possible only in the structure shown in Figure-A

## **II. Answer the following questions (One mark)**

18) Amoeba, and Leishmania

19) No.

Reason: For self-pollination, a flower must have stamens and pistils / the flower must be bisexual.

20) The testicles produce the hormone testosterone.

- They produce sperm cells, which are the male sex cells.

21) Sexual reproduction involves the combining of genetic material from two organisms. Sex cells are produced by meiosis.

22) Flower A undergoes self pollination, because it is a bisexual flower (has both male and female reproductive parts)

23) Reproduction that occurs through the union of male and female sex cells is called sexual reproduction.

24) AIDS and Warts

25) No. This is because the copper T is inserted into the uterus to prevent pregnancy.

Sexually transmitted diseases can be prevented by using a condom.

26) The government has banned prenatal sex determination to eliminate sex discrimination caused by female foeticide, which is a low ratio of females to males.

## **III. Answer the following questions.(Two marks)**

- 27)
- The thread like structures that grow on the tomato are hyphae of Rhizopus ( Bread mould )
  - They have blob like structures called sporangia Sporangia contain spores, they reproductive structures
  - When spores come into contact with moist surface, they begin to grow
  - Therefore cut tomato gets spoiled gradually.

- 28)
- If the egg is not fertilized, the lining slowly breaks down and is shed through the vagina in the form of blood and mucus.
  - This cycle occurs approximately every month and is called menstruation.

- 29)
- In women who have reached puberty, an egg is produced every twenty-eight days.
  - The uterus prepares itself every month to receive a fertilized egg.
  - Its lining becomes thick and spongy.
  - This preparation is necessary to nourish the egg if it is fertilized.

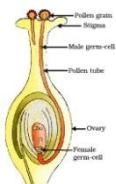
- 30)
- A bud develops as an outgrowth by repeated cell division in a specific part of the Hydra.
  - These buds develop into small organisms and after full growth, they separate from the parent body and become new independent organisms.
  - Buds are produced in the cavities along the leaf margin in the Bryophyllum.
  - These buds fall to the soil and grow into new plants.

- 31)
- Germ cells receive half the amount of DNA by a process of cell division called meiosis.

- This is necessary to ensure that the number of chromosomes and the amount of DNA in the new generation are reassigned

**1 + 1**

32)



33) \* The fertilized egg is called a zygote. The zygote cell continues to divide and becomes a ball of cells

\* It reaches the uterus and implants in the uterine lining. Then slowly body parts begin to appear

34)

- In men, a vasectomy surgery is to block the vas deferens and prevent the transport of sperm.
- In women, a tubectomy surgery is to block the fallopian tubes and prevent the transport of eggs.

35)

- Physical contraceptive methods have side effects.
- Contraceptive devices such as the IUCD or Copper-T are inserted into the uterus to prevent pregnancy. They can cause side effects due to uterine irritation.

36)

- Pollination is the process by which the pollen grains of stamens in a flower are transferred to the stigma of pistil. It occurs through wind, water, and insects.
- Fertilization occurs in the ovary by the union of male and female gametes.

#### **IV. Answer the following questions (Three marks)**

37)

- (a) Sperm formation requires a lower temperature than body temperature.
- (b) Testosterone regulates / stimulates the formation of sperm.
- (c) Secretion of Prostate gland makes the transportation of sperm easier.

Thus reproductive fertility is sustained by the formation, stimulation to the formation and proper transportation of sperms.

38)

- The transfer of pollen from the stamen to the stigma.
- **Germination of the pollen:** Pollen tube develops.
- **Fertilization:** Pollen grain enters the ovary through pollen tube and fuses with the ovum / egg. Zygote is formed.
- Ovum develops into seed. Ovary grows rapidly and ripens into fruit.
- Petals, sepals, stamen, style and stigma may shrivel and fall off.

39)

a) Sexual reproduction has the involvement of DNA molecules from two different organisms.

(The combination of male and female gametes with different genes takes place)

The variations in each generation of population of organisms increase due to new combination of genes.

**b) Placenta:** Provides a large surface area for glucose and oxygen to pass from the mother to the embryo. Removes waste substances generated by the developing embryo by transferring into the mother's blood

40)

#### **Hydra:**

- Reproduction by budding
- Development of an external bud by repeated cell division in a specific part
- The bud develops into an independent organism.

**Planaria :**

- Reproduction by regeneration.
- Specialized cells grow.
- Differentiated cells undergo changes and become tissues / development.
- Many parts of the organism grow into separate organisms.

41)

- The fertilized egg (zygote) divides and becomes an embryo.
- The embryo attaches to the lining of the uterus.
- Continues to grow and develop organs, becoming an embryo.

**Nutrition:**

- Through the placenta, a special plate-shaped organ.
- The fetal tissue has villi and the maternal tissue has blood vessels.
- It provides glucose and oxygen to the growing fetus.

42)

- Sexual reproduction is the process by which DNA molecules are replicated. Variations occur.
- Variations can lead to the creation of new species.
- Sexual reproduction is responsible for ensuring the survival of species.

43)

The reproductive methods shown in the two images above are different from each other.

<b>Spirogyra</b>	<b>planaria</b>
Reproduces by fragmentation	Reproduces by regeneration
After growth, they divide into small pieces. These pieces grow into new organisms.	When broken into many pieces, each piece grows into a complete organism.

44)

Pollination is the process by which pollen grains from the stamens of a flower are transferred to the stigma of a pistil.

Self Pollination	Cross pollination
The pollen grains in the stamen of a flower are transferred to the pistil of the same flower.	The pollen grains in the stamen of one flower are transferred to the pistil of another flower.
No external media required	External media is required.

45)

- After fertilization, the zygote divides several times inside the egg, producing an embryo.
- The egg develops a thick layer that slowly changes into a seed.
- The ovary grows rapidly, matures, and ripens. Meanwhile, the petals, sepals, stamens, pistils, and stigmas fall off easily.

46)

- Spores are produced in large numbers. This increases the number of organisms of this species.
- Spores are covered with a thick wall that protects them until they come into contact with moisture and begin to grow.
- Spores are dispersed over long distances by the wind, which results in the spread of organisms over long distances.

47)

- The process by which the mother cell's DNA copies itself during the preparatory phase of cell division.
- In sex cells, meiosis results in the number of original chromosomes being half.

In sexual reproduction, when male and female gametes fuse, the number of chromosomes is restored to the original number.

48)

- The placenta is a specialized, plate-like tissue embedded in the wall of the uterus.
- It provides nutrients to the foetus and removes waste products produced in the foetus into the mother's blood.
- Because sperm formation requires a lower temperature than the normal body temperature.

**V. Answer the following questions: (four marks)**

49)

- **Testis** : They produce sperms and testosterone hormone which is responsible for male characters.
- **Scrotum** : They regulate temperature necessary for production of sperms.
- **Urethra and vas deferens**: Transport sperm from testis.
- **Prostate gland and seminal vesicle** : They add their secretion to make the sperm transport easier and provide nutrition. **Penis** : Delivers the sperms to the site of fertilization.

50) Sexual maturity is necessary because,

**In Males:**

- Development of testicles for sperm production/testosterone production.
- Development of testicles for reproduction.
- To develop secondary male sexual characteristics.

51)

- **Ovary**: Produces eggs (female sex cells) and some hormones.
- **Fallopian tube**: The passage way through which the egg travels and where fertilization occurs.
- **Uterus**: A distendable sac-like structure where a fertilized egg attaches and develops into an embryo.
- **Vagina**: The part that receives sperm during sexual intercourse.

52)

**Structure of the placenta:** -

- The foetus receives nourishment from the mother's blood through the placenta, a specialized tissue.
- It is a plate-like structure embedded in the uterine wall.
- It is bordered by the foetal tissue.

**Functions of the placenta:** -

- Provides nutrition (glucose) and oxygen from the mother to the foetus.
- Removes waste products from the foetus.

53)

- They produce flower and fruit quickly.
- This method is useful in plants that do not produce seeds.
- They are genetically similar to the parent plant.
- They produce high-yielding, disease-free plants.
- A large number of plants can be grown in less time and at lower cost.

**UNIT - 8**

**Heredity**

**Key Answers**

**I. Multiple Choice Questions**

1. B. Gregor Mendel
2. B. Pea
3. C. 3 : 1
4. D. 1 : 1
5. D. Heredity
6. B. XY

7. A. trait for height is dominant
8. D) TtWw
9. A) Dominant
10. C) DNA
11. D) Self-pollination
12. A) F1
13. A) 0
14. C) Round and yellow seeds
15. A) 25%

## **II. One Mark Questions**

16. Ggaa
17. Female
18. Because the father has different chromosomes (XY)  
The child who gets the X chromosome from the father will be a girl.  
A child who receives a Y chromosome from the father will be a boy.
19. 3 : 1
20. 1 : 2 : 1
21. Flowers with only stamens cannot be pollinated because they do not have pistils
22. Changes in asexual tissues are not transferred to the DNA of the gametes.
23. The unit of DNA that provides the information required for the production of proteins is called a gene
- 24.. The transfer of characteristics of organisms from one generation to another is called heredity
25. If the gamete receives a Y chromosome from the father, then the gamete will be a boy.

## **III. Two Mark Questions**

26. Crossbreeding of parents showing different traits for one trait is called monobreeding.  
Manifestation ratio: 3 : 1
27. Crossbreeding of parents showing different traits for two traits is called dibreeding.  
Ratio: 9 : 3 : 3 : 1
28. Dominant Traits: If one of the two copies of a trait shows more of the visible trait in the offspring, it is a dominant trait  
Weak Trait: If one of the two copies of a trait shows less of the visible trait in the offspring, it is a weak trait
29. i) Types of plants obtained in the F1 generation: Tall pea plants with red flowers  
ii) The ratio of plants obtained in the F2 generation is 9 : 3 : 3 : 1  
Types of plants Red Tall – 9 Red Short-3 White Tall-3 White Short-1
30. In sexual reproduction, organisms with two different characteristics mate. This is the reason for more differences in the generation. During the production of sex cells, the DNA molecules recombine to produce the favorable traits.
- 31.

Male sex chromosomes	Female sex chromosomes
<ul style="list-style-type: none"> <li>• There is a pair of mismatched sex chromosomes</li> </ul>	<ul style="list-style-type: none"> <li>• There is a complete pair of sex chromosomes</li> </ul>
<ul style="list-style-type: none"> <li>• There is a normal size X chromosome and a smaller size Y chromosome..</li> </ul>	There are XX chromosomes of equal size

32. a) Pure white dog breed with expression ratio 1: 1
- b) Dog breed types found in gene pattern

1 : 2 : 3

3

42

Pure black dog Mixed black dog Pure white dog

## VI. Three Mark Questions

33.

Gamets	T	t
T	TT	Tt
t	Tt	tt

Sexual gamets	R	r
------------------	---	---

Phenotypic ratio 3 : 1  
Genotypic ratio: 1 : 2 : 1

1

34.

Gamets →	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Ryyy	rrYy	rryy

Ratio: 9 : 3 : 3 : 1

Round yellow seed-9

Round green seed-3

Dry yellow seed-3

Dry green seed-1

35. \* In the parent plants, the trait for red flowering is dominant and the trait for white flowering is weak

\* The sex genes of the parent organism have only one copy of these traits.

\* The plant in the generation has one copy of the dominant trait (R) and one copy of the weak trait (r).

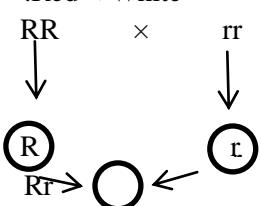
\* All the plants in the F1 generation produce red flowers.

\* The gene pattern of the parent organism that produces red flowers is RR

\* The gene pattern of the F1 generation plant is Rr

36.

.Red × White



F<sub>1</sub>(All red seeded plants)

Reason: Because in the F1 generation, the red flower gene (R) is combined with the white flower gene (r). The red flower gene is dominant and expressed.

R	RR Round seed	Rr Mixed round seed
r	Rr Mixed round seed	rr Wrinkled seed

37 . In humans, females have two X chromosomes and males have one X and one Y chromosome.

During meiosis, the chromosomes are halved.

The female produces an X and the male produces an X or Y, so sex is determined by the male chromosomes.

If the male's X combines with the female's X, the child will be a girl.

If the male's Y combines with the female's X, the child will be a boy.

38. \* Mendel crossed pure tall and dwarf pea plants. He sowed the seeds obtained from them and called the resulting plants the first generation (F1).

\* All these plants were tall. He made sure that the tall plants were self-pollinating. When the resulting seeds were sown, he called the resulting generation the second generation (F2).

\* Not all of these plants were as tall as the first generation. Instead, about a quarter of them were dwarfs.

\* From this experiment, Mendel concluded that the tall plants obtained in the first generation were not pure plants. Instead, they had both the tall and dwarf traits. The reason they were all tall was because the tall trait was strong and the dwarf trait was weak.

39.

Genotypic 1 Pure plant : 2 seed plant : wrinkled plant	Sexual gamets	R	r	ratio: 1 : 2 : 1  round seed Mixed round 1 Pure
	R	RR Round seed	Rr Mixed round seed	
	r	Rr Mixed round seed	rr Wrinkled seed	

40.

Gamets →	TR	Tr	tR	tr
TR	TTRR	TTRr	TtRR	TtRr
Tr	TTRr	TTrr	TtRr	Ttrr
tR	TtRR	TtRr	ttRR	ttRr
tr	TtRr	Ttrr	ttRr	ttrr

Ratio: 9 : 3 : 3 : 1

Tall round -9

Tall wrinkled -3

Dwarf round -3

Dwarf wrinkled - 1

41.

Gamets →	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty	TTYy	TTyy	TtYy	Ttyy
tY	TtYY	TtYy	ttYY	ttYy
ty	TtYy	Ttyy	ttYy	ttyy

Ratio: 9 : 3 : 3 : 1

Tall yellow -9

Tall green -3

Dwarf yellow -3

Dwarf green - 1

## UNIT – 9 Light Reflection and Refraction

### Key Answers

**I. Four alternatives are given for each of the following questions or incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet .**

1) B) Beyond C

2) (A) CD

3) D) At the centre of curvature and inverted.

4) (B) +2.0.D and convex lens

5) (A) Virtual, erect and enlarged.

6) (C) S

7) (D) Thin at the edges and thick in the middle

8) (C) Beyond 2F1

9) (B ) Diverges the light rays.

10) (A) Concave mirror and virtual image

11) B). Increases and bends away from the normal

12) B) Convex mirror

13) B) Rear view mirrors of vehicles

14. B) Pple

15) B) Diverges the light rays.

16) B) Focus

17) D) Between F and O

18) A).  $R=2f$

19) B) .Diopter

20) C) 0.50m

21) B). +3.0

22) B). N and K

23) A).  $n_1 = n_2 \ \& n_3 > n_4$

24) C) . R

25) C). In F1

26) B)  $50^0$

27) D) 25 cm.

28) C) 4 m.

29) B) Speed of light is more in medium B



30)

31) (A) Real and enlarged.

32) (D) – 0.40 m and concave lens

33) (B) is thick at the edges and thin in the middle

34) (A)+ 2.0 D and convex lens

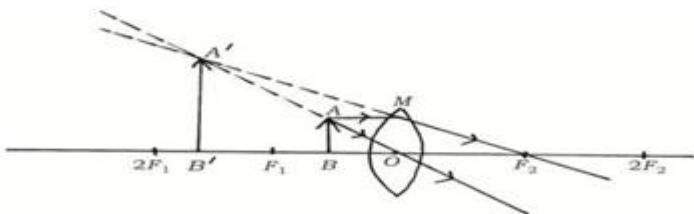
**II. Answer the following questions. (1 mark questions)**

35)

- Produces diminished and erect images.
- The field of view is very large due to curvature towards the outer edge.

36) The reflecting surface of a spherical mirror forms a part of a sphere. The centre of this sphere is called the centre of curvature.

37)



38) Converging distance of the lens ( $f$ ) = + 0.5 m

Power of the lens =  $P = 1/f$

$$= 1/0.5$$

$$P = + 2D$$

39)  $f = 25$ ,  $R = ?$

$$R = 2f$$

$$= 2 \times 25 = 50 \text{ cm}$$

40) The phenomenon of light falling on a surface returning back to same medium

The fact that the sides of the image are exchanged with the sides of the object is called lateral inversion

41)

42) If the reflecting surface of a mirror is a surface of a spherical mirror, it is called a spherical mirror.

43) Parallel light rays falling on a concave mirror are reflected and meet at a point on the principal axis. This point is called the principal focus.

44) Parallel light rays falling on a convex mirror are reflected as if they had come from a point on the principal axis. This point is called the principal focus of the convex mirror.

45) The diameter of the reflecting surface of the spherical mirror.

$$46) 1/f = 1/V + 1/u$$

47)

- Because the velocity of light is the same in both the media.

- There is no change in the direction of propagation of light.

48) The opposite faces of the glass slab are parallel and the bending of the light ray is equal and opposite.

49. The image moves from the principal focus towards the mirror.

50. Parallel light rays passing through a convex lens are refracted and intersect at a point on the principal axis. This point is the focal point. 1

51) Parallel light rays passing through a concave lens are refracted as if they were coming from a point on the principal axis. This point is the focal point of the concave lens.

### III . Answer the following questions. (2 Mark Questions)

52) i. The angle of incidence is equal to the angle of reflection.

ii. The incident ray, the reflected ray and the perpendicular drawn at the point of incidence lie in the same plane.

53)

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \quad \text{or}, \quad \frac{1}{u} = \frac{1}{v} - \frac{1}{f}$$

$$\frac{1}{u} = \frac{1}{-20} - \frac{1}{(-30)} = -\frac{1}{20} + \frac{1}{30}$$

$$\frac{1}{u} = \frac{-3+2}{60}$$

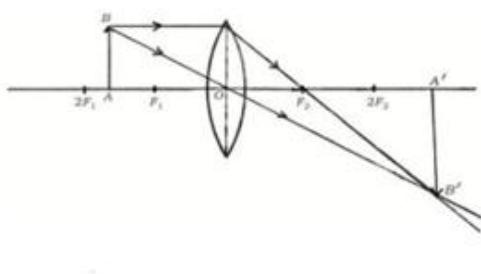
$$\frac{1}{u} = \frac{1}{-60} \quad \text{or} \quad u = -60 \text{ cm}$$

$\therefore$  Object distance 60 cm

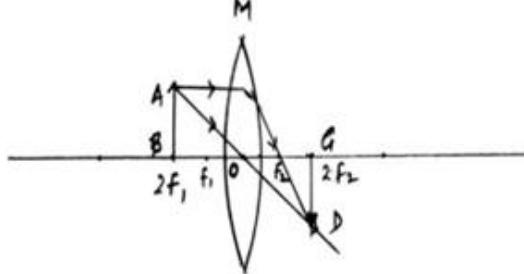
$$\begin{aligned}\text{Magnification : } m &= \frac{V}{u} \\ &= \frac{-20}{-60} \\ &= \frac{1}{3} \\ m &\approx 0.33.\end{aligned}$$

54)

i) Between F<sub>1</sub> and 2F<sub>1</sub>



ii) In 2F<sub>1</sub>



55)

**Object distance**  $u = -30 \text{ cm}$

**Image distance**  $v = -10 \text{ cm}$  සිංහල.

$$\begin{aligned}\textbf{Magnification} \quad m &= \frac{v}{u} \\ &= \frac{-10 \text{ cm}}{-30 \text{ cm}} \\ &= \frac{1}{3} = +0.33.\end{aligned}$$

Since  $v$  and  $u$  are negative, the lens used is concave lens. Since the magnification is also positive and less than one, the image erect and diminished virtual image.

56)

$$\begin{aligned}\frac{1}{v} + \frac{1}{u} &= \frac{1}{f} \\ \frac{1}{v} &= \frac{1}{f} - \frac{1}{u} = \frac{1}{-15} - \frac{1}{-25} \\ \frac{1}{v} &= \frac{-5+3}{75} = \frac{-2}{75} \\ v &= \frac{75}{-2} = -37.5 \text{ cm}\end{aligned}$$

$$\begin{aligned}\frac{1}{v} - \frac{1}{u} &= \frac{1}{f} \\ \frac{1}{u} &= \frac{1}{v} - \frac{1}{f} = \frac{1}{-10} - \frac{1}{-15} \\ \frac{1}{u} &= \frac{-3+2}{30} = \frac{-1}{30} \\ u &= -30 \text{ cm}\end{aligned}$$

57)

58)

**Refractive index of a medium**  $\frac{\text{Velocity of light in air}}{\text{Velocity of light in benzene}}$

or

$$1.50 = \frac{3 \times 10^8}{\text{Velocity of light in benzene}}$$

$$1.50 \times \frac{\text{Velocity of light in benzene}}{3 \times 10^8} = \frac{3 \times 10^8}{1.50}$$

$$\text{Velocity of light in benzene} = 2 \times 10^8 \text{ ms}^{-1}$$

59)

$$\begin{array}{lll}
 f = -12 \text{ cm} & \frac{1}{v} - \frac{1}{u} = \frac{1}{f} & \\
 & \frac{1}{u} = \frac{1}{v} - \frac{1}{f} & \frac{1}{u} = \frac{-4+3}{36} \\
 v = -9 \text{ cm} & & \\
 u = ? & \frac{1}{u} = \frac{1}{-9} + \frac{1}{-12} & \frac{1}{u} = \frac{-1}{36} \\
 & \frac{1}{u} = -\frac{1}{9} + \frac{1}{12} & -u = 36 \\
 & & u = -36 \text{ cm}
 \end{array}$$

60)

i) The central point of a lens is called optic centre.

ii) The diameter of the circular boundary of a spherical lens is called its aperture.

61. When light travels obliquely from one medium to another, the direction of propagation in the second medium changes.

For a given color of light and a given pair of media, the ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant.

$\sin I / \sin r = \text{constant}$

62 convex mirror

Concave mirror

i) The reflecting surface is bent outwards | i) The reflecting surface is bent inwards. It is bent.

ii) diverges the rays of light. ii) converges the rays of light.

iii) Always produces virtual and erect image iii) Always produces a real and inverted image. Produces an image.  
(Only when the object is placed between P and F, virtual erect image is formed)

63) Mirrors with curved surfaces are called spherical mirrors,

Types: Concave mirror Convex mirror

64)

- Used in torches, searchlights, and vehicle headlights to produce a powerful parallel beam of light.
- Used by doctors to examine cavities in teeth
- Used to get a large image of a face in a barber shop
- To focus the sun's rays in solar ovens.

65)

Convex lens	Concave lens
-------------	--------------

➤ Thin at the edge and thick in the middle	➤ Thick at the edge and thin in the middle
➤ converges the rays of light	➤ Diverges the rays of light
➤ Produces real and inverted image	➤ Produces false and direct image

66)

Real image	virtual image
Inverted image	Erect image
Image that can be obtained on a screen	Image that cannot be obtained on a screen

67)

- Light travels faster through ice.
- Because the refractive index of ice is less than that of water, light travels faster in optically rarer medium than in a optically denser medium.

68)

- The reflected ray through the principal focus of a ray incident parallel ray to the principal axis
- The reflected ray of a ray incident through the principal focus.
- The reflected ray in the same direction as the ray incident through the center of curvature.
- The reflected ray of a ray incident obliquely on the pole of a mirror.

69)

- The light coming towards us from the part of a pencil immersed in water appears to come from a different direction than the surface adjacent to the outside of the pencil.
- Refraction of light

70)

- The ray refracted through F2 coming from an object parallel to the principal axis.
- The refracted ray of a ray passing through the principal focus from an object.
- The ray passing through the optical centre from an object.

71)

- Virtual and erect.
- The image is equal to the size of the object.

- The image is formed at the same distance behind the mirror as the object is in front of the mirror.
- It has a lateral inversion.

72

$$\frac{R \cdot I_p}{R \cdot I_q} = \frac{\frac{C}{V_p}}{\frac{C}{V_q}}$$

$$1.82 = \frac{C}{V_p} \times \frac{V_q}{C}$$

$$1.82 = \frac{V_q}{V_p}$$

$$V_p = \frac{V_q}{1.82}$$

$$V_p = \frac{2.25 \times 10^8}{1.82}$$

$$V_p = 1.23 \times 10^8 \text{ m s}^{-1}$$

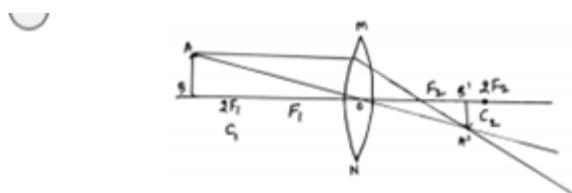
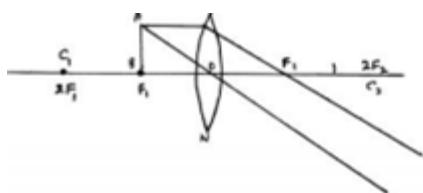
#### IV . Answer the following questions. (Three marks questions)

73) i) Concave mirror

ii) 50 cm

iii) Virtual, erect and same size as the object.

74)



75)

$$f = -12 \text{ cm}$$

$$u = -18 \text{ cm}$$

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

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

$$= -\frac{1}{12} - (-\frac{1}{18})$$

$$= -\frac{1}{12} + \frac{1}{18}$$

$$= \frac{-3+2}{36}$$

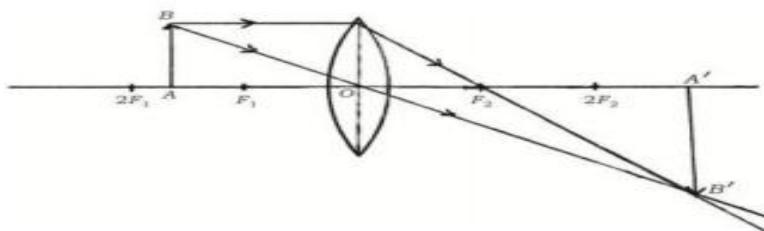
$$m = \frac{-v}{u}$$

$$= -(\frac{-36}{-18})$$

$$= -2$$

$$\therefore \frac{1}{v} = -\frac{1}{36} \Rightarrow v = -36 \text{ cm}$$

76)



Beyond the 2F<sub>2</sub>

Real inverted and diminished

77) This is a diverging lens.

Because the power is negative, convex lens

The diverging property of concave lens is to correct nearsightedness. The image of the object is formed on the retina, in front of the retina. Your lens of appropriate power produces a diverging image on the retina.

78)

The laws of refraction of light are as follows.

(1) The incident ray, the refracted ray, and the perpendicular drawn to the point of incidence at the point of contact of the two media are all in the same plane.

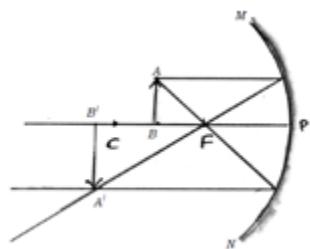
(2) For a given color of light and a given pair of media, the ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant. This is called Snell's law of refraction.

b) Medium one is denser because when a ray of light enters a denser medium from a rarer medium, it bends towards the vertical.

79)

- The object is always placed on the left side of the mirror. This indicates that the light from the object always falls from the left side.
- All distances parallel to the principal axis are measured from the mirror pole.
- All distances measured to the right of the origin (+X) are taken as positive and all distances measured to the left of the origin (-X) are taken as negative.
- Distances measured perpendicular to or above the principal axis are taken as positive.
- Distances measured perpendicular to or below the principal axis are taken as negative.

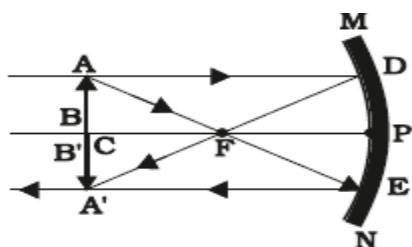
80)



Beyond C

Real, inverted and enlarged

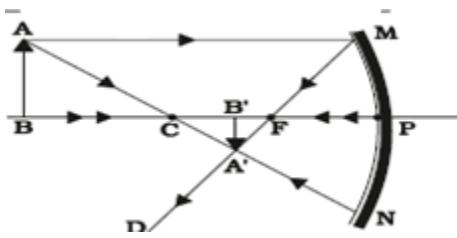
81)



At C

Real ,inverted and same size

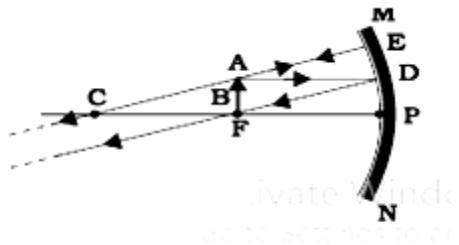
82)



Real, invertd

Smaller than object

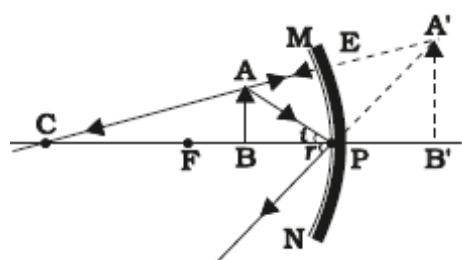
83)



Real, Inverted, Enlarged

At infinite

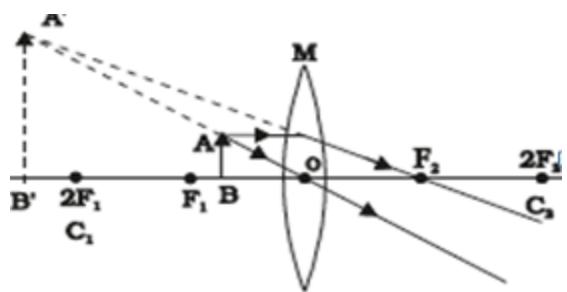
84)



Virtual and Erect

Back side of the mirror

85)



Virtual and Erect

Enlarged

86) Solution.

Magnification of image =  $m = -0.5$

Object distance  $u = -15 \text{ cm}$

Image distance  $v = ?$

$F = ?$

$m = -v/u$

$$-v = m \times u \\ 1$$

$$= 0.5 \times -15$$

$$-v = -7.5 \text{ cm}$$

$$v = 7.5 \text{ cm}$$

Convergence distance

$$1/f = 1/v + 1/u$$

$$1/f = 1/7.5 - 1/15$$

$$f = 5 \text{ cm}$$

Nature of image – virtual and erect

Size:- Diminished

87)

- A convex lens is held in the hand and directed towards the solar image.
- The rays of sunlight are focused on a sheet of paper.
- A bright and sharp solar image is obtained on the sheet.
- The paper and the lens are held in this position for some time.
- The sheet of paper starts burning, emitting smoke.
- The parallel rays of the sun are focused and a sharp solar reflection is formed

88)

- Hold a concave mirror in your hand and point its reflecting surface towards the sun.
- Direct the reflected rays to fall on a sheet of paper held close to the mirror.
- Slowly move the sheet of paper back and forth until a sharp point of bright light rays is seen on the sheet.
- Hold the mirror and the sheet of paper in this position for a few minutes.
- The paper will start to burn, producing smoke.
- The mirror will focus the sunlight.
- The distance between the mirror and the paper is the approximate focal length of the mirror.

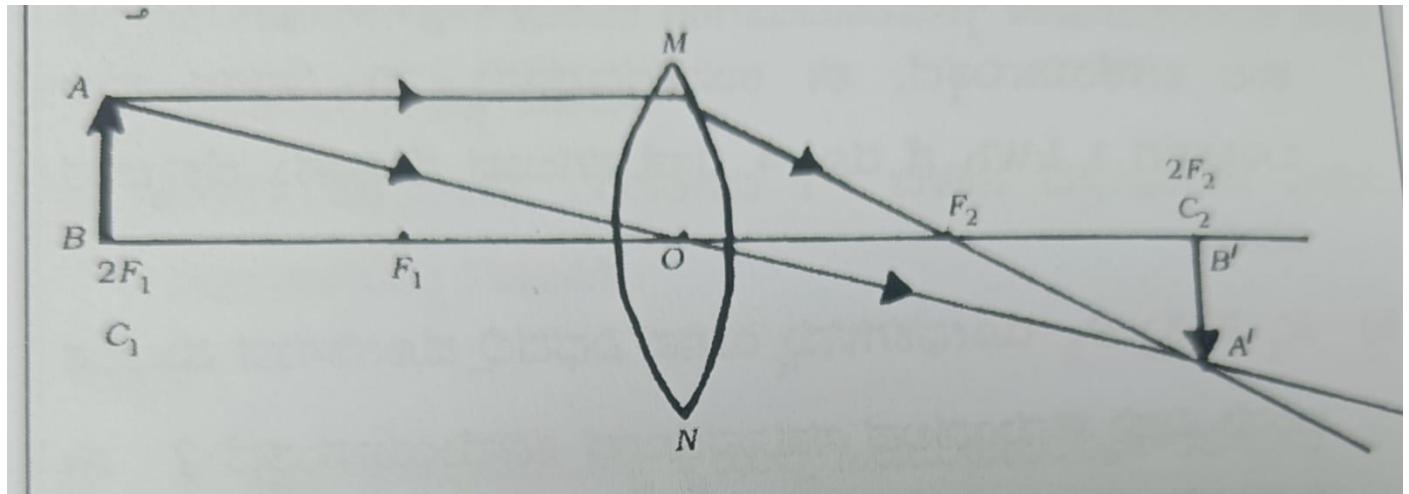
#### IV . Answer the following questions. (Questions of four marks)

89)

- Fix a sheet of white paper on a drawing board with the help of drawing pins.

- Place a rectangular glass plate in the middle of the sheet.
- Draw lines around the glass plate with the help of a pencil.
- Take four identical ballpoint pens and pierce two of them in such a way that they form a slanted line with the upper edge perpendicular to the sheet.
- Look at the reflections of the pierced pins from the opposite edge of the plate and pierce the other two pins so that they are in line with the reflections of the first pins.
- Remove the pins and the glass plate.
- Join the ends of the upper pins to the upper edge and the ends of the lower pins to the lower edge.
- Join the two points of the glass plate.

90)



- Place of the image : at  $2F_2$
- Nature of the image : real and inverted
- size of the image : same size of the object.

## MODEL KEY ANSWERS

### UNIT : 10 HUMAN EYE AND COLOURFUL WORLD

#### I. MULTIPLE CHOICE QUESTIONS

- 1) B. retina
- 2) A. eye lens
- 3) C. concave lens
- 4) D. cataract
- 5) B. farsightedness and use of appropriate convex lens
- 6) A. ciliary muscles
- 7) A. refraction of light
- 8) C. black
- 9) D. red
- 10) C. focal length of the lens increases
- 11) D. very large particles scatter all colours equally
- 12) A. real and inverted
- 13) C. red
- 14) B. sky appears blue to an astronaut flying at very high altitudes

#### III. Answer the following questions (One mark)

15. The minimum distance at which an object can be clearly seen by the eye is called the near point .The minimum point of normal vision is 25cm.
16. The maximum distance at which the eye can see clearly is called the far point. The maximum point of normal vision is infinity
17. The spectrum of white light is the list of coloured components obtained when light is dispersed through a glass prism.
18. There are three common defects of vision
  - a) Myopia
  - b) Hypermetropia
  - c) Presbyopia
19. the particular shape of the prism makes the emergent ray bend at an angle to the direction of the incident ray. This angle is called angle of the deviation.
20. The angle between its two lateral faces is called the angle of the prism.
21. The emergent angle of the prism is the angle at which a light ray exits the prism.
22. a) cornea  
b) iris

23. farsighted eye; remedy is a using convex lens
24. The splitting of white light into its constituent colours.
25. No, rainbows are not observed on the moon as there is no atmosphere.
26. Near point: 25 cm far point: Infinity
27. Rainbow ,blue sky, atmospheric refraction  
twinkling of stars ,blue sky
28. Adjustment of the lens focal length to clearly focus near or distant objects
29. Red, because it scatters the least and is visible from long distances even in fog
30. Student can't read the blackboard from back: suffer from nearsightedness . It can be corrected with the concave lens
31. Farsightedness can be corrected with concave lens
32. to control the amount of light entering the eye
33. X- angle of deviation

The particular shape of the prism makes the emergent ray bend at an angle to the direction of the incident ray.

34. sometimes the crystalline lens of people at old age becomes milky and cloudy. This condition is called cataract.

35. least bent colour is red and most bent colour is violet  
36. Yes / The spectrum of light forms on the screen.

Prism A disperses the white light into 7 colours, Prism B recombines the 7 colours of the spectrum to form the white light and Prism C disperses this white light into 7 colours and hence we see the spectrum of light on the screen. ½

### **III. Answer the following questions (Two mark)**

37. Farsightedness is the ability to see distant object clearly but not nearby objects.

Cause: the eye lens is too short or the eyeball is too small.

38. Nearsightedness is the ability to see nearby objects but not distant object.

Cause: The eye lens is too long or the eyeballs is too elongated.

39. A rainbow forms when the sunlight is refracted, dispersed, and reflected inside water droplets, causing a spectrum of colours.

40. Newton used prisms to separate white light into its spectrum and recombine it back into white light.

41. Isaac Newton was the first to use to obtain the spectrum of sunlight. He tried to split glass prism the colours of the spectrum of white light further by using another similar prism. However he could not get any more colours. He then placed a second identical prism in an inverted position with respect to the first prism. He allowed the colours of the spectrum to pass through the second prism. He found a beam of white light emerging from the other side of the second prism. This observation gave Newton the idea that sunlight is made up of 7 colours.

42. Nearsightedness: clear near vision; corrected with concave lens. Farsightedness: clear distant vision; corrected with convex lens.

43. A: nearsighted eye, the image forms in front of retina

B: farsighted eye, the image forms behind retina

C: normal eye, the image forms on retina

44. A -2.0 D lens is a concave lens, used for nearsightedness. The conditions described is farsightedness requiring a convex lens. Hence this lens is not suitable for correcting that defect.

45. To see distant objects: ciliary muscles relax, lens become thin, focal length increases

To see near objects: ciliary muscles contract, lens become thick, focal length decreases

46. The correct option is c) myopia

Predominately young folks suffer from myopia which occurs due to elongation of eye balls or bulging of cornea. When the normal curvature of the cornea bulges, the light are refracted so that the image is formed in front of the cornea. The rods and cones of eyes have areas where the image has the best clarity when the image is focused. Thus as the image of the distant objects is not formed at the right spot, it is decoated as blurry.

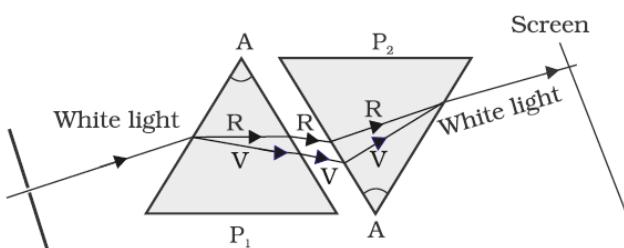
#### IV. Answer the following questions(Three mark)

47. The scattering of light by tiny particles in a colloid or in the atmosphere is the Tyndall effect.

Ex: blue sky, smoke from engines, light in milk

48. The molecules of air and other fine particles in the atmosphere have size smaller than the wavelength of visible light. These are more effective in scattering light of shorter wavelength at the blue end than light of longer wavelengths at the red end. The red light has a wavelength about 1.8 times greater than blue light. Thus, when sunlight passes through the atmosphere, the fine particles in air scatter the blue colour more strongly than red. The scattered blue light enters our eye.

49.



50. Stars are far away and appear as point sources of light. As the light enters the earth's atmosphere, it gets refracted continuously due to air layers. This causes their positions and brightness to fluctuate hence they twinkle.

Planets are closer and appear as extend sources. The light from different parts of a planet averages out, so they appear steady and do not twinkle.

51. Presbyopia is age-related farsightedness caused by the hardening of the eye lens or weakening of ciliary muscles. It is corrected with bifocal lenses. A condition usually seen in older people where they can't see nearby objects clearly

Causes: weakening of ciliary muscles, loss of flexibility in the lens

Remedy: use of bi focal lenses

52. Power (P) = -0.5 D

$$\text{Focal length}(f) = 1/P = 1/-0.5 = -2 \text{ meters}$$

Since the power is negative it is a concave lens

In myopia image forms in front of retina . A concave lens diverges incoming light rays so they focus correctly on the retina, not in front of it.

53. a) A normal eye cannot focus on objects closer than 25 cm due to the limits of the eye's lens to adjust its focal length. This distance is called the least distance of distinct vision.

b) Smaller particles scatter shorter wavelengths (like blue and violet) more, which is why the sky appears blue. Larger particles scatter all wavelengths equally, leading to white light.

54. 1). a) At noon, sunlight travels a shorter distance through the atmosphere, so there is minimal scattering of colors. As a result, all wavelengths reach our eyes, and the sun appears white.

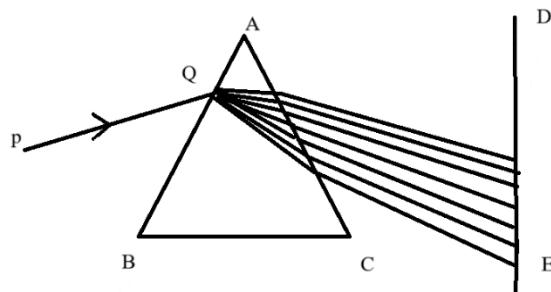
b) The human eye functions like a camera. The convex lens focuses light onto the retina. The eye adjusts the lens's shape to focus on objects at various distances (accommodation).

2) .a) Iris – Controls the amount of light entering the eye by adjusting the pupil size.

b) Pupil – The opening through which light enters the eye.

c) Cornea – Transparent front layer of the eye that helps in focusing light onto the retina.

55.



a) Name the phenomenon seen here.

- Dispersion of light.

b) Write the reasons.

- Different colors (wavelengths) of light refract at different angles when passing through the prism, resulting in the separation of white light into its constituent colors (VIBGYOR)

#### V. Answer the following questions (Four mark)

56

a) Phenomenon of formation of rainbow in the atmosphere : Rainbow is caused by the dispersion of sunlight by tiny water droplets present in the atmosphere. The water droplets act like small prisms ; they refract and disperse the

incident sunlight, then reflect it internally and finally refract it again when it comes out of the raindrop. Due to the dispersion of light and internal reflection, different colours reach the observer's eye.

b) Twinkling of stars : The twinkling of stars is due to atmospheric refraction of starlight. The starlight on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth.

The atmospheric refraction occurs in a medium of gradually changing refractive index As the path of rays of light coming from the star goes on varying slightly, the apparent position of the star fluctuates and the amount of starlight entering the eye flickers. This is the twinkling effect of stars.

57. a) Myopia : Myopia is a defect of vision ; a person with this defect can see nearby objects clearly but cannot see distant objects distinctly. A person with this defect has the far point nearer than infinity. Total In a myopic eye, the image of a distant object is formed in front of the retina and not at the retina itself.

Causes for myopia :

- Excessive curvature of the eye lens.
- Elongation of the eyeball.

b) Power of accommodation of eye : The ability of the eye lens to adjust its focal length. While seeing the distant objects

- the curvature of the eye lens gets modified / decreases by ciliary muscles
- the focal length of the eye lens increases
- the eye lens becomes thin

## **UNIT – 13 OUR ENVIRONMENT**

### **KEY ANSWER**

#### **I. Multiple choice questions (one mark)**

1. B.5 J
2. A. undergo recycling naturally in the environment
3. A. Plant fibers
4. C.O<sub>3</sub>
5. B. herbivores
6. A. algae
7. B. Herbivores
8. C. In the order of increasing accumulation of harmful chemicals
9. D. Cake, tree and grass
10. B. Grass, goat and human
11. D. All of the above.
12. D. The loss of energy is more than the amount of energy available.

#### **II. Answer the following questions (One Mark)**

13. Break down the complex organic substances into simple inorganic substances. Break down dead remains and wastes of organisms.
14. Decompose dead wastes (organic ) of plants and animals thus keep surroundings clean and maintain ecological balance. (Any other suitable answer )1

15. Chlorofluorocarbon -CFC's are responsible for the decrease in the amount of ozone layer which protects the earth from ultraviolet rays of sun.

16. The process of increasing the storage of harmful chemicals in the organisms that found in trophic levels of various food chains.

17. Ozone protects the earth's surface from ultraviolet radiation from sunlight at high levels of the atmosphere. In this way, it protects living things on earth.

18. Because as reaching to high trophic level of food chain, the amount of available energy goes on decreasing.

19. The transfer of food energy from one level to another in a food chain is called a food chain.

20. At each trophic level of a food chain, 10 percent of the energy is lost. Due to this, the availability of energy for the next trophic levels decreases.

21. CFCs cause the thinning of the ozone layer.

### **III Answer the following questions (two marks)**

22. (i) Birds are disturbed more due to biomagnification. As the birds occupy the top most level in the given food chain, the maximum concentration of harmful chemicals causing bio magnification get accumulated in their body.

(ii) Biomagnification is the process of accumulation of non degradable chemicals in the various trophic levels of food chain.

As the chemicals are non-degradable or cannot be washed, they cannot be removed from the organisms of the food chain. This leads to gradual destroying of the ecosystem.

23.

- Cucumber piece and banana peel are organic substances.
- They are biodegradable substances, and are ecofriendly.
- Glass piece and plastic pen are inorganic / synthetic substances.
- They are non-biodegradable substances and cause soil pollution.

24.

- The flow of energy in the food chain is unidirectional.
- The energy that is captured by autotrophs does not revert back to the solar input.
- The energy which passes to the herbivores does not come back to autotrophs
- The energy available at each trophic level gets diminished progressively due to loss of energy at each level.

25.

- These substances do not undergo natural recycling and remain inert in the environment.
- May harm the various members by adding into different stages of ecosystem / cause 'Biological magnification'.
- Cause environmental pollution.

26. By adopting following methods :

- Segregation of dry wastes and wet wastes.
- Reusing of wet wastes by converting them into manures.
- Recycling dry wastes • Limiting the use of disposable materials
- Following eco-friendly packagings.

27. Grass → Grasshopper → Frog → Snake → Eagle •

- If the number of organisms in the second trophic level increases, then the number of organisms in the first trophic level decreases.
- Eventually population of the rest of the organisms in the trophic levels decreases and leads to ecological imbalance.

28 1000 calory according to law of 10%

29 .\* Diatoms → Insect larvae → Fishes → Birds

Producers → Pri. Consumer → Sec. Consumer → Ter. Consumer

↓                      →

10,000 calories → 1000 calories → 100 calories → 10 calories

\* Organisms in the first trophic level that produced the energy was 10,000 calories

.i) Green plants are having the amount of energy – 70000 kJ ( Law of 10% )

ii) T / 3 Tiger

These chemicals are not degradable and get accumulated at each trophic level and hence the top level in any food chain the maximum concentration of these chemicals is accumulated.

30.\* Grass → Grasshopper → Frog → Snake

\* Snake

31.

- remain inert in the environment.
- cause ‘Biological magnification’.
- cause environmental pollution

32.

- The higher energy UV radiations split apart some molecular oxygen ( $O_2$ ) into free oxygen (O) atoms. These atoms then combine with the molecular oxygen to form ozone.
- Ozone protects the earth's surface from ultraviolet radiation of the sun

33. Bio-degradable substances: Decomposed by micro organisms, do not cause bio magnification, can be converted into compost . Ex: Kitchen wastes, paper, sewage

Non-degradable substances: Not decomposed by micro organisms, cause bio magnification, can be recycled. Ex: Plastic, metal cans, glass, polymer

34.

- The flow of energy in the food chain is unidirectional.
- Only 10% of energy is available to the next trophic level.
- Amount of harmful chemicals increases in the food chain at the higher trophic levels.

35. created ecological imbalance in the environment. yes because the primary ,secondary and tertiary consumers are getting food from the prducers so they can nt survive in the ecological balance so it will be cherished away

36. Biodegradable materials release bad smell and some harmful gases when they decompose. This causes air pollution.

Areas where biodegradable materials decompose cause soil and water pollution, which in turn leads to an increase in harmful insects, rats and other pests.

37. Ozone is a molecule formed by three oxygen atoms. Ozone is formed when ultraviolet radiation in the upper atmosphere breaks down oxygen molecules into oxygen atoms and combines with them to form ozone.

38. These are not naturally recycled and remain inactive in the environment for a long time. They can harm many organisms at different levels in the ecosystem and bring about biological enrichment. These cause environmental pollution.

39. Any unit in nature that interacts between biotic and abiotic components is called an ecosystem. Its main components

are biotic and abiotic components.

1) Biotic component; All units that have the characteristics of living things

For example: plants, animals and microorganisms.

2) Abiotic components: ; Components without living things

Ex: air, water, soil, heat

40.

- The flow of energy in a food chain is one-way.
- The energy captured by autotrophs does not return to the solar energy.
- The energy that is absorbed by herbivores does not return to their parents.
- The energy available at each trophic level gradually decreases due to energy loss at each level.

41. Since only a small amount (10%) of energy is available to the next level of predators and the energy consumed at each level is high, a minimum amount of energy from the four trophic levels is left for use.

### **III. Answer the following questions(Three marks questions)**

42. a)

- Very little energy is available (10% ) for the next level of consumers. Or the loss of energy at each step is so great that very little usable energy remains after four trophic levels.

b)

- Decomposers breakdown the dead remains and waste products of organisms / Decomposers breakdown the complex organic substances into simple inorganic substances.
- These substances are used up once more by the plants / Decomposers help in the natural replenishment of the soil.

c)

- Ozone layer shields the surface of the earth from ultraviolet radiation from the sun. This radiation is highly damaging to organisms.

43.

- Each step of the food chain is called a trophic level(T).
- The energy that is captured by autotrophs does not revert back to the solar input.
- The energy which passes to the herbivores does not come back to autotrophs.
- The energy available at each trophic level gets diminished progressively due to loss of energy at each level.

44.

<b>Biodegradable materials</b>	<b>Non-biodegradable materials</b>
<ul style="list-style-type: none"><li>• Break down by biological processes</li></ul>	<ul style="list-style-type: none"><li>• Does not break down by biological processes</li></ul>
<ul style="list-style-type: none"><li>• Does not remain intact in the environment for a long time</li></ul>	<ul style="list-style-type: none"><li>• Remain intact in the environment for a long time</li></ul>
<ul style="list-style-type: none"><li>• Less harmful</li></ul>	<ul style="list-style-type: none"><li>• More harmful</li></ul>
<ul style="list-style-type: none"><li>• Less polluting</li></ul>	<ul style="list-style-type: none"><li>• More polluting</li></ul>