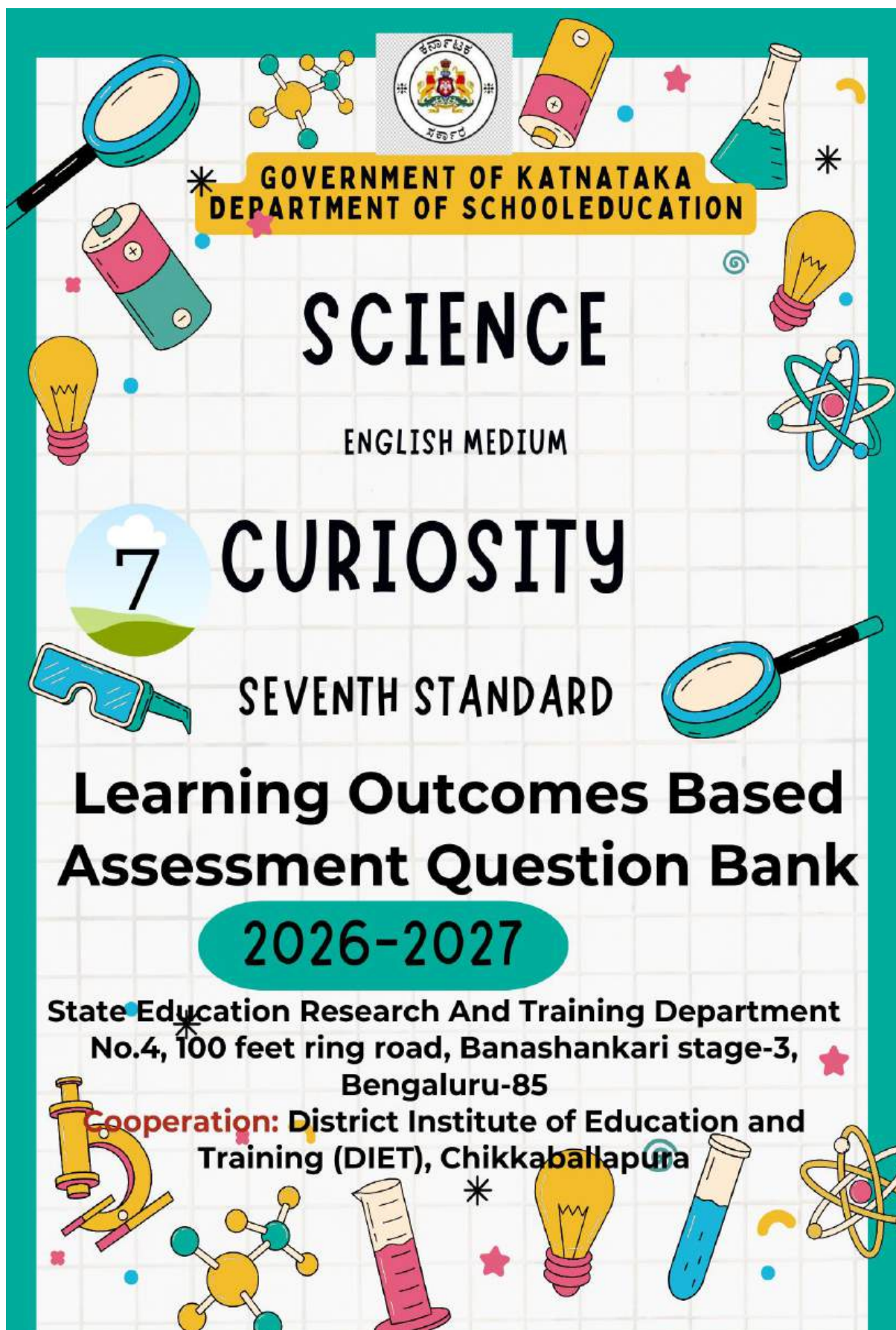




**Government of Karnataka
Department of School Education**

Learning Outcomes Based Assessment Material

**7 th Standard
Subject: Science (Kannada Medium)**

Curiosity

2026-27

**Department of State Educational Research and Training
Banashankari 3rd Stage, Bengaluru-560085
Cooperation: District Institute of Education and Training
(DIET), Chikkaballapura**

LEARNING OUTCOMES BASED QUESTION BANK 2026-27

CLASS: 7

SUB: SCIENCE CURIOSITY

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Director's Note

Science is not merely a collection of facts and information; it is a continuous journey of curiosity, observation, and exploration. Aligned with the NCERT curriculum, the primary school science textbook “Curiosity” has been prepared with the objective of inspiring and encouraging inquiry, creativity, and joyful learning in the minds of children.

To ensure that learning is not confined solely to textbooks but transforms into a meaningful understanding of daily life, the Department of School Educational Research and Training (DSERT) has brought out this Learning Outcomes-Based Question Bank. For the very first time, each chapter and its core concepts have been directly and systematically mapped to specific Learning Outcomes (LOs). This initiative will be immensely helpful in meaningfully assessing children's learning progress, identifying learning gaps, and effectively preparing students for state and national-level competitive examinations such as NMMS, as well as surveys like NAS, CSAS, and PARAKH.

The true success of this curriculum lies in the hands of our dedicated teachers. Teachers should deeply understand these mapped learning outcomes and create an active, activity-based classroom environment. By utilizing this initiative continuously (CCE) at every stage—from classroom processes to assessment—all teachers can play a pivotal role as mentors in fostering scientific temper, logical thinking, and sustained curiosity in every child. I hope this Learning Outcomes-Based Question Bank serves as an inspiring guide for teachers and becomes a stepping stone towards the academic excellence of our students.

Director

Department of School Educational Research and Training (DSERT)

Bengaluru, Karnataka

Guidelines for Teachers

The Grade 7 'Curiosity' science textbook is not merely a medium for imparting information; rather, it is a tool to stimulate a questioning attitude, scientific thinking, and experiential learning in a child.

Recognizing the importance given to Learning Outcomes in the current education system, teachers should observe the following points to make classroom instruction more meaningful:

Nurturing Curiosity and Creativity

- Instead of starting every lesson with a direct explanation, it should begin through children's daily life experiences, questions, or small experiments.
- Rather than immediately answering curious questions like 'Why?', 'How?', and 'When?' that arise in children, an opportunity and a creative environment should be built for them to find the answers themselves.
- To prevent the feeling that science is a tough subject, it can be ensured that the learning process flows very easily and accurately through play and activities.

Mapping and Utilization of Learning Outcomes

- For the very first time, the department has mapped each chapter of the textbook, its key learning competencies, and specific Learning Outcomes (LOs) with one another.
- Before teaching, teachers should clearly understand the specific learning outcome that a child needs to achieve from each chapter.
- Classroom processes should not be limited merely to completing the syllabus, but should be supportive in ensuring whether the child has achieved that learning outcome.

Effective Use of Learning Materials and Question Bank

- Continuously utilizing (CCE) the Learning Outcomes-Based Question Bank brought out by DSERT.
- Providing hands-on experiences to children using locally available, no-cost, or low-cost materials.
- Enhancing children's thinking skills by using the diverse types of questions available in the question bank.

Preparation for Competitive Examinations and Assessment (PARAKH, NAS, CSAS, NMMS)

- Understanding that surveys such as PARAKH, NAS (National Achievement Survey), CSAS (State Achievement Survey), and national and state-level examinations like NMMS are designed based on learning outcomes.
- Analyzing children's learning progress continuously based on learning outcomes rather than measuring it solely on the basis of marks.
- Identifying learning gaps found through the analysis and planning remedial teaching measures accordingly.

Teacher's Role as a Mentor

- Teachers should act not just as providers of information, but as motivators and mentors for a child's self-learning.
- Creating equal opportunities and support for every child in the classroom to share their thoughts and conduct experiments.

The core objective of the 'Curiosity' book is to foster scientific temper in every child. This is possible only through appropriate guidance from teachers and effective implementation of learning outcomes.

Learning Outcome-Based Question Bank 2026-27

Subject: Science

Class: 7

List of Learning Outcomes Mapped Chapter-wise

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
1. Exploring the world of matter and its constituents, properties, and behaviors.	C-1.1 Classifies matter based on observable physical characteristics (solid, liquid, gas, shape, size, density, transparent, opaque, translucent, magnetic, non-magnetic, conducting, non-conducting) and chemical characteristics (pure, impure; acid, base; metal, non-metal; element, compound).	1. Classifies various substances used in daily life into acidic, basic (alkaline), neutral, metals, and non-metals based on their physical and chemical properties. Lists the differences between each. Identifies the nature of solutions through experiments using natural and synthetic indicators.	4. World of Metals and Non-Metals 2. Exploring Substances: Acids, Bases, and Neutral Substances
	C-1.2 Describes physical and chemical changes in matter and applies the particulate nature of matter to explain its properties and transformations.	2. Analyzes changes occurring around them as physical and chemical changes and understands their causes.	5. Changes Around Us: Physical and Chemical Changes
	C-1.3 Explains the importance of measurement and measures physical properties of matter (volume, weight, temperature, density) using indigenous, non-standard, and	—	—

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
	standard units with simple instruments.		
	C-1.4 Observes and explains phenomena caused by differences in pressure, temperature, and density, such as breathing, sinking and floating, water pumps, cooling processes, and wind formation.	3. Understands through experiments that heat transfers from one substance to another through conduction, convection, and radiation methods.	7. Heat Transfer in Nature
2. Exploring the physical world in scientific and mathematical terms.	C-2.1 Describes one-dimensional motion (uniform, non-uniform, horizontal, vertical) using measurements of position, speed, and changes in speed through mathematical and diagrammatic representations.	4. Mathematically calculates the relationship between an object's speed, distance, and time.	8. Measurement of Time and Motion
	C-2.2 Explains how electricity works by manipulating components in simple circuits and demonstrates the heating and magnetic effects of electricity.	5. Identifies various components used in simple electric circuits such as bulb, cell, switch, and draws their circuit diagram symbols.	3. Electricity: Circuits and Their Components
	C-2.3 Describes the properties of natural and artificial magnets	—	—

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
	and explains how the Earth behaves as a magnet.		
	C-2.4 Demonstrates rectilinear propagation of light from natural and artificial sources and reflecting surfaces; verifies the laws of reflection using mirrors, pinhole cameras, kaleidoscopes, and periscopes.	6. Understands the difference between reflection and refraction of light and explains how shadows are formed.	11. Light: Shadows and Reflections
	C-2.5 Observes and identifies celestial objects such as stars, planets, satellites, constellations, and comets, and explains their role in navigation, calendars, moon phases, eclipses, and life on Earth.	7. Analyzes the relative motion of the Earth, Moon, and Sun and the phenomenon of eclipses caused by them.	12. Earth, Moon, and Sun
3. Exploring the living world in scientific terms.	C-3.1 Describes the diversity of living organisms/cells in natural surroundings, including insects, earthworms, snails, birds, mammals, reptiles, spiders, plants, fungi, and microscopic organisms.	8. Explains processes such as nutrition, transportation, digestion, respiration, and blood circulation in plants and animals.	10. Life Processes in Plants 9. Life Processes in Animals

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
	C-3.2 Distinguishes living organisms from non-living things based on characteristics such as nutrition, growth, respiration, response to stimuli, reproduction, excretion, and cellular organization.	—	—
	C-3.3 Analyzes relationships between living organisms and their environment, highlighting interdependence and responses to environmental factors.	—	—
	C-3.4 Explains the conditions necessary to sustain life on Earth and other planets, including atmosphere, suitable temperature and pressure, light, and water properties.	—	—
4. Understanding components of health, hygiene, and well-being.	C-4.1 Analyzes food components with reference to Indian culinary practices and modern nutrition and explains the effects of nutrition on health.	—	—

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
	C-4.2 Examines the diversity of food sources, nutrients, climatic conditions, and dietary practices.	—	—
	C-4.3 Describes biological changes during adolescence, including growth and hormonal changes, and measures to be followed for overall well-being.	9. Understands the physical and psychological changes that occur in the bodies of girls and boys during adolescence and the importance of this stage.	6. Adolescence: A Phase of Growth and Change
	C-4.4 Recognizes and discusses substance abuse and views the school as a safe environment for raising such concerns.	—	All Lessons
5. Understanding the interconnection between Science, Technology, and Society.	C-5.1 Illustrates how science and technology improve human life in areas such as healthcare, communication, transportation, food security, climate change mitigation, resource conservation, and satellite applications, while recognizing harmful uses of science in history.	—	—

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
	C-5.2 Shares and discusses views on news and articles related to the mutual impact of science, technology, and society.	—	—
6. Exploring the nature and processes of science through engagement in the evolution of scientific knowledge and conducting scientific inquiries.	C-6.1 Explains how scientific knowledge and ideas have evolved over time and identifies scientific values such as scientific temper, collaboration, and conservation of biodiversity and ecosystems.	—	—
	C-6.2 Formulates scientific questions, identifies possible causes and patterns, and collects evidence through observation, simple experiments, and scientific instruments.	—	—
7. Communicating science-related questions, observations, and conclusions.	C-7.1 Uses scientific vocabulary accurately in oral, written, and visual forms of communication.	—	—
	C-7.2 Designs and builds simple models	—	—

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
	to demonstrate scientific concepts.		
	C-7.3 Represents real-world events and relationships using diagrams and simple mathematical representations.	—	—
8. Understanding and appreciating India's contributions throughout history and in modern times across various subject areas involving science.	C-8.1 Explains the significant contributions of India to scientific concepts, explanations, methods, and discoveries integrated within the curriculum.	10. Explains with examples that science is a continuously evolving field and understands the importance of scientific discoveries.	1. The Ever-Changing World of Science
9. Developing awareness of the most current discoveries, ideas, and new frontiers (modern research) in all areas of scientific knowledge to perceive that science is continuously growing and there are still many unanswered questions.	C-9.1 States concepts that reflect current scientific understanding of topics being studied, appropriate to the developmental stage of learners.	—	All Lessons
	C-9.2 Identifies and states questions within the curriculum	—	—

Curriculum Goals	Competencies	Learning Outcomes	Corresponding Lesson mapped
	for which current scientific understanding remains incomplete or inadequate.		

Note: The following learning outcomes apply to all units, and teachers need to formulate appropriate chapter-wise strategies and provide timely guidance to help students achieve them.

1. Students raise scientific questions about natural events around them; collect evidence through appropriate experiments, observations, and instruments; and clearly express the collected information using accurate scientific terminology, diagrams, and simple mathematical models.
2. Students grasp how scientific concepts have changed over time, design and build simple technical/scientific models, and critically explain the significant contributions made by ancient and modern Indian scientists to this development.
3. Students analyze and discuss the impact of science and technology on society and ecosystems; internalize scientific values of environmental and biodiversity conservation; and identify open, unanswered, or incomplete questions in science, thinking critically about them.

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Learning Outcome-Based Assessment Question Bank 2026-27

SCIENCE – 7th Standard

BLUEPRINT, CHAPTER-WISE WEIGHTAGE FRAMEWORK

1. Allocation of Marks Based on Learning Objectives

Sl. No.	Objectives	Total Marks
1	Knowledge	25
2	Understanding	30
3	Application	25
4	Analysis / Skill	20
	Total	100

2. Allocation of Marks Based on Types of Questions

Type of Questions	Marks per Question	Number of Questions	Total Marks
Objective Questions (MCQ)	1	10	10
Very Short Answer	2	10	20
Short Answer	3	10	30
Long Answer	4 or 5	8	40
Total		38	100

3. Allocation of Marks According to Difficulty Levels

Level	Percentage	Marks
Easy	30%	30
Average	50%	50
Difficult	20%	20
Total	100%	100

4. Chapter-wise Allocation of Marks (Unit-wise)

Chapter No.	Chapter Name	Percentage of Marks
	PART - 1	
01.	The Ever-Changing World of Science	-
02.	Exploring Substances: Acidic, Basic, and Neutral	10% (10)
03.	Electricity: Circuits and Its Components	10% (10)
04.	The World of Metals and Non-Metals	09% (09)
05.	Changes Around Us: Physical and Chemical	09% (09)
06.	Adolescence: A Stage of Growth and Change	08% (08)
	PART - 2	
07.	Heat Transfer in Nature	09% (09)
08.	Measurement of Time and Motion	09% (09)
09.	Life Processes in Animals	10% (10)
10.	Life Processes in Plants	09% (09)
11.	Light: Shadows and Reflections	09% (09)
12.	Earth, Moon, and Sun	08% (08)
	Total Marks	100% (100)

Note: All chapters have been balanced, and teachers can conduct accurate evaluations using questions based on each learning outcome. To test students' varied levels of thinking and comprehension, external, application-oriented, and analytical questions can be aligned with the CCE (Continuous and Comprehensive Evaluation) pattern design.

Sample Questions Based on Lesson-wise Learning Outcomes

Chapter 1: The Ever -Evolving World Of Science

Learning Outcomes:

Explains with examples that science is an ever-evolving field and understands the importance of scientific discoveries.

I. Fill in the blanks with suitable words (1 mark each)

1. As new evidence and proofs are found, scientific knowledge undergoes continuous _____.
2. Observing any phenomenon closely in the scientific method is called _____.
3. Constructing new devices for human convenience using the principles of science can be called _____.
4. The result that emerges after testing a temporary hypothesis through experiments is _____.
5. Science is not just a collection of information; it is a continuously ongoing _____.
6. Making testable hypotheses and conducting experiments to find the truth is the main characteristic of _____.
7. Observing and questioning various phenomena found in nature is the first step of scientific _____.
8. When new evidence and discoveries are found, old scientific theories get _____.
9. Accepting nothing without basic evidence, but questioning and seeking the truth is called a _____ temper/attitude.

II. Four options are given for each of the following. Choose the correct option and write it. (1 mark each)

10. Which of the following is the correct order of the scientific method?
(A) Conclusion → Experiment → Observation
(B) Observation → Hypothesis → Experiment → Conclusion
(C) Hypothesis → Conclusion → Observation → Experiment
(D) Experiment → Observation → Conclusion → Hypothesis
11. A theory or law in science changes when
(A) Society does not accept it
(B) New and more precise evidence is found
(C) Scientists get bored
(D) Old books are lost
12. The technology that brought a revolutionary change in weather forecasting and telecommunication systems is
(A) Steam engine
(B) Artificial Satellites
(C) Microscope
(D) Mercury thermometer
13. Science means
(A) Merely a collection of facts and information
(B) A process of continuous learning and exploring
(C) A list of rules to be memorized
(D) An unchangeable final truth

14. When new evidence and discoveries are found, old scientific theories
 - (A) Are permanently rejected
 - (B) Undergo change and revision
 - (C) Never change
 - (D) Are removed from science
15. The first major step of the scientific method to understand natural phenomena is
 - (A) Arriving at a conclusion
 - (B) Memorizing formulas
 - (C) Observing closely and questioning
 - (D) Writing experiment results
16. Not accepting anything directly without testing or evidence is called
 - (A) Superstition
 - (B) Scientific temper
 - (C) Personal belief
 - (D) Imagination
17. The main objective of the growth of science is
 - (A) Scoring marks in technical examinations
 - (B) Understanding the laws of nature to improve human life and the world
 - (C) Rote learning old books
 - (D) Forcibly imposing new rules

III. Match the following (1 mark each)

18.

Group 'A'	Group 'B'
1. Observation	(A) Human misuse
2. Artificial Intelligence (AI)	(B) Gathering information through five senses
3. Environmental pollution	(C) Change in modern science
19.	

List 'A'	List 'B'
1. Scientific temper	(A) Gets revised when new evidence is found
2. Observation and questioning	(B) Not accepting anything without evidence
3. Scientific theories	(C) A path of continuous learning and exploring
4. Scientific method	(D) The first step of scientific inquiry
5. The world of science	(E) Involves testable hypotheses and experiments

IV. Analyze the relationship in the first pair and fill in the blanks: (1 mark each)

- 20. Telescope : Astronomy :: Microscope : _____.
- 21. Communication in olden times : Paper letters :: Communication in modern times : _____.
- 22. Collection of information : Record of facts :: Scientific inquiry : _____
- 23. Traditional belief : Blind acceptance :: Scientific temper : _____
- 24. First step of inquiry : Observation and questioning :: Stage of arriving at a conclusion : _____
- 25. Old scientific theory : Revision/Change :: Testable hypothesis : _____
- 26. Mathematics : Numbers and calculations :: Science : _____

V. Answer the following questions in one sentence each. (1 mark questions)

- 27. What is science?
- 28. What is a hypothesis?
- 29. Name any one modern invention that changed the world of science.
- 30. What is the first step of scientific method?
- 31. Which is the first step of scientific inquiry?
- 32. What is scientific temper?
- 33. What happens to old scientific theories when new evidence is found?
- 34. Why is science called a 'continuous process'?

VI. Answer the following questions in two sentences each. (2 mark questions)

- 35. "Science is never static; it is dynamic" – Briefly explain this statement.
- 36. What is technology? What is the relationship between science and technology?
- 37. Why is it important to develop a scientific temper?
- 38. How would you say that science is not just a collection of information, but a 'process'?
- 39. State the main steps of the scientific method.
- 40. Why is it important to cultivate a scientific temper? (Give two reasons).
- 41. How do scientific theories change over time? Explain with an example.
- 42. What is the role of science in daily life? Give two examples.

VII. Answer the following questions in three sentences each. (3 mark questions)

- 43. List and explain the major steps of the scientific method.
- 44. Write about the role of computers and the internet in the changing world of science.

VIII. Answer the following questions in four to five sentences each: (4 / 5 marks)

- 45. Discuss in detail the positive (good) and negative (bad) impacts of the progress of science and technology on human life.
- 46. You have been asked to prepare a short essay/brainstorming paper on the topic "What if there was no scientific temper and right to question in the world?" for your school science exhibition. As a responsible science student, write 3 major problems human society would have faced in such a situation, and creatively explain in your own words how the 'scientific method' has improved the world as a solution to them.

Chapter 2:

Exploring Materials: Acidic, Basic, and Neutral

Learning Outcome: Classifies various substances used in daily life into acidic, basic (alkaline), neutral, metals, and non-metals based on their physical and chemical properties. Lists the differences between each of them. Identifies the nature of solutions through experiments using natural and synthetic indicators.

I. Four options are given for each of the following questions. Choose the correct one and write it:

1. In which of the following solutions does blue litmus paper turn red?
 - A. Sodium bicarbonate solution
 - B. Calcium hydroxide solution
 - C. Potassium hydroxide solution
 - D. Hydrochloric acid
2. Litmus paper is obtained from the following natural substances
 - A. Lichen
 - B. Chrysanthemum flower
 - C. Marigold flower
 - D. Lotus flower
3. The taste of a base is ---.
 - A. Sour
 - B. Bitter
 - C. Sweet
 - D. Salty
4. Identify the chemical indicator:
 - A. Turmeric
 - B. Litmus paper
 - C. Phenolphthalein
 - D. Hibiscus petal
5. A substance containing acetic acid:
 - A. Spinach
 - B. Curd
 - C. Vinegar
 - D. Raw mango
6. The base used in soap:
 - A. Sodium hydroxide
 - B. Potassium hydroxide
 - C. Both A and B
 - D. None of these
7. When acid and base are added respectively to a water mixture of red rose petals, the colour changes observed are:
 - A. Red and Green
 - B. Dark Pink (Magenta) and Green
 - C. Green and Blue
 - D. Green and White
8. Identify the odd word out:

- A. Acetic acid
 - B. Citric acid
 - C. Lactic acid
 - D. Hydrochloric acid
9. Match the following:
- | | |
|--------------------|--------------|
| a. Baking soda | 1. Indicator |
| b. Vinegar | 2. Salt |
| c. Common Salt | 3. Acid |
| d. Phenolphthalein | 4. Base |
- A. a-3, b-4, c-2, d-1
 - B. a-4, b-3, c-2, d-1
 - C. a-3, b-4, c-1, d-2
 - D. a-4, b-3, c-1, d-2
10. Identify the correct statement:
- A. Milk of Magnesia is a base
 - B. Sugar is an indicator
 - C. Shampoo is an example of an acid
 - D. Common salt is a basic substance
11. Chemical name of baking soda:
- A. Sodium carbonate
 - B. Sodium bisulphate
 - C. Sodium bicarbonate
 - D. Sodium chloride
12. The products obtained when sodium hydroxide reacts with hydrochloric acid are:
- A. Salt and Water
 - B. Salt and Hydrogen
 - C. Acid and Water
 - D. Bases
13. Substance that undergoes a colour change when turmeric indicator is used:
- A. Sugar solution
 - B. Vinegar
 - C. Salt solution
 - D. Soap solution
14. Identify the incorrect statement:
- Caution must be exercised while handling acids and bases in the laboratory, because:
- A. They are corrosive in nature.
 - B. They cause burning sensations.
 - C. They cause damage to the skin.
 - D. They have crystallizing properties.
15. Complete the equation: $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{---}$
- A. H_2O
 - B. H_2
 - C. O_2
 - D. H_2O_2
16. Vitamin abundant in Indian Gooseberry (Amla):

- A. Vitamin A
 - B. Vitamin C
 - C. Vitamin D
 - D. Vitamin E
17. Acid rain means:
- 1. Rainwater becoming acidic
 - 2. Rainwater becoming basic
 - 3. High content of sulfuric acid and carbonic acid in rainwater
 - 4. High content of citric acid and acetic acid in rainwater
- A. 1, 2, and 3
 - B. Only 1 and 2
 - C. 1, 3, and 4
 - D. 1 and 3 only
18. Ammonium hydroxide is used in which of the following?
- A. Soap
 - B. Window cleaner
 - C. Vinegar
 - D. Detergent
19. Substance used to neutralize factory wastes:
- A. Salt
 - B. Vinegar
 - C. Slaked lime
 - D. Water
20. The solution that can be generally used for ant bites:
- A. Baking soda solution
 - B. Calamine solution
 - C. Both A and B can be used
 - D. None of these
21. Due to the excessive use of chemical fertilizers, soil:
- A. Acidity increases.
 - B. Basicity increases.
 - C. Both increases.
 - D. Acidity decreases.
22. When red litmus paper is dipped in lime water:
- A. It turns blue.
 - B. Colour does not change.
 - C. It changes to red.
 - D. It remains white.
23. The reaction that occurs when specific quantities of hydrochloric acid and magnesium hydroxide are mixed:
- A. Product
 - B. Neutralization
 - C. Evaporation
 - D. Crystallization
24. Which of the following acids causes a burning sensation when an ant bites?

- A. Citric acid
 - B. Tartaric acid
 - C. Oxalic acid
 - D. Formic acid
25. If litmus paper is placed in acid, what colour does it turn into?
- A. Blue
 - B. Red
 - C. Yellow
 - D. Green
26. If turmeric indicator is in a base, what colour does it turn into?
- A. Red
 - B. Black
 - C. Green
 - D. Blue
27. Salt is created by which of these processes?
- A. Acid + Acid
 - B. Base + Base
 - C. Acid + Base
 - D. Combination of Water
28. Which of the following is a base?
- A) Hydrochloric acid
 - B) Lemon juice
 - C) Soda lime
 - D) Acetic acid
29. Which among these is a natural indicator?
- A. Litmus
 - B. Methyl Orange
 - C. Phenolphthalein
 - D. Bromothymol Blue
30. Which ion is commonly present in bases?
- A. OH-
 - B. H+
 - C. Cl-
 - D. Na+
31. Which of the following is not a natural indicator?
- A. Litmus
 - B. Turmeric
 - C. China Rose
 - D. Fruit juice
32. What happens to heat in a neutralisation reaction?
- A. No temperature change
 - B. Cooling effect
 - C. Heat absorption
 - D. Heat release
33. Lichens are formed by the symbiotic association of which of the following organisms

- A. Fungi and Algae
- B. Fungi and Plant
- C. Fungi and Bacteria
- D. Fungi and Virus

34. The reason for the increase in acidity in soil is:

- A. Excessive rain
- B. Use of chemical fertilizers
- C. Organic matter
- D. All of the above

35. If the Hydrangea plant growing in Himachal Pradesh bears blue flowers, its soil is:

- A. Acidic
- B. Basic
- C. Neutral
- D. None of these

36. Among the following, only this statement is correct:

- A. Yellow colour of turmeric changes to red in basic solution.
- B. Yellow colour of turmeric changes to blue in acidic solution.
- C. Yellow colour of turmeric changes to blue in basic solution.
- D. Yellow colour of turmeric changes to red in acidic solution.

II. Fill in the blanks with correct answers:

- 37. The main acid found in lemon juice is _____.
- 38. Litmus is a _____ indicator.
- 39. Soda lime is a _____.
- 40. The acid present in tamarind is _____ acid.
- 41. The combination of acid and base produces _____.
- 42. Litmus is obtained from a lichen/algae called _____.
- 43. If turmeric is applied to lemon juice, the colour turns to _____.
- 44. The salt present in common salt: _____
- 45. Litmus paper turns to _____ colour in lemon juice.
- 46. Abundantly present in amla is ----- vitamin.
- 47. National Science Day is celebrated on -----.
- 48. Chemical name of lime is -----

III. Match the following:

49.

A	B
1. Hydrochloric acid	i. Non-vegetarian digestion
2. Soda lime	ii. Base
3. Turmeric	iii. Natural indicator
4. Salt	iv. Acid + Base

50. A	B
1. Litmus	i. Natural indicator
2. Hydroxide	ii. Base
3. Turmeric	iii. Yellow indicator
4. Salt	iv. Neutralization
5. Citric acid	v. Lemon juice

51. A	B
1. Phenolphthalein	i. Vinegar
2. Lichens	ii. Salt + Water
3. Acetic acid	iii. Source of obtaining litmus
4. Sodium hydroxide	iv. Man-made indicator
5. Neutralization reaction	v. Base

IV. State True or False. If false, correct the sentence and rewrite:

52. Tap water is acidic in nature.
53. We should take an antacid when suffering from acidity.
54. Neutralization is a reaction between an acid and a neutral substance.
55. Lime water turns blue litmus paper to red colour.
56. Turmeric is a chemical indicator.
57. Common salt is a base.
58. Acid rain means rainfall with high citric acid content.
59. Curd contains acetic acid.
60. Excessive use of fertilizers decreases soil acidity.
61. Carbonic acid is used as a source of Vitamin C.
62. If the Hydrangea plant bears pink or red flowers, its soil possesses basic nature.
63. Red rose extract turns red in acidic solutions.
64. It is possible to test acidic substances using turmeric indicator.

V. Answer the following questions in a word or a sentence each:

65. What colour indicator is turmeric?
66. What is the chemical formula of hydrochloric acid?
67. What type of substance is lemon juice?
68. Give an example for salts.
69. What is the source of obtaining litmus?
70. If a hydroxyl ion group is present, is it an acid or a base?

71. Name the acid present in vinegar.
72. What is the chemical name of bleaching powder?
73. Name the base present in lime water.
74. What are olfactory indicators?
75. Who is called the 'Father of Modern Indian Chemistry'?
76. What is blue litmus solution?

VI. Answer the following questions in two-three sentences each: (Short Answer – 2 Marks)

77. How is salt formed?
78. What is an indicator? Write two examples.
79. Write the differences between acids and bases.
80. Write the names of two natural indicators.
81. Colour changes when turmeric indicator is added to soap — why?
82. Adding acid slowly to water is safe — why?
83. Turmeric colour changes in a base — why?
84. When litmus is added to an acidic solution, it turns red — why?
85. Heat is produced in a neutralization reaction — why?
86. Turmeric is a natural indicator — how?
87. Common salt is said to be a salt — why?
88. Separate the following substances into acids and bases:
Lemon juice, baking soda, orange juice, curd, vinegar, soap solution.
89. Observe these pictures and separate them into acids and bases according to their nature:
Vinegar, Baking soda, Distilled water, Lemon juice, Borax, Soda



Vinegar



Baking Soda



Distilled Water



Lemon Juice



Borax



Soda

90. What is acid rain?
91. How will you test whether distilled water is acidic, basic, or neutral?

92. Ammonia is found in many household products like window cleaners. How will you find out whether its nature is acidic or basic?
93. Name the acid present in the following:
i. Lemon juice ii. Curd iii. Tamarind iv. Spinach
94. Name the acids used in the following activities:
 - For eye wash
 - In carbonated/flavoured beverages
95. Write the chemical names:
 - Salt
 - Baking soda
96. Lemon juice has a sour taste, whereas lime water is bitter. Why?
97. Name the base used in the following:
 (i) To remove grease stains from clothes -----
 (ii) Antacid -----
98. Name two air pollutants that cause acid rain.
99. Why did bubbles appear when vinegar accidentally spilled on an eggshell?
100. Turmeric is called the golden spice. Why?
101. Observe the pictures and analyse; paper strips of rose flower extract are used in this. Identify the nature of solutions in each container.



102. A sample of liquid in the laboratory was tested using various indicators. Justify the acidic and basic nature of the liquid.

Indicator	Red litmus	Blue litmus	Turmeric
Change	No change	Turned red	No change in colour

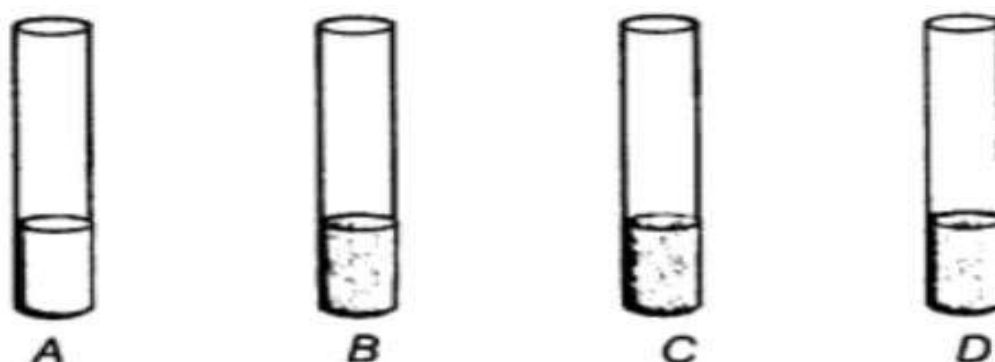
103. Many is given two unknown solutions to test whether they are acidic or alkaline. Which indicator should Many use to test the solutions? Why?
104. Can you suggest various substances that can be used to write a message on a white sheet and what might be in the spray bottle? List various possible combinations and writing colours.

VII. Answer the following questions in three-four sentences each: (Brief Answer – 3 Marks)

105. Write the differences between natural and man-made indicators.
106. Define neutralization reaction and give an example.
107. Explain the colour changes of phenolphthalein indicator.
108. Why do you take an antacid tablet when suffering from acidity?
109. Why is calamine solution applied to the skin when an ant bites?
110. Factory wastes must be neutralized before disposing of them. Why?

VIII. Answer the following questions in four-five sentences each: (Short Essay – 4 Marks)

111. Write the differences between acids and bases.
112. Explain acids and bases with examples of their use in the body or in daily household routines.
113. State the purpose and daily uses of salts.
114. Explain an activity regarding natural indicators.
115. Explain the process of formation of salts and their uses.
116. Explain the neutralization applications of these substances in daily life:
 - a. Toothpaste
 - b. Ant bite treatment
117. Observe the image given below containing solutions A, B, C, D. State what colour change occurs when red litmus paper is dipped in the following solutions and explain the nature of the solution:



Milk in water

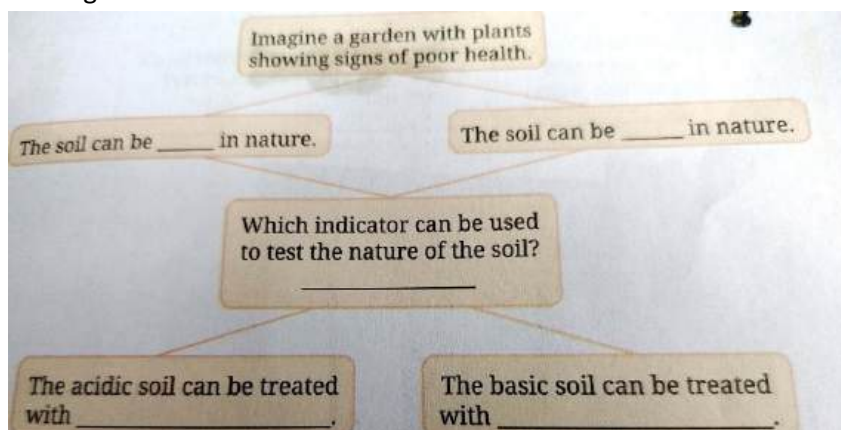
Baking powder in water

Vinegar in water

Glucose in water

IX. Answer the following questions: Five Marks Questions (Long Answer – 5 Marks)

118. Explain the uses and harmful effects of acids, bases, and salts.
119. Write an equation for a neutralization reaction and explain it.
120. Briefly explain "Acids, Bases, and Indicators".
121. Observe and analyze the information given in the following table and fill in the missing information.



122. Grape juice is mixed with red rose extract. This mixture obtained a red shade. What happens if baking soda is added to this mixture? Justify your answer.
123. You are provided with three liquids. One is vinegar, another is baking soda solution, and the third is a sugar solution. Can you identify them using only turmeric paper? Explain.

Chapter 3: Electricity: Circuits and Its Components

Learning Outcome: Identifies various components used in simple electric circuits such as bulb, cell, switch, and draws their circuit symbols/diagrams.

I. Choose and write the correct option from the four choices given for each of the following questions. (1 Mark)

1. The part that helps to easily identify the positive (+) and negative (-) terminals of an electric



cell is:

- (A) Metal cap (+) and Metal disc (-)
 - (B) Metal disc (+) and Metal cap (-)
 - (C) Plastic cover
 - (D) Wire connection
2. The thin wire inside a bulb that emits light is called:

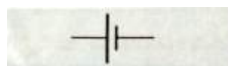


- (A) Connector
 - (B) Filament
 - (C) Terminal
 - (D) Switch
3. The metal commonly used to make the filament of a bulb is:
- (A) Copper
 - (B) Iron
 - (C) Tungsten
 - (D) Aluminium
4. In a simple electric circuit, electric current flows in this direction:
- (A) From negative terminal to positive terminal
 - (B) From positive terminal to negative terminal
 - (C) Can flow in any direction
 - (D) From positive terminal to positive terminal
5. When an electric circuit becomes a 'Closed Circuit', the bulb:
- (A) Does not glow
 - (B) Glows
 - (C) Gets fused
 - (D) Gives a shock
6. When the switch is in the 'OFF' position, the electric circuit is _____.
- (A) Closed / Complete
 - (B) Open / Incomplete
 - (C) Short-circuited
 - (D) Series circuit
7. The arrangement formed by connecting two or more electric cells in a row is called a:



- (A) Generator
 - (B) Motor
 - (C) Battery
 - (D) Fuse
8. While making a battery, electric cells should be connected like this:
- (A) Positive terminal of one to positive terminal of another
 - (B) Negative terminal of one to negative terminal of another
 - (C) Positive terminal of one to negative terminal of another
 - (D) Can be connected in any manner
9. Materials that allow electric current to pass through them are called:
- (A) Insulators
 - (B) Conductors
 - (C) Semiconductors
 - (D) Magnetic substances
10. Which of the following is an example of an electrical insulator?
- (A) Copper wire
 - (B) Iron nail
 - (C) Rubber
 - (D) Aluminium foil
11. Which of the following is an example of an electrical conductor?
- (A) Plastic scale
 - (B) Piece of wood
 - (C) Graphite (Pencil lead)
 - (D) Glass
12. In dry cells, electric energy is produced from:
- (A) Heat energy
 - (B) Chemical energy
 - (C) Mechanical energy
 - (D) Dense energy
13. The wire used in a tester tool is covered with plastic or rubber because:
- (A) To look beautiful
 - (B) To prevent electric shock (as an insulator)
 - (C) To prevent the wire from breaking
 - (D) To prevent the wire from getting heated
14. If a bulb is 'burnt' (fused), it means:
- (A) Its glass is broken
 - (B) Its filament is broken
 - (C) Its terminal is broken
 - (D) The energy in the cell is exhausted

15. In circuit diagrams, the long line in the symbol of an electric cell represents:



- (A) Negative terminal
- (B) Positive terminal
- (C) Switch
- (D) Wire

16. The main function of a 'switch' in an electric circuit is to:

- (A) Produce electricity
- (B) Complete or break the circuit
- (C) Increase the amount of light
- (D) Charge the battery

17. The human body is a good _____ of electricity.

- (A) Insulator
- (B) Conductor
- (C) Resistor
- (D) None of these

II. Fill in the blanks with the correct answers. (1 Mark)

18. The continuous closed path provided for the flow of electric current is called an electric _____.

19. Materials that allow electricity to flow through a wire are called _____ of electricity.

20. Electric wires have a covering of _____ or rubber for safety.

21. The metal cap of an electric cell is its _____ terminal.

22. The metal disc of an electric cell is its _____ terminal.

23. The thin wire that emits light in a bulb is called _____.

24. The metal commonly used to make the filament of a bulb is _____.

25. In an electric circuit, electric current always flows from the _____ terminal to the _____ terminal of the cell.

26. The combination of two or more electric cells is called a _____.

27. While making a battery, the positive terminal of one cell should be connected to the _____ terminal of another cell.

28. A simple device used to complete or break the flow of current in a circuit is _____.

29. When the switch is in the 'ON' position, the electric circuit is _____.

30. When the switch is in the 'OFF' position, the electric circuit is _____.

31. Materials that allow electric current to pass through them are called _____ of electricity.

32. Materials that do not allow electric current to pass through them are called _____ of electricity.

33. The _____ energy stored in an electric cell gets converted into electrical energy.

34. If the filament of a bulb is broken, that bulb is called a _____ bulb.

35. In electric circuit symbols, the long and thin line represents the _____ terminal.

36. In electric circuit symbols, the thick and short line represents the _____ terminal.

37. Pencil lead (graphite) is a good _____ of electricity.

38. Plastic, rubber, and wood are examples of electrical _____.
39. Our human body is a good _____ of electricity.
40. Plastic coating is provided on top of electric wires because plastic is an electrical _____.

III. Based on the relationship in the first pair, fill in the blank with a suitable answer: (1 Mark)

41. Metal cap : Positive terminal :: Metal disc : _____
42. Copper wire : Conductor :: Rubber band : _____
43. Switch ON : Closed circuit :: Switch OFF : _____
44. Single electric cell : Cell :: Combination of two or more cells : _____
45. Light-emitting part of bulb : Filament :: Part controlling electric flow : _____
46. Long thin line : Positive terminal :: Short thick line : _____
47. Plastic scale : Insulator :: Graphite (Pencil lead) : _____
48. Normal bulb : Light glows :: Burnt (fused) bulb : _____

IV. Match the following: (1 Mark)

49.

Group 'A'	Group 'B'
1. Electric Cell	(A) Gives light
2. Electric Bulb	(B) Electrical insulator
3. Plastic	(C) Source of electrical energy

50. Components of an electric circuit and their symbols/roles:

List 'A'	List 'B'
1. Electric Cell	A) Helps to start or stop the flow of electricity
2. Battery	B) Source of electrical energy in a circuit
3. Switch	C) Gives light when electric current flows
4. Bulb	D) Combination of more than one electric cell

51. Electrical appliances and their parts:

List 'A'	List 'B'
1. Metal cap	A) Example of an insulator
2. Filament	B) Negative terminal (-) of an electric cell
3. Metal disc	C) Positive terminal (+) of an electric cell
4. Plastic coating	D) Light-emitting tungsten wire in a bulb

52. Electrical Conductivity of materials:

List 'A'	List 'B'
1. Copper wire	A) Human body (Conductor)
2. Rubber / Wood	B) Insulator that stops electric flow
3. Pencil lead (Graphite)	C) Metallic conductor
4. Electric shock	D) Non-metal yet a conductor

53. Circuit states and their effects:

List 'A'	List 'B'
1. Closed Circuit	A) Filament broken and current does not flow
2. Open Circuit	B) From positive terminal to negative terminal
3. Burnt (Fused) bulb	C) Circuit completes and bulb glows
4. Direction of electric current	D) Circuit incomplete and bulb does not glow

V. Answer the following questions in one sentence each: (1 Mark)

54. What is an electric cell?
55. What is a battery?
56. What is meant by the 'filament' of a bulb in an electric circuit?
57. Which metal is used to make the filament of a bulb?
58. What are electrical conductors? Give an example.
59. What are electrical insulators? Give an example.
60. What is a 'Closed Circuit'?
61. What is an 'Open Circuit'?
62. What is the direction of electric current in a simple electric circuit?
63. What is the main function of a 'switch' in an electric circuit?
64. What does it mean if a bulb is fused (burnt)?
65. Is pencil lead (graphite) a conductor or an insulator of electricity?
66. Why are electric wires covered with plastic?
67. What is an electric tester used for?
68. In what form is energy stored in a dry cell?

VI. Answer the following questions in two sentences each. (2 Marks Questions)

69. Explain the structure of an electric cell and its two terminals.
70. Write two major differences between electrical conductors and electrical insulators.
71. State the difference between a closed circuit and an open circuit.
72. What causes an electric bulb to fuse? Why does a fused bulb not glow?
73. What is a battery? What precaution should be taken while connecting electric cells to make a battery?

74. Why is a plastic or rubber coating used while using electrical appliances and wires?
75. State the construction and use of a simple electric tester.
76. Why should we not touch electric switches or appliances with wet hands?

VII. Answer the following questions in three sentences each: (3 Marks)

77. How would you determine whether an object is a conductor or an insulator using a conduction tester?

78. **Diagram-based Question:** Draw diagrams of an electric cell and a bulb, and label the parts.

- a. Name the main parts of an electric cell and its terminals.
- b. Name the major parts of an electric bulb and state the role of the filament.

79. **Circuit Analysis:** Closed Circuit and Open Circuit.

With neat labelled diagram descriptions, compare the flow of electric current and the status of the bulb in closed and open circuits.

80. **Experiment-based Question:** Testing the electrical conductivity of an object.

Explain step-by-step an experiment to find out whether an object is a conductor or an insulator using a simple electric tester.

81. **Electric Symbols and Circuit Diagram:**

Draw standard symbols used for the following electrical components, and using them, explain the diagram of a simple electric circuit in the switch 'ON' state:

- i. Electric cell
- ii. Electric bulb
- iii. Switch (ON state)

82. **Battery Connection and Troubleshooting:**

Suraj made a battery using two electric cells, but the bulb is not glowing.

- (A) State 2 major reasons for this issue.
- (B) Explain the correct method of connecting the cells.

VIII. Answer the following questions in four to five sentences each: (4 / 5 Marks)

83. Draw a labeled diagram of a closed electric circuit consisting of an electric cell, bulb, switch, and connecting wires.

84. **Comprehensive Analysis of Circuit Components:**

- (A) Name the 4 major components required to construct a simple electric circuit and explain the function of each. (4 Marks)
- (B) State the importance of the plastic coating on electric wires. (1 Mark)

85. **Thoughtful Scenario - Electrical Safety and Experimentation:**

Raju assembled an electric circuit in the school laboratory. But even after turning the switch 'ON', the bulb is not glowing.

- a. List 4 different possible reasons for this problem. (2 Marks)
- b. How can he check and rectify these faults one by one? (2 Marks)
- c. Write 2 important safety rules to be followed while working with electrical appliances at home. (1 Mark)

86. (A) What are electrical conductors and electrical insulators? Give two examples for each. (2 Marks)

(B) Classify the following objects into conductors and insulators:

(Iron nail, Rubber eraser, Copper coin, Glass bangle, Pencil lead (graphite), Piece of dry wood)
(3 Marks)

87. Circuit Design and Series Connection:

- (A) What is a 'battery'? Explain with/without diagrams the correct and incorrect methods of making a battery using two electric cells. (3 Marks)
- (B) How does energy transformation take place in a dry cell? (1 Mark)
- (C) Briefly explain how a flashlight (torch) works. (1 Mark)

Chapter 4: World of Metals and Non-Metals

Learning Outcome: Classifies various substances used in daily life as acidic, basic (alkaline), neutral, metals, and non-metals based on their physical and chemical properties. Lists the differences between each of them. Identifies the nature of solutions through experiments using natural and synthetic indicators.

I. Fill in the blanks: (1 Mark)

1. Copper, which is used to make cooking utensils, is a good _____ of heat.
2. When a magnesium ribbon is burnt in air, _____ is formed.
3. Iron reacts with moisture and oxygen to form _____.
4. The metal with the highest ductility is -----.
5. Substances that allow electricity to flow through them are called -----.
6. The gradual wearing away of metal surfaces due to air, water, or other substances is called -----.
7. The formation of a reddish-brown deposit on iron due to moist air is called -----.
8. The burning of a magnesium ribbon to form magnesium oxide is a ----- change.
9. Phosphorus is a very highly ----- non-metal.
10. Metals react with acids to liberate ----- gas.
11. The non-metal used by living organisms during respiration is -----.
12. A metal that is soft enough to be cut with a knife is -----.
13. An alloy used in space technology is -----.

I. Four options are given for each of the following questions. Choose and write the correct one: (1 Mark)

14. Metals possess the following properties:
i) Lustre
ii) Malleability and Ductility
iii) Thermal conductivity
iv) Insulating nature
A. Only i
B. i and ii
C. All i, ii, iii, iv
D. Only i, ii, iii
15. Among the following metals, the one that does not undergo malleability is:
A. Gold
B. Copper
C. Sodium
D. Silver
16. The metal found in a liquid state is:

- A. Copper
 - B. Iron
 - C. Mercury
 - D. Aluminium
17. We have seen a thin layer or foil on sweets. Which metal is this layer made of?
- A. Aluminium
 - B. Silver foil
 - C. Iron foil
 - D. Copper foil
18. The property of drawing materials into thin wires is called:
- A. Malleability
 - B. Ductility
 - C. Sonority
 - D. Corrosion
19. The gas produced when sulphur is burnt in air is:
- A. Sulphur dioxide
 - B. Sulphur trioxide
 - C. Hydrogen sulphide
 - D. Sulphuric acid
20. The non-metal stored in water is:
- A. Sodium
 - B. Potassium
 - C. Sulphur
 - D. Phosphorus
21. The metal stored in kerosene is:
- A. Sodium
 - B. Potassium
 - C. Phosphorus
 - D. Sulphur
22. Since it is cheap and its thin sheets can be folded into any shape, this metal is used as a packaging material for food:
- A. Aluminium
 - B. Copper
 - C. Iron
 - D. Gold
23. Non-metals react with oxygen to form oxides. The nature of these oxides is:
- A. Acidic
 - B. Basic
 - C. Neutral
 - D. None of these
24. When iron is left in the open for a few days, a reddish-brown powder forms on its surface under which of the following conditions?
- A. When in contact with dry air
 - B. When in contact with water
 - C. When in contact with both air and water

- D. When in contact with acid
25. A metal that flattens upon being struck with a hammer is:
- A. Piece of coal
 - B. Iron nail
 - C. Piece of wood
 - D. Sulphur lump
26. Among the following, this metal catches fire when it comes in contact with water:
- A. Copper
 - B. Aluminium
 - C. Zinc
 - D. Sodium
27. Among the following, this statement is correct:
- A. All metals are malleable.
 - B. All metals are ductile.
 - C. Generally, some metals are malleable.
 - D. Some non-metals are malleable.
28. Reasons for using aluminium in manufacturing cooking utensils are:
- i) Good thermal conductivity
 - ii) Ductility
 - iii) High melting point
 - iv) Good electrical conductivity
- Which of these are correct?
- A. i and ii
 - B. i and iii
 - C. i and iv
 - D. All i, ii, iii, iv
29. Method(s) that can be used to prevent corrosion:
- A. By applying paint
 - B. By applying oil/grease
 - C. By using rust-preventive oil
 - D. All of the above
30. This property of metals is used to make strings of musical instruments like the sitar and violin, as well as bells:
- A. Sonorous property
 - B. Malleability
 - C. Ductility
 - D. Conductivity
31. To protect iron from rusting during galvanization, a thin layer of the following metal is coated over it:
- A. Gallium
 - B. Aluminium
 - C. Zinc
 - D. Silver

32. The non-metal that conducts electricity is:
 A. Diamond
 B. Sulphur
 C. Graphite
 D. Phosphorus
33. The most abundant metal found in the Earth's crust is:
 A. Iron
 B. Calcium
 C. Aluminium
 D. Sodium
34. An example of a non-metal among the following is:
 (A) Iron
 (B) Sulphur
 (C) Copper
 (D) Magnesium
35. The process of coating a thin layer of zinc onto iron objects is:
 (A) Combustion
 (B) Galvanization
 (C) Erosion / Corrosion
 (D) Neutralization

III. State whether the following statements are True or False: (1 Mark)

36. Non-metals react with acids.
 37. Sodium is a highly reactive metal.
 38. Sulphur oxide possesses acidic nature.
 39. Coal can be drawn into thin wires.
 40. A coin possesses the property of sonority.
 41. The handle of a screwdriver is made of iron. Magnesium oxide shows no change on red litmus paper.
 42. Aluminium and copper are examples of non-metals used to make utensils and statues.
 43. Metals combine with oxygen to form oxides whose solution turns blue litmus paper red.
 44. Copper vessels are used to boil water because they are good conductors of electricity.

IV. Match the following: (1 Mark)

45.

Column 'A'	Column 'B'
1. Magnesium ribbon	(A) Non-metal
2. Coal	(B) Anti-rust coating
3. Zinc	(C) Burns with a dazzling white light

46.

Column 1	Column 2
1. Used in electrical wiring	i. Oxygen
2. Has high malleability and ductility	ii. Chlorine
3. Living organisms cannot survive without this	iii. Copper
4. Plants grow luxuriously when fertilizers containing this element are added to soil	iv. Nitrogen
5. Used in water purification	v. Gold

47.

Column 1	Column 2
1. Gold	i. Thermometer
2. Iron	ii. Electric wire
3. Aluminium	iii. Jewellery
4. Carbon	iv. Food packaging
5. Copper	v. Tools / Implements
6. Mercury	vi. Fuel

V. Identify the relationship in the first pair and fill in the blank: (1 Mark)

48. Iron : Metal :: Sulphur : _____.

49. Copper : Good conductor of heat :: Wood : _____ conductor.

VI. Answer the following questions in one sentence each: (1 Mark)

50. What is rust chemically?

51. What are thermal conductors?

52. Name two metals.

53. Name two non-metals.

54. Name a non-metal that is a good conductor of electricity.

55. Which gas is generally produced when a metal reacts with an acid?

56. Name a non-metal that possesses lustre.

57. Why is phosphorus stored in water?

58. Name two metals that do not react with oxygen even at high temperatures.

59. What happens when a metal reacts with oxygen?

60. Which non-metal is used as an antiseptic?

61. Which non-metal is present in lipids and proteins?

62. Which was the first metal discovered by humans?

63. Name the constituent metals present in steel.
64. What is an electrical conductor?
65. What are electrical insulators?

VII. Give suitable reasons for the following:

66. Why are only certain metals suitable for making jewellery?
67. Sodium and potassium are stored in kerosene. Why?
68. Handles of cooking utensils are made of wood or rubber. Why?
69. Bells are made of metals. Why?
70. Silica gel packets are kept in shoe boxes. Why?
71. Ropes made of steel wires can withstand heavy loads. Why?

VII. Answer the following questions in two sentences each: (2 Marks)

72. Why are the handles of cooking utensils made of wood or plastic?
73. Will an iron nail rust if it is kept immersed in oil? Give reason.
74. State the differences between the physical properties of metals and non-metals.
75. Classify the following into metals and non-metals:

Copper, Iron, Graphite, Sulphur, Aluminium, Oxygen, Nitrogen.

76. What happens when a magnesium ribbon is burnt in air?



77. Explain the term 'malleability' with a suitable example.
78. Explain the term 'ductility' with a suitable example.
79. What is galvanization? For what purpose is it used?
80. What are elements? What is the number of elements found in nature?
81. You are given the following substances. Which substance will you choose to make a container most suitable for boiling water? Why?

Iron, Copper, Sulphur, Coal, Plastic, Wood, Cardboard.

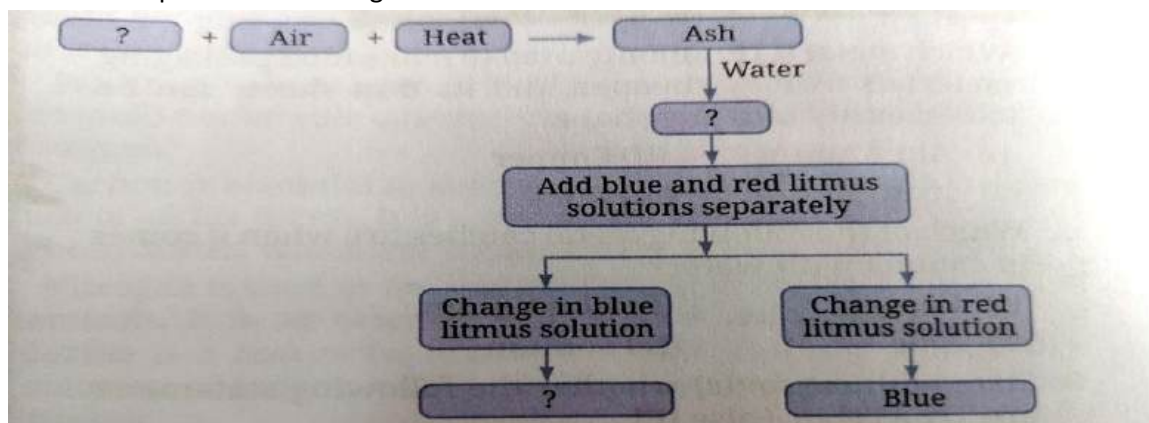
82. You are given three iron nails immersed in oil, water, and vinegar respectively. Which iron nail will not rust and why?
83. What is corrosion? Which metal has the highest susceptibility to corrosion?
84. What is rusting?
85. What is an alloy? What are the constituent metals present in the alloy called steel?

VIII. Answer the following questions in three sentences each: (3 Marks)

86. Describe the experiment of burning a magnesium ribbon and write its chemical equation.
87. List the physical and chemical differences between metals and non-metals.
88. What happens when oxygen reacts with magnesium and sulphur? What are the key differences in the nature of the products formed?

VIII. Answer the following questions in four to five sentences each: (4 / 5 Marks)

89. Complete the following flow chart:



90. How do the different properties of metals and non-metals determine their uses in daily life?
91. A blacksmith heats iron before making tools. Why is it necessary to heat iron in this process?
92. Explain through an activity that metals conduct electricity well.
93. Name the metals and non-metals found in smartphones and explain how they help the phone function properly.
94. What are good conductors of electricity and poor conductors of electricity? Write two examples for each.
95. State the methods that can be used to prevent rusting.

Chapter 5: Changes Around Us; Physical and Chemical

Learning Outcomes: Analyses the changes occurring around them as physical and chemical changes and understands their causes.

I. Four options are given for each of the following questions. Choose and write the correct one: (1 Mark)

- Which of the following is an appropriate example of a physical change?
(A) Curdling of milk
(B) Melting of ice into water
(C) Burning of paper
(D) Rusting of iron
- The main characteristic of a physical change is:
(A) An entirely new substance is formed
(B) It is a permanent change
(C) The chemical composition of the substance does not change
(D) It can never be reversed
- Which of the following is a chemical change?
(A) Heating water to form steam
(B) Dissolving sugar in water
(C) Digestion of food
(D) Melting of wax

4. The chemical name of the ash obtained when a magnesium ribbon is burnt in air is:
(A) Magnesium sulphate
(B) Magnesium oxide
(C) Magnesium carbonate
(D) Magnesium hydroxide
5. The nature of the solution obtained when magnesium oxide is dissolved in water is:
(A) Acidic
(B) Basic
(C) Neutral
(D) Saline
6. When an iron nail is placed in a copper sulphate (Blue Vitriol) solution, the colour of the solution changes from blue to:
(A) Red
(B) Yellow
(C) Green
(D) White
7. When an iron nail is placed in a copper sulphate solution, a brown deposit forms on the nail. This layer is:
(A) Iron oxide
(B) Copper
(C) Zinc
(D) Sulphur
8. When carbon dioxide gas is passed through lime water, the lime water turns milky white due to the formation of:
(A) Calcium carbonate
(B) Calcium hydroxide
(C) Calcium sulphate
(D) Carbonic acid
9. The essential factors required for the rusting of iron are:
(A) Oxygen only
(B) Water / Moisture only
(C) Both oxygen and water (moisture)
(D) Carbon dioxide and nitrogen
10. The process of depositing a layer of zinc or chromium metal on iron to prevent it from rusting is called:
(A) Crystallisation
(B) Galvanisation
(C) Hydrolysis
(D) Neutralisation
11. A cut apple slice turning brown when exposed to air for a short time is this type of change:
(A) Physical change
(B) Chemical change
(C) Reversible change
(D) Temporary change

12. The process of obtaining pure crystals from a saturated solution of a substance (Crystallisation) is this type of change:
- (A) Chemical change
 - (B) Physical change
 - (C) Biological change
 - (D) Permanent change
13. Burning of firecrackers is a chemical change because this process releases:
- (A) Heat and light
 - (B) Sound
 - (C) Gases and unpleasant odour
 - (D) All of the above
14. The chemical name of iron rust is:
- (A) Ferrous sulphate
 - (B) Hydrated Iron Oxide
 - (C) Iron carbonate
 - (D) Ferrous chloride
15. An example of a reversible change among the following is:
- (A) Burning of a candle
 - (B) Making (folding) a paper boat
 - (C) Cutting a log of wood
 - (D) Ripening of fruits
16. The process of photosynthesis is a _____ change.
- (A) Physical
 - (B) Chemical
 - (C) Mechanical
 - (D) No change
17. The absorption of harmful ultraviolet (UV) radiation by the atmospheric ozone layer and its conversion into oxygen is this type of change:
- (A) Physical change
 - (B) Chemical change
 - (C) Nuclear change
 - (D) Natural physical change
18. Which of the following is a chemical change?
- (A) Melting of ice
 - (B) Tearing of paper
 - (C) Burning of magnesium ribbon
 - (D) Weathering/Erosion of rocks
19. Which natural process causes the accumulation of sand in riverbeds?
- (A) Combustion
 - (B) Erosion (Soil erosion)
 - (C) Neutralisation
 - (D) Galvanisation

II. Fill in the blanks: (1 Mark)

20. A change in the shape, size, or state of a substance is called a _____ change.
21. A chemical change always produces one or more _____ substances.

22. The erosion of rocks due to the continuous flow of river water is an example of a _____ change.
23. Properties such as shape, size, colour, and state of a substance are called its _____ properties.
24. A change in which no new substance is formed is called a _____ change.
25. A change in which one or more new substances are formed is called a _____ change.
26. The chemical name of the ash formed when a magnesium ribbon burns in air is _____.
27. When magnesium oxide is dissolved in water, _____ is produced.
28. When an iron nail is placed in a copper sulphate solution, the green-coloured solution formed is coloured _____.
29. The white precipitate formed when carbon dioxide (CO₂) gas is passed through lime water is _____.
30. The chemical formula / name of lime water is _____.
31. The two essential factors required for iron to rust are _____ and _____.
32. The process of applying a thin layer of zinc on iron is called _____.
33. The process of separating salt from seawater and pure crystals from a solution is called _____.
34. Melting of ice into water is an example of a _____ change.
35. Ripening of fruits and digestion of food are examples of _____ changes.
36. A cut slice of apple turning brown when exposed to air is a _____ change.
37. When lemon juice is added to baking soda, the bubbles produced are due to the release of _____ gas.
38. Crystallisation is a _____ change.
39. The ozone layer in the atmosphere absorbs harmful _____ radiation from the sun.
40. While tearing paper is a physical change, burning paper is a _____ change.

III. Fill in the blanks based on the relationship in the original pair: (1 Mark)

41. Melting of ice : Physical change :: Curdling of milk : _____
42. Magnesium oxide + Water : Magnesium hydroxide :: Carbon dioxide + Lime water : _____
43. Tearing paper : Irreversible physical change :: Folding paper : _____
44. Copper sulphate solution : Blue colour :: Ferrous sulphate solution : _____
45. Coating zinc on iron : Galvanisation :: Obtaining pure crystals from solution : _____
46. Burning paper : Chemical change :: Making a paper boat : _____
47. Magnesium hydroxide : Base :: Carbonic acid : _____
48. Digestion of food : Chemical change :: Evaporation of water : _____

IV. Match the following: (1 Mark)

49.

Group 'A'	Group 'B'
1. Water turning into ice	(A) Production of new substance
2. Chemical change	(B) Natural physical change
3. Smoothing of rough river stones	(C) Physical change

50. Types of changes and examples

List 'A'	List 'B'
1. Melting of ice	A) Chemical change (evolution of gas)
2. Rusting of iron	B) Reversible physical change
3. Baking soda + Lemon juice	C) Irreversible physical change
4. Cutting a log of wood	D) Permanent chemical change forming new substance

51. Chemical combinations and their effects

List 'A'	List 'B'
1. Magnesium + Oxygen	A) Calcium carbonate (milky white)
2. Magnesium oxide + Water	B) Green-coloured ferrous sulphate
3. Carbon dioxide + Lime water	C) Magnesium oxide (ash)
4. Copper sulphate + Iron	D) Magnesium hydroxide (base)

52. Processes and their purpose/description

List 'A'	List 'B'
1. Galvanisation	A) Blocking harmful atmospheric UV rays
2. Crystallisation	B) Keeping in water to prevent browning
3. Ozone layer	C) Zinc coating to prevent iron from rusting
4. Cut apple slice	D) Obtaining pure physical crystals from a solution

V. Answer the following questions in one sentence each: (1 Mark)

53. What are physical properties?

54. What is a physical change?
55. Define a chemical change.
56. Write the main chemical equation for the rusting of iron.
57. What is galvanisation?
58. Which product is obtained when magnesium oxide is dissolved in water?
59. Which white chemical compound is formed when carbon dioxide is passed through lime water?
60. What is the colour change observed in the solution when an iron nail is added to a copper sulphate solution?
61. What is crystallisation?
62. Why does a cut apple turn brown when left exposed to air for a short time?
63. Why do iron objects rust faster in coastal areas?
64. From which harmful rays coming from the sun does the ozone layer protect the Earth?
65. Which gas is released when baking soda and lemon juice are mixed?
66. Give a single daily-life example of a chemical change.
67. What type of change is tearing a paper?

VI. Answer the following questions in one sentence each: (1 Mark)

68. When change is called a physical change?
69. Write two characteristics of a chemical change.

VII. Answer the following questions in two sentences each: (2 Marks)

70. Write 2 main differences between physical changes and chemical changes.
71. What are the two major conditions/factors required for iron to rust?
72. What is galvanisation? What is its main use?
73. Write the chemical equation for the reaction that occurs when a magnesium ribbon is burnt in air.
74. Lime water turns milky white when carbon dioxide is passed through it. Why? Give reason.
75. Mention 2 main changes that occur when an iron nail is placed in a copper sulphate solution.
76. A cut apple slice turns brown when left in the air. Which type of change is this and why?
77. What is crystallisation? Is it a physical change or a chemical change?
78. List 2 indications/effects that can occur during a chemical change.
79. Are tearing paper and burning paper the same type of changes? Justify your answer.
80. Write the reaction between baking soda and lemon juice using a word equation.
81. Why do iron objects rust faster in coastal areas than in desert areas?

VIII. Answer the following questions in three sentences each:

82. Experiment-based Question: Burning of Magnesium Ribbon

- (A) Explain the reaction that occurs when a magnesium ribbon is burnt in air and write the equation.
- (B) What do you observe when the ash obtained after burning is dissolved in water and tested with red litmus paper? State the reason.

83. Diagram/Experiment-based Question: Reaction of Copper Sulphate and Iron

Explain the experiment of placing an iron nail in a copper sulphate solution. Write two clear changes observed in this reaction.

84. Gas Test:

- a. When baking soda and lemon juice are mixed, a gas comes out with effervescence (bubbles).
- b. Which gas is this?

c. What happens when this gas is passed through lime water? Explain with a suitable chemical equation.

85. Rusting and Prevention:

(A) What is rusting of iron?

(B) Explain any 2 useful methods used to prevent iron tools from rusting.

86. Crystallisation:

Explain step-by-step the procedure for preparing pure crystals of copper sulphate.

VIII. Answer the following questions in four to five sentences each: (4 Marks)

87. (A) How does the process of 'rusting' lead to the rapid damage of iron bridges and ships?

Explain with an equation. (2 Marks)

(B) Why is protecting ships from rust more challenging since they are constantly in water? (1 Mark)

(C) How can rust be prevented by converting iron into stainless steel? (1 Mark)

88. Experiment and Analytical Question:

a. Write the experiment of lime water turning milky white with a suitable diagram/explanation.

b. Explain the materials used and the steps involved in this experiment. (2 Marks)

c. Write the word equations for the chemical reactions taking place. (1 Mark)

d. Why is this experiment used as a standard test to identify carbon dioxide gas? (1 Mark)

89. Thoughtful Comparison and Contextual Analysis (HOTS):

Study the following scenarios, determine which type of change (physical/chemical) each one is, and justify: (4 Marks)

i. Melting of a candle and burning of a candle.

ii. Cutting a log of wood into small pieces and burning wood.

iii. Photosynthesis process.

iv. Separating copper sulfate crystals from a solution (crystallisation).

90. Difference and Process-based Question:

(A) List 3 main differences between physical and chemical changes. (3 Marks)

(B) "The ozone layer in the atmosphere is an example of a natural chemical change." — Briefly justify this statement. (1 Mark)

91. Chemical Changes:

a. Define a chemical change. (1 Mark)

b. Mention any 3 different characteristics/effects that may be observed during a chemical change along with the formation of a new substance. (3 Marks)

c. "Burning firecrackers is a dangerous chemical change" — Why? (1 Mark)

92. Diagram and Experiment Analysis - Lime Water and Carbon Dioxide:

a. Explain the steps of the experiment of passing carbon dioxide into lime water. (2 Marks)

b. Write the word equations for the two-stage chemical reactions taking place in this experiment. (2 Marks)

c. Name the substance responsible for turning lime water milky white. (1 Mark)

93. Rusting:

a. (A) Explain the conditions required for the process of iron rusting along with a chemical equation. (2 Marks)

b. (B) What causes ships in coastal areas to rust rapidly? (1.5 Marks)

c. (C) How do galvanisation and stainless steel help protect iron objects from rust? (1.5 Marks)

94. Experiment and Conceptual Comparison - Magnesium and Copper Sulfate:

- a. (A) What product is obtained when the ash from burning a magnesium ribbon is dissolved in water? How do you test its acidic/basic nature? (2.5 Marks)
- b. (B) What is the reason for the colour change and the change on the iron nail when it is placed in a copper sulphate solution? Explain with an equation. (2.5 Marks)
95. Why is the erosion of rocks caused by landslides or river water called a physical change? Explain.

Exercise Questions and Answers

1. Classify the changes involved in the following processes as physical or chemical changes:

- (a) Photosynthesis
(B) Dissolving sugar in water
(C) Burning of wood
(d) Melting of wax
(E) Beating aluminium to make aluminium foil
(f) Digestion of food

Answer:

- (a) Photosynthesis: **Chemical change**
(B) Dissolving sugar in water: **Physical change**
(C) Burning of wood: **Chemical change**
(d) Melting of wax: **Physical change**
(E) Beating aluminium to make aluminium foil: **Physical change**
(f) Digestion of food: **Chemical change**

2. State whether the following statements are True or False. If a statement is false, write the corrected statement in your notebook:

- (a) Cutting a log of wood into pieces is a chemical change.

Answer: False.

Corrected Statement: Cutting a log of wood into pieces is a physical change.

- (B) Formation of manure from leaves is a physical change.

Answer: False.

Corrected Statement: Formation of manure from leaves is a chemical change.

- (C) Iron pipes coated with zinc do not get rusted easily.

Answer: True.

- (d) Iron and rust are the same substance.

Answer: False.

Corrected Statement: Iron and rust (iron oxide) are two different substances.

- (E) Condensation of steam is not a chemical change.

Answer: True.

3. Fill in the blanks in the following statements:

- (a) When carbon dioxide is passed through lime water, it turns milky due to the formation of _____.
- (B) The chemical name of baking soda is _____.
- (C) Two methods by which rusting of iron can be prevented are _____ and _____.

(d) Changes in which only _____ properties of a substance change are called physical changes.

(E) Changes in which new substances are formed are called _____ changes.

Answers:

(a) Calcium carbonate

(B) Sodium hydrogen carbonate (Sodium bicarbonate)

(C) Painting and Galvanisation

(d) Physical

(E) Chemical

4. **When baking soda is mixed with lemon juice, bubbles are formed with the evolution of a gas. What type of change is this? Explain.**

Answer: This is a **chemical change**.

Explanation: When citric acid present in lemon juice reacts with baking soda (sodium hydrogen carbonate), carbon dioxide gas and other new products are formed. Since a new substance is formed, it is a chemical change.

5. **When a candle burns, both physical and chemical changes take place. Identify these changes. Give another familiar example in which both physical and chemical changes take place.**

Answer:

When a candle burns:

- **Physical Change:** Solid wax melts into liquid wax due to heat (change of state, no new substance is formed).
- **Chemical Change:** Wax burns in the presence of oxygen producing light, heat, carbon dioxide, and water vapor (new substances are formed).

Another Example: Cooking / Eating food

i) Cutting and chewing food = **Physical change**

ii) Cooking food with heat and digestion of food in the digestive system = **Chemical change**

6. **How would you show that setting of milk into curd is a chemical change?**

Answer: Setting of milk into curd is a chemical change because:

- i. When curdling agent is added to milk, a new substance with entirely different properties called lactic acid (curd) is formed due to the chemical action of *Lactobacillus* bacteria.
- ii. The taste and chemical composition of milk change.
- iii. Curd cannot be reversed back into milk by any physical method (it is a permanent change).

7. **Explain why burning of wood and cutting it into small pieces are considered as two different types of changes.**

Answer:

- **Cutting wood into pieces (Physical Change):** When wood is cut, only its size and shape change. No new chemical substance is produced.
 - **Burning wood (Chemical Change):** When wood burns in air, entirely new substances like ash, carbon dioxide gas, heat, and smoke are produced.
- Therefore, these two are considered different types of changes.

8. **Describe how crystals of copper sulphate are prepared.**

Answer: Copper sulphate crystals are prepared by the method of **crystallisation**:

- i. Take a cup of water in a beaker, add a few drops of dilute sulphuric acid, and heat it.
- ii. When water starts boiling, add copper sulphate powder slowly while stirring continuously.

- iii. Continue adding copper sulphate powder until no more powder can be dissolved (saturated solution).
 - iv. Filter the solution through filter paper and allow it to cool undisturbed.
 - v. After a few hours, observe pure blue crystals of copper sulphate formed in the solution.
9. **Explain how painting an iron gate prevents it from rusting.**
Answer: Rusting of iron requires both oxygen (air) and moisture (water). When an iron gate is painted, the layer of paint acts as a protective shield between the iron and air/moisture. This prevents direct contact of iron with air and water, thereby preventing the gate from rusting.
10. **Explain why rusting of iron objects is faster in coastal areas than in desert areas.**
Answer:
- **Coastal Areas:** The air near sea shores contains a very high amount of moisture (water vapor) and salt. Saline water increases the rate of the chemical reaction of rusting.
 - **Desert Areas:** The air here is very dry and the moisture content is extremely low. Therefore, iron objects rust much faster in coastal areas than in desert areas.
11. **The gas we use in the kitchen is called Liquefied Petroleum Gas (LPG). In the cylinder, it exists as a liquid. When it comes out from the cylinder, it becomes a gas (Process-A) then it burns (Process-B). Choose the correct statement regarding these:**
- (i) Process-A is a chemical change.
 - (ii) Process-B is a chemical change.
 - (iii) Both Process-A and Process-B are chemical changes.
 - (iv) None of these is a chemical change.
- Answer: (ii) Process-B is a chemical change.** (Reason: Coming out of the cylinder is a change of physical state (A), but combustion upon burning is a chemical change (B)).
12. **Anaerobic bacteria digest animal waste and produce biogas (Process-A). The biogas is then burnt as fuel (Process-B). Choose the correct statement regarding these:**
- (i) Process-A is a chemical change.
 - (ii) Process-B is a chemical change.
 - (iii) Both Process-A and Process-B are chemical changes.
 - (iv) None of these is a chemical change.
- Answer: (iii) Both Process-A and Process-B are chemical changes.** (Reason: Both the conversion of waste into gas and the burning of gas to release energy produce new substances).

Chapter 6: Adolescence: A Stage of Growth and Change

Learning Outcome: Students will understand the physical and psychological changes that occur in the bodies of girls and boys during adolescence, as well as the significance of this phase.

I. Fill in the blanks with appropriate answers:- (1 Mark)

1. A plant's journey usually begins with a seed's _____
2. The stage at which plants gain the ability to produce seeds is _____
3. The stage of growth between the ages of 10 and 19 is _____
4. The swollen structure visible in the throat region is _____
5. The cause of pimples appearing on the face during adolescence is _____
6. The features that help to distinguish between a male and a female are _____

7. Normally, the duration of the menstrual cycle is _____
8. The phase of the menstrual cycle where blood is discharged from the body is _____
9. The age at which menstruation naturally stops in women is _____
10. The nutrients that help in blood production are _____
11. The nutrients that assist in bone growth are _____
12. The scientist who studied the structure of Vitamin B-12 is _____
13. The program undertaken by the Government of Karnataka to support menstrual hygiene is _____
14. The scheme implemented in Tamil Nadu and Odisha states to support menstrual hygiene is _____
15. Harassing others using digital devices is _____
16. Tobacco, gutkha, cigarette, beedi, and alcohol are _____
17. The scheme launched by the Government of India to prevent drug abuse is _____
18. The National Toll-Free Drug De-addiction Helpline number is _____
19. Plays a crucial role in controlling various aspects of growth and development _____
20. Characteristics influenced by hormones are mood and _____

II. Identify whether the following statements are True or False. (1 Mark)

21. Immediately after germination, a sapling gains the capacity to produce its own seeds.
22. The stages of human life's journey are infancy, childhood, adolescence, adulthood, and old age.
23. During adolescence, the body gets prepared for adulthood.
24. Adolescence is defined as the age group between 16 and 19 years.
25. An increase in height becomes more prominent during adolescence.
26. The growth of the voice box in adolescent boys leads to a cracked or changing voice.
27. Pimples block skin pores and eliminate infections.
28. Changes in height, voice, or facial hair occur at the exact same age for everyone.
29. The period of adolescence varies from person to person.
30. Secondary sexual characteristics are natural indicators that the body is preparing for adulthood.
31. An important internal change related to girls is the onset of the menstrual cycle.
32. The menstrual cycle naturally stops by the age of 35–40 years.
33. Menstruation is a natural process.
34. Adolescence does not involve emotional and behavioural changes.
35. Engaging in diverse activities reduces creativity.
36. The emotions of adolescents are more intense compared to those of children.
37. Adolescence is a period of growth and development, making nutritious food extremely essential.
38. Personal hygiene is not very important during adolescence.
39. Regular exercise and physical activities are also very important during adolescence.
40. Adolescents are not attracted toward their peers.
41. Cyberbullying aims for the well-being of others.
42. Becoming addicted to drugs means damaging our own health.
43. The first step in overcoming addiction is seeking help from family and friends.
44. Hormones are chemical substances produced in our body.

45. Hormones do not exert influence on mood and behaviour.

III. State whether the following statements are True or False. (1 Mark)

46. Menstruation is the bleeding that typically occurs every 28–30 days in adolescent girls.

47. The cracked voice in adolescent boys is caused by an enlarged voice box.

48. Secondary sexual characteristics are not natural signs of the body preparing for adulthood and do not mark the onset of puberty.

49. Since alcohol and drugs are addictive, we must say no to them.

50. Significant and unique physical, biological, and emotional changes are not observed during adolescence.

51. Our health and future are in our hands.

52. We must use internet networks responsibly for social well-being.

53. Regular exercise and physical activities are not very important during adolescence.

54. Along with nutrition, personal hygiene is also important during adolescence.

55. Increased secretion of oil from the skin during adolescence causes pimples.

IV. Match the following. (1 Mark)

56.

Column A	Column B
1. 10–19 years	i. Menstruation stops
2. 28–30 days	ii. Production of blood
3. 14446	iii. Adolescence
4. 45–55 years	iv. National Toll-Free De-addiction Helpline
5. Iron	v. Menstrual cycle duration

57.

Column A	Column B
1. Calcium	i. Sanitary pad
2. Protein	ii. Dorothy Hodgkin
3. Hormones	iii. Growth
4. Vitamin B-12	iv. Bone development
5. Physical health	v. Chemicals

58.

Column A	Column B
1. Karnataka	i. Menstrual Hygiene Scheme (MHS)
2. Tamil Nadu	ii. Rashtriya Kishor Swasthya Karyakram (RKSK)
3. MHS	iii. Suvidha Hygiene Napkin Initiative
4. RKSK	iv. Shuchi Scheme
5. Biodegradable	v. Sanitary Napkin Scheme

V. Four alternatives are given for each of the following questions. Choose and write the correct one. (1 Mark)

59. A stage in human life's journey:

1. Infancy
2. Adolescence
3. Adulthood
4. All of the above

60. Height during adolescence:

1. Increases
2. Decreases
3. Remains the same
4. None of the above

61. Characteristics observed in adolescent boys:

1. Increase in height
2. Increase in weight
3. Broadening of the chest
4. All of the above

62. The voice box located in the throat area:

1. Esophagus
2. Adam's Apple
3. Trachea
4. Windpipe

63. Changes observed during adolescence:

1. Change in voice
2. Growth of hair in various body parts
3. Appearance of pimples
4. All of the above

64. A characteristic feature seen in adolescent girls:

1. Facial hair
2. Change in voice
3. Onset of the menstrual cycle
4. None of the above

65. Thoughtful decisions on adolescents' well-being:

1. Have a negative impact
2. Have a positive impact
3. Have no impact
4. Both 1 and 2

66. Essential requirements for proper growth:

1. Good nutrition
2. Personal hygiene
3. Physical activities
4. All of the above

67. If someone commits cyberbullying:

1. One should be scared
2. One should show helplessness
3. It should be handled wisely
4. One should cry

68. When someone forces you to consume drugs:

1. Try them
2. Start consuming them
3. Test them out of curiosity
4. Say NO

VI. Answer the following questions in one sentence each. (1 Mark)

69. What is adolescence?
70. What is Adam's Apple?
71. On which parts of the body does hair appear during adolescence?
72. What are secondary sexual characteristics?
73. At what age does menstruation naturally end?
74. What is the menstrual cycle?
75. What is the period of menstruation?
76. What is menstruation?
77. Why do adolescents engage more in social activities?
78. Who is the scientist that studied the structure of Vitamin B-12?

VII. Answer the following questions in 2–3 sentences each. (2 Marks)

79. What are the misconceptions surrounding menstruation? How can they be eradicated?
80. What is the National Toll-Free Drug De-addiction Helpline number? What is its utility?
81. What are hormones? What do they influence?
82. What is substance/drug abuse?
83. What is puberty/adulthood?
84. A 11-year-old boy, Ramesh, noticed a few pimples appearing on his face. His mother informed him that this was the result of biological changes taking place in his body.
 - A) What caused the appearance of pimples on his face?
 - B) What can he do to avoid or manage these pimples?

VIII. Answer the following questions in 4–5 sentences each. (4 Marks)

85. What are pimples/acne? Why do pimples appear in adolescents?
86. Which factors exert a positive impact on adolescents?
87. Why do adolescent girls require a higher amount of iron?
88. Why is personal hygiene extremely important for adolescents?

89. Mention the essential nutrients required for adolescents.
90. Do adolescents need physical activity? Give reasons.
91. What is cyberbullying? What steps should be taken to escape/prevent it?
92. Adolescents sometimes experience mood swings. On some days, they feel very energetic and happy, while on other days, they feel discouraged. What other behavioral changes are associated with this age?

IX. Answer the following questions in 5–6 sentences each. (5 Marks)

93. List the characteristics/symptoms observed in adolescents.
94. Explain how body structure undergoes changes during adolescence.
95. Explain the measures that should be followed to maintain personal hygiene during adolescence.
96. Briefly write down the initiatives undertaken by the government to support menstrual hygiene.
97. What is a balanced social life? How does it impact adolescents?

Chapter 7: Heat Transfer in Nature

Learning Outcome: Students understand through experiments how heat is transferred from one object to another through conduction, convection, and radiation methods.

I. Choose the correct alternative for each of the following and write it. (1 Mark)

"As shown in the picture, bowls with handles made of two different materials, A and B, were purchased. A suitable property for the materials of these handles is..."



- (a) Both A and B are good conductors of heat
 - (b) Both A and B are poor conductors of heat
 - (c) A is a good conductor of heat, B is a poor conductor of heat
 - (d) A is a poor conductor of heat, B is a good conductor of heat
1. Heat transfer in solids mainly occurs through this process:
 - (a) Convection
 - (b) Conduction
 - (c) Radiation
 - (d) Infiltration / Percolation
 2. The phenomenon of cool air moving from the sea towards the land during the daytime is:
 - (a) Land breeze
 - (b) Radiation
 - (c) Sea breeze
 - (d) Evaporation

3. Heat flows from which object?
 - (a) From a lower temperature object to a higher temperature object
 - (b) From a higher temperature object to a lower temperature object
 - (c) Only between two objects having the same temperature
 - (d) Does not flow in any fixed direction
4. The process of heat transfer that takes place without the need for any medium (air, water, etc.) is:
 - (a) Conduction
 - (b) Convection
 - (c) Radiation
 - (d) Evaporation
5. The main mode of heat transfer in solids (e.g., a metal spoon) is:
 - (a) Convection
 - (b) Conduction
 - (c) Radiation
 - (d) Condensation
6. The main mode of heat transfer taking place in liquids and gases is:
 - (a) Conduction
 - (b) Convection
 - (c) Radiation
 - (d) Condensation
7. The mode by which heat from the Sun reaches the Earth is:
 - (a) Radiation
 - (b) Convection
 - (c) Conduction
 - (d) Freezing / Solidification
8. The main reason for the occurrence of 'Sea Breeze' blowing during the day in coastal areas is:
 - (a) Land heats up faster than water (Convection)
 - (b) Water heats up faster than land
 - (c) Thermal radiation over the sea
 - (d) Thermal conduction over the land
9. The process responsible for making us feel cool when kept in the shade or when wind blows is:
 - (a) Condensation
 - (b) Cooling caused by evaporation
 - (c) Radiation
 - (d) Convection phenomenon
10. Among the following, this is NOT a conductor of heat:
 - (a) Copper
 - (b) Aluminium
 - (c) Plastic
 - (d) Iron

11. The reason for recommending black or dark-coloured clothes in winter is:

- (a) They radiate heat
- (b) They absorb more heat
- (c) They do not block heat
- (d) They reflect light

12. The reason why blowing wind gives us a cool sensation is:

- (a) Air does not absorb heat from our body
- (b) It helps the sweat on the body to evaporate faster
- (c) Air temperature is always below 0°C
- (d) Air blocks thermal radiation

II. State whether the following statements are True or False. (1 Mark)

- 14. Heat transfer in solids takes place through convection.
- 15. Heat transfer through convection occurs by the actual movement of particles.
- 16. The infiltration/percolation of water in clayey soil regions is higher than in sandy soil regions.
- 17. The cool air moving from the land towards the sea is called land breeze.
- 18. Heat always flows from an object at a lower temperature to an object at a higher temperature.
- 19. The process of heat transfer occurring without the need for any medium (air, water, etc.) is called 'Radiation'.
- 20. In liquids and gases, heat is mainly transferred through the method of 'Conduction'.
- 21. Black or dark-coloured clothes absorb more heat than light-coloured clothes.
- 22. During the daytime, air over the land gets heated faster than air over the sea.
- 23. Wool is a poor conductor of heat (Bad conductor/Insulator).
- 24. The process of 'Conduction' is responsible for heat reaching the Earth from the Sun.
- 25. We feel cool when sweat on the body evaporates.
- 26. The wind blowing from the land towards the sea during nighttime is called 'Sea Breeze'.
- 27. Metals such as copper, aluminium, and iron are good conductors of heat.

I. Fill in the blanks in the following: (1 Mark)

- 28. Heat always flows from an object of _____ temperature to an object of _____ temperature.
- 29. In solids, heat is mainly transferred through the _____ method.
- 30. The main mode of heat transfer in liquids and gases is called _____.
- 31. The process of heat transfer that occurs without the help of any medium is called _____.
- 32. Heat from the Sun reaches the Earth through the process of _____.
- 33. The wind blowing from the sea towards the land at the seashore during the day is called _____.
- 34. The wind blowing from the land towards the sea during the night is called _____.
- 35. Substances that allow heat to flow through them easily are called _____ of heat.
- 36. In winter, woollen clothes trap air, which makes us feel _____.
- 37. The process of liquid turning into vapor (evaporation) causes _____ in the surrounding atmosphere.

II. Answer the following questions in one sentence each: (1 Mark)

- 38. What is heat?
- 39. What is temperature?

40. What is the standard unit (SI Unit) used to measure temperature?
41. What is heat transfer?
42. What is the main mode of heat transfer in solids?
43. What is the process of heat transfer in liquids and gases?
44. Which mode of heat transfer does not require any physical medium?
45. What is a conductor of heat?
46. What is an insulator or poor conductor of heat?
47. What is Sea Breeze?
48. What is Land Breeze?
49. Which process is responsible for water kept in an earthen pot becoming cool?
50. What is the reason why woollen clothes give us a warm sensation?
51. What is the mode by which heat from the Sun reaches the Earth?
52. What is the reason why handles of cooking utensils are made of plastic or wood?

III. Answer the following questions in two sentences each: (2 Marks)

53. Give two examples each for good conductors and poor conductors of heat.
54. Why is it more comfortable to wear light-coloured clothes in summer?
55. What is infiltration?
56. What is the reason why wet clothes hung out to dry, dry faster in the sun?
57. What is heat conduction? Give one example.
58. What is heat convection? In which media does it occur?
59. What is heat radiation? What is its specialty?
60. What are conductors of heat and insulators (poor conductors) of heat? Give two examples for each.
61. Evaporation causes cooling — Give a daily-life example explaining this.

IV. Answer the following questions in three sentences each: (3 Marks)

62. State the differences between Sea Breeze and Land Breeze.
63. Explain how woollen clothes help to keep us warm in winter.
64. Why is it recommended to wear light-coloured (white) clothes in summer and black/dark-coloured clothes in winter?
65. Explain step-by-step how the process of 'Heat Convection' occurs while heating water in a vessel.

V. Answer the following questions in four to five sentences each. (4, 5 Marks)

66. Explain on the basis of the principle of convection how sea breeze and land breeze are formed.
67. Explain how water infiltrates through the Earth's surface to get collected as groundwater and how aquifers are formed.
68. Why are hollow bricks used for constructing the outer walls of houses in very hot regions?
69. **Science and Daily Life Applications:**
 - (A) Explain the process of formation of Sea Breeze and Land Breeze on the basis of heat transfer. (3 Marks)
 - (B) What is the reason for constructing the windows of houses in coastal areas facing the sea? (1 Mark)

70. Experiment and Comparison Based:

- (A) Compare the 3 major modes of heat transfer with suitable examples. (3 Marks)
(B) When a metal spoon is placed in hot water, which mode is responsible for its free end also becoming hot? (1 Mark)

71. Descriptive and Applied Questions:

- (A) Give 3 key examples from daily life to explain that evaporation causes cooling. (3 Marks)
(B) Why does wearing two thin blankets layered one over the other feel warmer in winter than wearing a single thick blanket? (2 Marks)

72. Context-Based Analysis:

Identify which mode of heat transfer or phenomenon is functioning in the following situations and give reasons: (5 Marks)

1. Water at the bottom moving upwards while heating water in a vessel.
2. Wearing white clothes during the day and dark clothes at night in the desert.
3. Water remaining cool in an earthen pot.
4. Sun rays reaching and heating the Earth.
5. Using wood or bakelite plastic for the handle of a cooking vessel.

Chapter 8: Measurement of Time and Motion

Learning Outcome: Mathematically calculate the relationship between speed, distance, and time of objects.

I. Four alternatives are given for each of the following. Choose and write the correct answer: (1 Mark)

1. **SI Unit of speed**
(A) km/h
(B) m/s
(C) m/min
(D) km/min
2. **The value obtained by dividing the total distance covered by an object by the total time taken to cover that distance is:**
(A) Speed
(B) Time
(C) Wavelength
(D) Force
3. **'Time Period' of a simple pendulum means:**
(A) Time taken to complete 10 oscillations
(B) Time taken to complete half an oscillation
(C) Time taken to complete 1 oscillation
(D) Time taken for the pendulum to come to rest
4. **If the speed of an object moving along a straight line remains constant without changing, that motion is called:**
(A) Non-uniform motion
(B) Uniform motion
(C) Periodic motion
(D) Oscillatory motion

5. **A device used in vehicles to measure the total distance traveled:**
(A) Speedometer
(B) Odometer
(C) Thermometer
(D) Barometer
6. **A device that directly displays the instantaneous speed of a vehicle in km/h:**
(A) Odometer
(B) Ammeter
(C) Speedometer
(D) Galvanometer
7. **The motion of a simple pendulum is an example of this type of motion:**
(A) Rectilinear motion
(B) Circular motion
(C) Oscillatory or Periodic motion
(D) None of these
8. **In ancient times, the time from one sunrise to the next sunrise was called:**
(A) A month
(B) A year
(C) A day
(D) A Prahara
9. **The 'Distance-Time' graph of an object in uniform motion is a:**
(A) Straight line
(B) Curved line
(C) Circle
(D) Zig-zag line
10. **The correct formula used to find distance:**
(A) Distance = Speed $\times$ Time
(B) Distance = Speed $\div$ Time
(C) Distance = Time $\div$ Speed
(D) Distance = $1 / (\text{Speed} \times \text{Time})$
11. **A car travels at a speed of 40 km/h for 15 minutes, and then at a speed of 60 km/h for the next 15 minutes. The total distance travelled by the car is:**
(A) 100 km
(B) 25 km
(C) 15 km
(D) 10 km
12. **The small metallic ball of a simple pendulum is called:**
(A) Support
(B) Bob
(C) Thread
(D) Oscillator
13. **The basic unit of time:**
(A) Hour
(B) Minute
(C) Second
(D) Day

14. A train takes 4 hours to cover a distance of 240 km. Its speed is:
- (A) 40 km/h
 - (B) 50 km/h
 - (C) 60 km/h
 - (D) 80 km/h
15. If a schoolgirl riding a bicycle at a speed of 2 m/s reaches school in 15 minutes, the distance between her house and the school is:
- (A) 1.8 km
 - (B) 18 km
 - (C) 30 km
 - (D) 300 m
16. The clock used by Physical Education teachers to measure time during school running competitions:
- a. Wristwatch
 - b. Water clock
 - c. Shadow
 - d. Stopwatch
17. A device that helps measure small intervals of time within a day:
- a. Sundial
 - b. Water clock
 - c. Sand clock / Hourglass
 - d. All of the above
18. The height of Samrat Yantra:
- a. 270 m
 - b. 2,700 m
 - c. 27 m
 - d. 7 m
19. What was used to measure time in ancient India?
- a. Shadow
 - b. Water clock
 - c. Both a and b
 - d. None of these
20. SI unit of time:
- a. Second
 - b. Minute
 - c. Hour
 - d. Day
21. SI unit of length:
- a. Milli meter
 - b. Meter
 - c. Centi meter
 - d. Kilo meter
22. SI unit of speed:
- a. km/h
 - b. km/s
 - c. m/s
 - d. m/h

23. The distance covered by an object in unit time:

- a. Distance
- b. Time
- c. Speed
- d. None of these

II. Fill in the blanks with suitable answers:

- 24. The basic unit of time is _____.
- 25. The distance covered by an object in unit time is called its _____.
- 26. The device used to measure the total distance travelled by vehicles is _____.
- 27. The motion of a simple pendulum is an example of _____ motion.
- 28. The metallic sphere of a simple pendulum is called _____.
- 29. The device that directly measures the speed of a vehicle in km/h is _____.
- 30. The motion of an object moving at a constant speed along a straight line is called _____ motion.
- 31. The distance-time graph of an object in uniform motion is a _____.
- 32. Formula to find distance: Distance = _____ $\times$ Time.
- 33. The time taken by a simple pendulum to complete one full oscillation is called its _____.
- 34. The world's largest stone sundial is _____.
- 35. The place where Samrat Yantra is constructed is _____.

III. Match the following: (1 Mark)

36. Concepts and Definitions

List - A	List - B
(1) Basic unit of time	(A) Odometer
(2) Basic unit of speed	(B) Time period
(3) Time taken for 1 oscillation	(C) Second
(4) Device that measures distance covered	(D) m/s

Options Code:

- [i] 1-A, 2-B, 3-C, 4-D
- [ii] 1-C, 2-D, 3-B, 4-A
- [iii] 1-D, 2-C, 3-A, 4-B
- [iv] 1-C, 2-A, 3-D, 4-B

37. Instruments and Their Uses

List - A	List - B
(1) Speedometer	(A) Uniform motion
(2) Odometer	(B) Instantaneous speed (km/h)

List - A	List - B
(3) Simple pendulum	(C) Total distance travelled
(4) Straight-line distance-time graph	(D) Oscillatory motion

Options Code:

- [i] 1-B, 2-C, 3-D, 4-A
- [ii] 1-C, 2-B, 3-A, 4-D
- [iii] 1-B, 2-D, 3-C, 4-A
- [iv] 1-A, 2-C, 3-B, 4-D

38. Types of Motion and Examples

List - A	List - B
(1) A car moving on a straight road	(A) Oscillatory motion
(2) Motion of a swing	(B) Circular motion
(3) Motion of the hands of a clock	(C) Rectilinear motion
(4) A tree branch swaying in the wind	(D) Periodic motion

Options Code:

- [i] 1-C, 2-A, 3-B, 4-D
- [ii] 1-A, 2-C, 3-D, 4-B
- [iii] 1-C, 2-D, 3-A, 4-B
- [iv] 1-B, 2-A, 3-C, 4-D

III. State whether the following statements are True or False: (1 Mark)

39. The basic unit (SI unit) of time is Hour.
40. If an object covers equal distances in equal intervals of time, its motion is called 'Uniform Motion'.
41. An odometer is used to measure the speed of a vehicle directly.
42. The time taken by a simple pendulum to complete one oscillation is called its 'Time Period'.
43. The ratio between distance and time is called 'Speed'.
44. The distance-time graph of an object in uniform motion is a curved line.
45. Periodic motion can be used to measure time.
46. The metallic ball of a simple pendulum is called a 'Bob'.
47. The speedometer of a car shows the total distance travelled by the vehicle in kilo meters.
48. It is appropriate to measure the distance between two cities in meters.

IV. Answer the following questions in one sentence each: (1 Mark)

49. What is speed?
50. What is the International (SI) unit of speed?
51. What is the basic unit of time?
52. What is uniform motion?
53. What is non-uniform motion?

54. What is Time Period?
55. What is the 'Bob' of a pendulum?
56. What is the use of a speedometer?
57. What is the use of an odometer?
58. What is the shape of the distance-time graph for an object in uniform motion?
59. Give an example of periodic motion.
60. Write the formula used to calculate speed.

V. Answer the following questions in two sentences each: (2 Marks)

61. Write two differences between uniform motion and non-uniform motion.
62. What is a simple pendulum? What is its oscillatory motion?
63. State the difference between a speedometer and an odometer.
64. Name three devices used by people in ancient times to measure time.
65. Write two uses of a Distance-Time Graph.
66. What is the 'Time Period' of a simple pendulum?
67. Define speed and write its SI unit.
68. What are the functions of the Speedometer and Odometer found in vehicles?
69. On what factors does the time period of a simple pendulum depend, and on what does it not depend?

VI. Answer the following questions in three sentences each: (3 Marks)

70. What is meant by one oscillation and time period of a simple pendulum? State the method to measure the time period.
71. Explain the steps to draw a Distance-Time Graph.
72. State the relationship between speed, distance, and time, and write the three formulas to calculate them.

VII. Answer the following questions in four to five sentences each: (4 Marks)

73. Differentiate between uniform rectilinear motion and non-uniform rectilinear motion with suitable examples.
74. How did the ancient 'Ghatika Yantra' or water clock work? How was time announced?

VIII. Solve the following: Numerical Problems and Formula-based Questions

75. Calculate the speed of a car that covers a distance of 150 meters in 10 seconds. Express your answer in km/h.
76. A train travels 180 km in 3 hours. Find its speed in km/h and m/s units.
77. What is the time taken by a train moving at a speed of 25 m/s to cover a distance of 360 km?
78. Raghav is traveling on a bus at a speed of 50 km/h. If it takes 2 hours to reach, how far away is that city?

IX. Solve the problems using the following formulas:

Important Formulas:

- $\text{Speed} = \frac{\text{Distance travelled}}{\text{Time taken}}$
- $\text{Distance} = \text{Speed} \times \text{Time}$
- $\text{Time} = \frac{\text{Distance travelled}}{\text{Speed}}$
- $\text{Time Period} = \frac{\text{Total time taken for oscillations}}{\text{Number of oscillations}}$

Questions for Practice:

Question 1: A car takes 3 hours to cover a distance of 180 km. Find the speed of the car in km/h.

Question 2: If a bus travels at a speed of 60 km/h for 2.5 hours, what is the total distance covered by it?

Question 3: An athlete covers a distance of 200 m in 25 seconds. What is his speed?

Question 4: A simple pendulum takes 40 seconds to complete 20 oscillations. Find its Time Period.

Question 5: A train is moving at a speed of 72 km/h. Express its speed in m/s (meters per second).

Question 6: A schoolgirl rides her bicycle at a speed of 2 m/s and reaches school in 15 minutes. What is the distance between her house and the school?

Chapter-9: Life Processes in Animals

Learning Outcome: Explains processes like nutrition, transportation, digestion, respiration, and circulation in plants and animals.

I. Four alternatives are given for each of the following. Choose the correct one and write. (1 Mark)

1. The liquid part of the blood:
(A) Blood cells
(B) Plasma
(C) Haemoglobin
(D) Platelets
2. The pigment that gives red colour to blood and carries oxygen:
(A) Chlorophyll
(B) Melanin
(C) Haemoglobin
(D) Insulin
3. The blood cells that fight against disease-causing germs entering the body:
(A) Red Blood Cells (RBC)
(B) White Blood Cells (WBC)
(C) Platelets
(D) Plasma
4. The part of the blood that helps in blood clotting when injured:
(A) WBC
(B) RBC
(C) Platelets
(D) Haemoglobin
5. The blood vessels that carry oxygenated blood from the heart to various parts of the body:
(A) Veins
(B) Arteries
(C) Capillaries
(D) Pulmonary veins
6. The blood vessels that bring back deoxygenated (carbon dioxide-rich) blood from various parts of the body to the heart:
(A) Arteries
(B) Veins
(C) Aorta
(D) None of the above

7. The throbbing movement caused due to the high pressure of blood spurting through the arteries is called:
 - (A) Pulse
 - (B) Heart attack
 - (C) Breathing rate
 - (D) Blood pressure
8. The resting pulse rate of a normal adult per minute is:
 - (A) 50 to 60
 - (B) 72 to 80
 - (C) 90 to 100
 - (D) 100 to 120
9. The number of chambers in the human heart:
 - (A) 2
 - (B) 3
 - (C) 4
 - (D) 6
10. The upper two chambers of the heart:
 - (A) Ventricles
 - (B) Atria
 - (C) Valves
 - (D) Arteries
11. The device used by doctors to amplify and listen to the heartbeat:
 - (A) Thermometer
 - (B) Stethoscope
 - (C) Microscope
 - (D) Barometer
12. Though sponges and Hydra do not have a circulatory system, nutrients and oxygen are transported by:
 - (A) Blood
 - (B) Air
 - (C) Water
 - (D) Cytoplasm
13. The process of removal of waste products produced in the cells of living organisms is called:
 - (A) Digestion
 - (B) Excretion
 - (C) Respiration
 - (D) Blood circulation
14. The main organ of the human excretory system:
 - (A) Lungs
 - (B) Liver
 - (C) Kidneys
 - (D) Stomach
15. The tubes that carry urine from the kidneys to the urinary bladder:
 - (A) Ureters
 - (B) Urethra
 - (C) Artery
 - (D) Vein

16. The average amount of urine excreted by a healthy human in 24 hours:
(A) 0.5 L to 1 L
(B) 1.0 L to 1.8 L
(C) 3.0 L to 4.0 L
(D) More than 5 L
17. The major nitrogenous waste present in human urine:
(A) Uric acid
(B) Urea
(C) Ammonia
(D) Glucose
18. The process of artificially filtering the blood of a patient suffering from kidney failure is called:
(A) Transplantation
(B) Dialysis
(C) Electrolysis
(D) Blood Transfusion
19. Aquatic animals like fishes excrete cellular waste in the form of:
(A) Urea
(B) Uric acid
(C) Ammonia
(D) Albumin
20. The white semi-solid waste excreted by animals like birds, lizards, and snakes:
(A) Ammonia
(B) Uric acid
(C) Urea
(D) Salt

I. Fill in the blanks: (1 Mark)

21. The blood vessels that carry oxygenated blood from the heart to different parts of the body are called _____ .
22. A red-coloured pigment in the blood called _____ helps in the transportation of oxygen.
23. The blood cells that help in blood clotting during an injury are _____ .
24. The rhythmic contraction and relaxation of the heart together is called _____ .
25. The main excretory organs of the human body are _____ .
26. The process of artificially filtering the blood of a patient with kidney failure is called _____ .
27. Fishes excrete their cellular waste into the water in the form of _____ .
28. The white semi-solid waste excreted by birds and lizards is _____

II. Match the following: (1 Mark)

29. Blood components and their functions:

List - A	List - B
(1) Red Blood Cells (RBC)	(A) Fight against germs
(2) White Blood Cells (WBC)	(B) Blood clotting
(3) Platelets	(C) Liquid part and transport of nutrients
(4) Plasma	(D) Transport of oxygen

30. Organs and their excretory functions:

List - A	List - B
(1) Kidneys	(A) Store urine
(2) Ureters	(B) Filter blood and produce urine
(3) Urinary Bladder	(C) Excrete urine from the body
(4) Urethra	(D) Transport urine to the urinary bladder

III. Answer the following questions in one sentence each: (1 Mark)

31. What are the three main components of the circulatory system?
32. What is the liquid part of the blood called?
33. Which is the respiratory pigment present in Red Blood Cells (RBC)?
34. What is the main function of White Blood Cells (WBC)?
35. Which blood cell helps in stopping blood loss by clotting during an injury?
36. What are arteries?
37. What are veins?
38. What is pulse?
39. What is the pulse rate of a normal adult person at rest?
40. Which instrument is used by doctors to amplify and listen to the heartbeat?
41. What is excretion?
42. Which is the main organ of the human excretory system?
43. Which is the major nitrogenous waste product found in human urine?
44. What is dialysis?
45. In which form do fishes excrete their cellular waste?
46. What is the waste product excreted by birds and reptiles (lizard/snake)?

IV. Answer the following questions in two sentences each: (2 Marks)

47. Write two main differences between arteries and veins.
48. Name the major components of blood and state their functions.
49. Why are White Blood Cells (WBC) and platelets essential for our body?

50. How does the transportation of nutrients and oxygen take place in sponges and Hydra despite lacking a separate circulatory system?
51. What are the major nitrogenous waste products excreted by different animals? Give examples.

V. Answer the following questions in three sentences each: (3 Marks)

52. Explain the structure of the human heart. (Chambers and their functions)
53. Name the main organs of the human excretory system and explain the pathway of urine formation and elimination.
54. What is dialysis? Explain the causes of kidney failure and the necessity of the dialysis process.

VI. Answer the following questions in four to five sentences each: (4 and 5 Marks)

55. In the circulatory system, artery walls are thick and elastic, whereas vein walls are thin and contain valves inside.
- (a) What is the reason for the walls of arteries to be thick?
- (b) Why are valves necessary in veins?
- (c) Evaluate what would happen in the body if the valves in the blood vessels fail to function.
56. "All living organisms need blood and all living organisms must possess a complex circulatory system." How do you evaluate this statement? Justify your answer with the example of sponges and Hydra.
57. The human heart keeps oxygenated (O_2) and deoxygenated (CO_2) blood completely separated.
- (a) Which structure of the heart helps in this separation?
- (b) Analyse the consequences on the human body if oxygenated and deoxygenated blood mix with each other.
- (c) Why is this separation essential in birds and mammals?
58. The waste materials excreted by different animals (Ammonia, Uric acid, Urea) are different.
- (a) Analyse the relationship between the habitat/availability of water for an animal and the type of waste it excretes.
- (b) What are the advantages for birds in excreting uric acid?
- (c) Humans produce less urine but sweat more during summer – what is the biological significance of this?

Chapter 10: Life Processes in Plants

Learning Outcomes: Students explain processes such as nutrition, transportation, digestion, respiration, and circulation in plants and animals.

I. Four alternatives are given for each of the following. Choose the correct one and write. (1 Mark)

1. The vascular tissue in plants that transports water and minerals from the soil from roots to leaves is:
 - (a) Phloem
 - (b) Xylem
 - (c) Parenchyma
 - (d) Cambium
2. The transport organelle/tissue that transports food (glucose) prepared in the leaves to all parts of the plant is:
 - (a) Xylem
 - (b) Phloem
 - (c) Stomata
 - (d) Root hair
3. The small pores present on the underside of plant leaves are called:
 - (a) Guard cells
 - (b) Stomata
 - (c) Xylem vessels
 - (d) Root hairs
4. The cells that control the opening and closing of stomata are:
 - (a) Guard cells
 - (b) Epidermal cells
 - (c) Phloem cells
 - (d) Stem cells
5. The process by which plants lose excess water in the form of water vapor through stomata is called:
 - (a) Photosynthesis
 - (b) Respiration
 - (c) Transpiration
 - (d) Excretion
6. The main force that helps water to rise from the bottom to the top in tall trees is:
 - (a) Gravitational force
 - (b) Transpirational pull (Suction pull)
 - (c) Magnetic force
 - (d) Frictional force
7. The structures that increase the surface area for roots to absorb water and minerals from the soil are:
 - (a) Stomata
 - (b) Root hairs
 - (c) Guard cells
 - (d) Bark

8. The gas released during cellular respiration in plants is:
- Oxygen
 - Nitrogen
 - Carbon dioxide
 - Hydrogen
9. The process that predominantly occurs in plants during the night is:
- Photosynthesis only
 - Respiration
 - Starch production
 - Absorption of sunlight
10. Plant roots obtain oxygen for respiration:
- Directly from atmospheric air
 - From the air present between soil particles
 - Through the stem
 - Only from water

II. Fill in the blanks (1 Mark)

11. The vascular tissue that transports water and mineral salts from the roots in plants is ____.
12. The tissue that delivers food prepared in the leaves to various parts of the plant is ____.
13. The microscopic structures that increase the surface area for roots to absorb water are ____.
14. The microscopic pores present on the surface of leaves are called ____.
15. The process of loss of water in the form of water vapor through stomata is called ____.
16. The cells that regulate the opening and closing of stomata are ____.

III. Match the following:

17.

List - A	List - B
(1) Xylem	(A) Transport of food
(2) Phloem	(B) Transport of water and minerals
(3) Stomata	(C) Absorption of water from soil
(4) Root hairs	(D) Transpiration and gas exchange

18. Plant organs/structures and their biological functions:

List - A	List - B
(1) Guard cells	(A) Providing support to the plant and driving force for water to rise high
(2) Transpirational pull (Suction pull)	(B) Movement of stomata and control of pores
(3) Artificially colored water (Ink water) experiment	(C) Helping to absorb oxygen from the air present between soil particles

List - A	List - B
(4) Slipping of root cells / Root hairs	(D) Demonstrating the ascent of water through xylem in the stem

19. Plant processes and their related facts:

List - A	List - B
(1) Photosynthesis	(A) Breakdown of glucose releasing energy and carbon dioxide
(2) Cellular respiration	(B) Food (glucose) preparation in leaves
(3) Transpiration	(C) Bidirectional transport through vascular tissue
(4) Food transport through phloem (Translocation)	(D) Keeping plant parts cool and maintaining water flow

IV. Answer the following questions in one sentence each: (1 Mark)

20. What are vascular tissues?
21. What is the main function of Xylem tissue?
22. What is the main function of Phloem tissue?
23. What is the importance of root hairs?
24. What is translocation in plants?
25. What are stomata?
26. Which cells control the opening and closing of stomata?
27. What is transpiration?
28. Which major force causes water to rise from bottom to top in tall trees?
29. Where does cellular respiration occur in plants?
30. From where do plant roots get the oxygen required for respiration?
31. Which is the major gas taken up by plants from the atmosphere during daytime?

I. Answer the following questions in two sentences each: (2 Marks)

32. Write two main differences between Xylem and Phloem tissues.
33. What is transpiration in plants? State two uses of it for the plant.
34. Write two main functions of stomata present in leaves.
35. How do root hairs help plants in absorbing water and mineral salts?
36. Differentiate between respiration and photosynthesis in plants.

II. Answer the following questions in three sentences each: (3 Marks)

37. Explain how water reaches from the roots to the top in tall trees.
38. Describe a simple experiment to show that the stem of a plant conducts water upwards.
39. Do plant roots also need respiration? Analyse why a plant dies if soil is overwatered.

III. Answer the following questions in four to five sentences each: (4 and 5 Marks)

40. Although the process of transpiration in plants appears to be a wasteful loss of water, it is an essential "Necessary Evil" for the survival of the plant.

41. (a) Justify this statement with three main uses of transpiration.
(b) The rate of transpiration decreases during extremely cold or cloudy weather. Analyse what happens to the speed of water rising in the plant because of this.
42. A farmer cuts and removes a circular ring of bark from the stem of a coconut tree in his garden (Girdling/Ringing).
(a) Which vascular tissue of the plant is damaged by this process?
(b) Critical evaluation: What happens to the roots of that tree after a few days, and what is the overall effect on the entire plant? Give reasons.
43. The major life processes of plants, 'Photosynthesis' and 'Respiration', are complementary to each other.
(a) Explain how the exchange of gases—oxygen and carbon dioxide—varies during day and night in these two processes.
(b) What is the biological reason behind the advice "One should not sleep under a dense tree at night"?
(c) Do plants respire during the daytime? If yes, why does the carbon dioxide released at that time not reach the outside atmosphere?
44. Two identical potted plants (A and B) are taken. Pot A's soil is watered regularly with normal amounts of water. Pot B's soil is completely filled with water, causing daily waterlogging.
(a) After 10 days, the plant in Pot B wilts and dries up. Analyze the biological changes that occurred at the root level of the plant.
(b) What is the key agricultural practice followed by farmers/gardeners to correct this problem?
(c) Mention two major adaptations developed by plants growing in desert (arid) regions (e.g., Cactus) to prevent water loss.

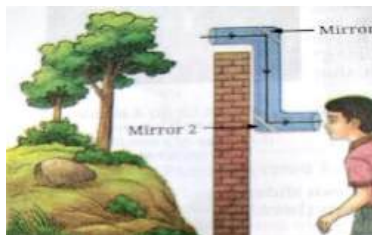
Chapter 11: Light: Shadows and Reflections

Learning Outcome: Understands the difference between reflection and refraction of light and explains how shadows are formed.

I. Four alternatives are given for each of the following questions. Choose and write the correct one. (1 Mark)

1. The Sun is a _____ source.
(a) Non-luminous source
(b) Artificial source
(c) Luminous source of light and heat
(d) Reflecting source
2. Which of the following is a natural source of light?
(a) Mirror
(b) Moon
(c) Lightning
(d) Electric bulb

3. The Moon shines because...
 - (a) It emits its own light
 - (b) It reflects sunlight
 - (c) There is fire inside it
 - (d) It is transparent
4. Light travels in a _____.
 - (a) Zig-zag path
 - (b) Curved line path only
 - (c) Straight line path
 - (d) Randomly
5. In a plane mirror, which of the following gets laterally inverted?
 - (a) Left-right orientation
 - (b) Distance
 - (c) Size
 - (d) Shape
6. The word "AMBULANCE" is written inverted on the front of ambulances because...
 - (a) It looks attractive
 - (b) People like it
 - (c) Drivers can read it correctly in their rear-view mirror
 - (d) It is mandatory by law
7. The image formed by a plane mirror...
 - (a) Can be captured on a screen
 - (b) Cannot be captured on a screen
 - (c) Is always inverted
 - (d) Is enlarged
8. The image formed in a Pinhole camera is...
 - (a) Erect and real
 - (b) Inverted and virtual
 - (c) Inverted and real
 - (d) Erect and virtual
9. A Periscope works on the principle of...



- (a) Refraction
 - (b) Two reflections
 - (c) Dispersion
 - (d) Diffraction
10. A Kaleidoscope works on the principle of...

(a) Dispersion of light	(b) Refraction
(c) Eye structure	(d) Multiple reflection

11. Designers and artists use this device to make patterns.
 - (a) Kaleidoscope
 - (b) Pinhole camera
 - (c) Periscope
 - (d) Microscope
12. This device is used in submarines to see objects above the surface of the water.
 - (a) Microscope
 - (b) Telescope
 - (c) Periscope
 - (d) Kaleidoscope
13. A shadow appears on a wall...
 - (a) When there is no light source
 - (b) When an opaque object blocks the light
 - (c) When a transparent object is present
 - (d) When an object emits light
14. The device that gives an inverted but real image is...
 - (a) Plane mirror
 - (b) Convex mirror
 - (c) Kaleidoscope
 - (d) Pinhole camera
15. The following combination is essential for the formation of a shadow:
 - (a) A source of light, an object, and a screen
 - (b) A source of light and a mirror
 - (c) Light and air
 - (d) Torch and lens
16. The time taken by sunlight to reach the Earth is...
 - (a) 8 hours
 - (b) 8 minutes 20 seconds
 - (c) 2 seconds
 - (d) 1 hour
17. The number of images formed by a single plane mirror is...
 - (a) One
 - (b) Two
 - (c) Many
 - (d) None
18. A flat and smooth mirror is called...
 - (a) Plane mirror
 - (b) Concave mirror
 - (c) Convex mirror
 - (d) Curved mirror
19. This property of light is responsible for the image in a pinhole camera always being inverted:
 - (a) Reflection
 - (b) Rectilinear propagation (Straight-line motion)
 - (c) Refraction
 - (d) Scattering

20. Light always travels in this manner:

- (a) In a curved line
- (b) In a straight line
- (c) In a zig-zag path
- (d) In a circular path

21. This property of light is responsible for the image in a pinhole camera always being inverted:

- (a) Reflection
- (b) Rectilinear propagation
- (c) Refraction
- (d) Scattering

II. Fill in the blanks (1 Mark)

22. Oiled paper or frosted glass that does not allow light to pass through completely, but allows light partially, are called _____ objects.

III. Identify the relation in the first pair and fill in the blank appropriately for the third item: (1 Mark)

23. Glass : Transparent :: Wall : _____.

24. Luminous object : Sun :: Non-luminous object : _____.

IV. Match the following

25.

List - A	List - B
(i) Pinhole camera	(A) The dark region formed behind an object
(ii) Opaque object	(B) Light passes almost completely through it
(iii) Transparent object	(C) Forms an inverted image
(iv) Shadow	(D) Blocks light completely

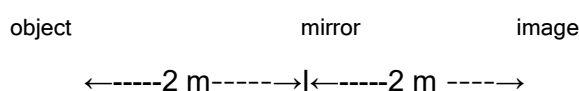
26. List - A	List - B
(i) If the torch is near the ball	(A) Two shadows appear on the screen
(ii) If the torch is far away	(B) A bright spot appears on the screen
(iii) If the ball is removed from the setup	(C) Shadow is smaller
(iv) If there are two torches on the left side of the ball setup	(D) Shadow is larger

V. Answer the following questions in one or two sentences: (1 or 2 Marks)

27. Give examples of Luminous objects.

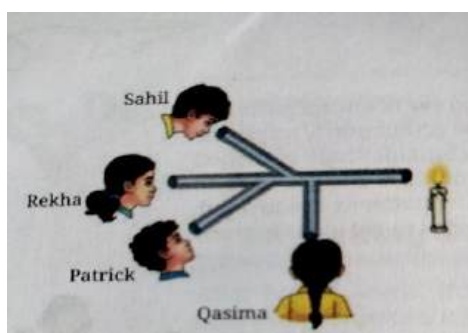
28. What are Non-luminous objects?

29. Which property of light forms shadows?
30. What causes a shadow to form?
31. What determines the size of a shadow?
32. What is the Angle of incidence?
33. What is the Angle of reflection?
34. In which type of mirror does the image appear smaller than the object?
35. What is the nature of the image generally formed in a Concave mirror?
36. What happens when light passes through a translucent object?
37. What is the effect of object distance on the image size in a concave mirror?
38. In which mirror is the image always erect and smaller than the object?
39. Why does the color of an object not affect the color of its shadow?
40. If you stand 2 meters away from a plane mirror, at what distance will your image appear behind the mirror?

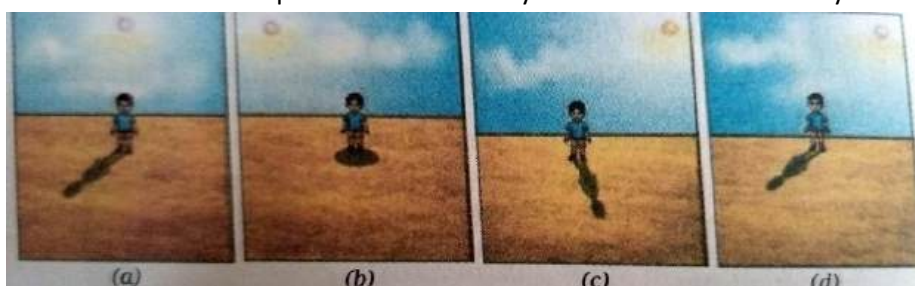


VI. Answer the following questions in three sentences: (3 Marks)

41. Sahil, Rekha, Patrick, and Kasima are trying to view a candle flame through a pipe. Who can see the flame and why?



42. What is the correct sequence in which a boy's shadow is formed? Why?



43. What are the characteristics of the image of a tree formed in a pinhole camera?



44. What happens when you write your name on a paper and hold it in front of a mirror?
45. Describe the changes in the length of a shadow at 9 AM, 12 PM (noon), and 4 PM.

46. The shadow of a bird flying high in the sky is not seen on the ground, but it is visible when the bird flies closer to the ground. Why?
47. Differentiate between transparent, translucent, and opaque objects with examples.
48. State four major characteristics of an image formed by a Plane Mirror.
49. What are the three essential components required for a shadow to form?
50. Will the colour of the shadow change if a torch is covered with a coloured transparent sheet?
51. Is it possible for a small mirror to form an image of an object larger than its size (e.g., a tree)?

VII. Answer the following questions in four to five sentences: (4 and 5 Marks)

52. Is it possible to hold a shape in one position to give a circular shadow and in another position to give a rectangular shadow? Explain.
53. Explain how to construct a Periscope using a 'Z'-shaped tube and two plane mirrors.
54. Explain how Multiple Reflection occurs when two mirrors are kept at different angles.
55. Explain in detail how Solar and Lunar eclipses occur based on the rectilinear propagation of light and shadow formation.

Chapter-12 Earth, Moon, and Sun

Learning Outcome: Analyses the relative motion of the Earth, Moon, and Sun and the phenomenon of eclipses caused by them.

I. Four alternatives are given for each of the following questions. Choose and write the correct one: (1 Mark)

1. The Earth rotates on its axis in this direction:
 - (a) East to West
 - (b) West to East
 - (c) North to South
 - (d) South to North
2. Time taken by the Earth to complete one rotation on its axis:
 - (a) 12 hours
 - (b) 365 days
 - (c) 24 hours
 - (d) 30 days
3. Occurs due to the rotation of the Earth:
 - (a) Change of seasons
 - (b) Eclipses
 - (c) Day and night
 - (d) Tides
4. Occurs due to the revolution of the Earth around the Sun:
 - (a) Day and night
 - (b) Change of seasons
 - (c) Solar eclipse
 - (d) Lunar eclipse

5. Approximate time taken by the Earth to go around the Sun once (revolution):
 - (a) 24 hours
 - (b) 27.3 days
 - (c) 365 days
 - (d) 30 days
6. The reason for the apparent motion of the Sun from East to West in the sky:
 - (a) Revolution of the Sun
 - (b) Earth's rotation from West to East
 - (c) Revolution of the Earth
 - (d) Motion of the Moon
7. In the night sky, stars appear to move from:
 - (a) East to West
 - (b) West to East
 - (c) North to South
 - (d) South to North
8. The only natural satellite of the Earth among these:
 - (a) Sun
 - (b) Mars
 - (c) Moon
 - (d) Venus
9. A Lunar eclipse occurs when:
 - (a) The Moon comes between the Sun and the Earth
 - (b) The Earth comes between the Sun and the Moon
 - (c) The Sun comes between the Earth and the Moon
 - (d) The Moon is very far from the Earth
10. A Solar eclipse occurs when:
 - (a) The Earth comes between the Sun and the Moon
 - (b) The Moon comes between the Sun and the Earth
 - (c) The Sun comes between the Earth and the Moon
 - (d) The Moon is on a full moon day
11. During a total solar eclipse, the disk of the Sun appears:
 - (a) Completely dark/hidden
 - (b) Larger than usual
 - (c) Completely red in colour
 - (d) Blue in colour
12. The reason why the apparent (visual) size of the Moon and the Sun appear the same in the sky:
 - (a) They are equal in actual size
 - (b) They are at an equal distance from the Earth
 - (c) The ratio of their actual size to their distance from the Earth is the same
 - (d) Both are planets
13. Observing the shadows of trees, this change is noticed from morning to noon:
 - (a) Long in the morning, short at noon
 - (b) Short in the morning, long at noon
 - (c) Same length throughout the day
 - (d) Disappears at noon

14. While riding a 'Merry-go-round', outside objects appearing to move in the opposite direction demonstrates:
- (a) Rotation of the Sun
 - (b) Revolution of the Earth
 - (c) Apparent motion caused by the rotation of the Earth
 - (d) Orbit of the Moon
15. The reason why the Pole Star (Polaris) appears almost stationary in the sky:
- (a) It moves from East to West
 - (b) It lies directly along the rotational axis of the Earth
 - (c) It does not move with the Earth
 - (d) It is brighter than other stars
16. The reason why days are longer during summer in the Northern Hemisphere:
- (a) The Earth is closer to the Sun
 - (b) The Northern Hemisphere is tilted towards the Sun, receiving light for more than 12 hours
 - (c) The Earth rotates faster
 - (d) The Moon reflects more light
17. The longest day in the Northern Hemisphere is called:
- (a) Winter Solstice
 - (b) Summer Solstice
 - (c) Spring Equinox
 - (d) Autumn Equinox
18. On Equinoxes (March 21 and September 23) in the Northern Hemisphere, this occurs:
- (a) Longest day
 - (b) Shortest day
 - (c) Equal day and night (approximately 12 hours)
 - (d) No night at all
19. The reason why the impact of seasonal variation is low in South India (e.g., Tamil Nadu, Karnataka):
- (a) It is far from the Sun
 - (b) It is close to the Equator
 - (c) Clouds are high here
 - (d) It is close to the North Pole

II. Fill in the blanks (1 Mark)

20. The spinning of the Earth on its own axis is called _____.
21. The movement of the Earth around the Sun in its orbit is called _____.
22. Day and night are caused by the Earth's _____.
23. The change of seasons on Earth is caused by the _____ of its axis.
24. The Moon is Earth's only natural _____.
25. The Moon takes about _____ days to complete both its rotation and revolution.
26. We always see the same side of the Moon because its rotational and _____ periods are equal.
27. The darkest, central part of a shadow is called the _____.
28. The lighter, outer part of a shadow is called the _____.
29. Viewing the _____ directly with the naked eye can permanently damage eyesight.

30. The highest level of tides occurring on new moon and full moon days are called _____.
31. The lower level of tides occurring during the first and third quarter phases of the Moon are called _____.
32. Due to the lack of _____ on the Moon, there is no air, water, or sound transmission there.
33. The regular rise and fall in the sea level occurring twice a day is called _____.
34. The Moon does not have its own light, it reflects the light of the _____.

III. State whether True or False (1 Mark)

35. A lunar eclipse occurs when the Sun comes between the Earth and the Moon.
36. Sunrise occurs earlier in Gujarat than in Jharkhand.
37. The longest day of the year in Chennai occurs on the 'Summer Solstice'.
38. We should view a solar eclipse directly with the naked eye.
39. Seasons occur due to the tilt of the Earth's axis and its revolution.
40. The Earth revolving around the Sun causes day and night.
41. Penumbra is the completely dark central region of a shadow.
42. Ocean tides occur regularly twice a day.
43. We can see different sides (the back side) of the Moon from Earth on different days.
44. A Leap Year comes once every four years and contains 366 days.

IV. Match the Following

45. Motions

Column - A	Column - B
(1) Rotation	(A) 365.25 days
(2) Revolution	(B) Spinning on its own axis
(3) Earth's orbit	(C) Elliptical path

46. Parts of Shadow

Column - A	Column - B
(1) Eclipse	(A) The darkest part of the shadow
(2) Penumbra	(B) The faint outer part of the shadow
(3) Umbra	(C) Obscuration caused by shadows of celestial bodies

47. Solar Eclipse

Column - A	Column - B
(1) Position during Solar Eclipse	(A) New Moon day
(2) Day of occurrence of Solar Eclipse	(B) Corona visible

Column - A	Column - B
(3) Total Solar Eclipse	(C) Moon is in the middle

48. Lunar Eclipse

Column - A	Column - B
(1) Position during Lunar Eclipse	(A) Reddish-brown Moon (Blood Moon)
(2) Day of occurrence	(B) Earth is in the middle
(3) Total Lunar Eclipse	(C) Full Moon night

49. Tides

Column - A	Column - B
(1) Tides	(A) Spring and Neap
(2) Types of tides	(B) Rise and fall of water twice a day
(3) Main cause of tides	(C) Gravitational pull of the Moon and Sun

V. Answer the following questions in one sentence: (1 Mark)

50. What is a Solar Eclipse?
51. What is a Lunar Eclipse?
52. How does the tilt of the Earth's axis affect the duration of day and night?
53. Why is it safe to view a lunar eclipse, but unsafe to look at a solar eclipse directly?
54. Seetha saw the constellation Orion directly overhead last night at 8:00 PM. When will she see Orion directly overhead today?
55. During one rotation of the Earth, how many hours of sunlight do the North Pole and South Pole receive?
56. Abhay noticed that when it was daytime in India, his uncle in the USA was sleeping (it was night time). What is the reason for this time difference?

VI. Answer the following questions in two sentences: (2 Marks)

57. Four friends used the following methods to view a solar eclipse. Who among them was careless?
 1. **Ravikiran:** Used solar eclipse glasses.
 2. **Jyothi:** Used a mirror to project the image of the Sun on paper.
 3. **Aditya:** Looked at the Sun directly with the naked eye.
 4. **Aruna:** Participated in a special observation program at a planetarium.
58. Even though the Moon is much smaller than the Sun, how can it completely block the Sun during a total solar eclipse?
59. What type of clothing (summer or winter) should the Indian cricket team carry when traveling to Australia to play matches in the month of December? Why?

VII. Answer the following questions in three sentences: (3 Marks)

60. Write three major differences between the Rotation and Revolution of the Earth.
61. Why are seasons opposite in the Northern and Southern Hemispheres? Explain.
62. Explain the sequence of the cycle of seasons starting from the Summer Solstice in the Northern Hemisphere.
63. How would you demonstrate a model of a lunar eclipse using a torch, a large ball, and a small ball?
64. Write the correct alignment order of celestial bodies (Sun, Earth, Moon) during a Solar Eclipse and a Lunar Eclipse.

VIII. Answer the following questions in four to five sentences: (4 Marks)

65. A lunar eclipse is visible from large parts of the Earth, but a total solar eclipse is visible from only a very small area. Why?
66. If the Earth's axis were not tilted and was completely vertical (90°), what would be the effect on Earth's climate and seasons?
67. Nandini observed a specific group of stars at midnight on June 21. A year later, on the same date, when will those stars appear, and why do stars rise earlier every day?

MODEL ANSWERS

The Ever -Evolving World Of Science

I. Fill in the blanks

1. change / revision / updates
2. Observation
3. Technology
4. Conclusion / Theory
5. process / journey
6. Scientific method
7. inquiry / observation
8. revised / updated
9. scientific

II. Multiple Choice Questions (MCQs)

10. (B) Observation → Hypothesis → Experiment → Conclusion
11. (B) New and more precise evidence is found
12. (B) Artificial Satellites
13. (B) A process of continuous learning and exploring
14. (B) Undergo change and revision
15. (C) Observing closely and questioning
16. (B) Scientific temper
17. (B) Understanding the laws of nature to improve human life and the world

III. Match the following

- 18: 1. Observation — (B) Gathering information through five senses
2. Artificial Intelligence (AI) — (C) Change in modern science
3. Environmental pollution — (A) Human misuse

19:

1. Scientific temper — (B) Not accepting anything without evidence
2. Observation and questioning — (D) The first step of scientific inquiry
3. Scientific theories — (A) Gets revised when new evidence is found
4. Scientific method — (E) Involves testable hypotheses and experiments
5. The world of science — (C) A path of continuous learning and exploring

IV. Analogy / Fill in the blanks

20. Biology / Microbiology (Study of microorganisms)
21. Emails / Instant messages / Mobile phones
22. Continuous process / Scientific inquiry
23. Questioning and evidence / Rational thinking
24. Arriving at a conclusion / Data analysis
25. Hypothesis
26. Experimentation and logical reasoning

V. One Sentence Answers (1 Mark)

27. Science is a systematic body of knowledge gained through observation, experimentation, and logical reasoning.

28. A hypothesis is a temporary or testable tentative explanation proposed for an observed phenomenon.
29. Smartphone / Internet / Artificial Satellite.
30. Observation
31. Asking a Question / Identifying a Problem
32. Scientific temper is an attitude of logical thinking that involves questioning, testing, and demanding evidence before accepting anything as truth.
33. Old scientific theories undergo changes, updates, and revisions when new evidence is found.
34. Science is called a continuous process because knowledge keeps growing endlessly with new questions, tools, and discoveries.

VI. Two Sentences Answers (2 Marks)

35. No conclusion in science is final. As new tools and discoveries emerge, older theories are revised to reveal newer truths; hence, science is dynamic rather than static.
36. Technology is the application of scientific knowledge for practical purposes. While science provides principles and theories, technology builds tools using that knowledge.
37. Cultivating a scientific temper helps eliminate superstitions, prevents blind acceptance of ideas, and enables logical decision-making in life.
38. Science is not merely a list of facts recorded in books; it is an active method of asking questions, testing ideas, and analyzing outcomes. Hence, it is a process.
39. Observation and Questioning.
Formulating a hypothesis, testing through experimentation, and drawing a conclusion.
40. To overcome blind beliefs and superstitions.
To make rational decisions backed by evidence.
41. Scientific theories evolve as better technology yields fresh evidence. *Example:* The geocentric model (Earth at the center) was revised to the heliocentric model (Sun at the center).
42. Use of vaccines and medicines in healthcare.
Use of automobiles and smartphones for transport and communication.

VII. Three Sentences Answers (3 Marks)

43.
Observation & Questioning: Noticing natural phenomena and framing questions.
Hypothesis & Experimentation: Making a testable prediction and carrying out experiments.
Data Analysis & Conclusion: Examining experimental outcomes to reach a final conclusion.
44. Computers and the internet allow information to be shared globally within seconds. They enable scientists to process massive datasets rapidly and accelerate worldwide scientific research.

VIII. Long Answers (4/5 Marks)

45.
Positive Impacts: Medical advancements like vaccines have increased life expectancy; modern transportation and communication save time; agricultural innovations boost food production.
Negative Impacts: Industrial pollution causes environmental degradation and global warming; excessive gadget use leads to health issues; development of destructive weapons poses a threat to peace.
- 46.

3 Major Problems: 1) Society would be dominated by fear and superstitions. 2) Preventable epidemics would claim lives due to lack of medical knowledge. 3) Human progress would remain stagnant without technological innovations.

Solution by Scientific Method: The scientific method provided the freedom to question, experiment, and rely on evidence. By allowing theories to be corrected when new proof appears, it guided humanity from ignorance to enlightenment.

Exploring Substances: Acidic, Basic and Neutral

I. Choose the correct option for each of the following questions:

1. D. Hydrochloric acid
2. A. Lichen
3. B. Bitter
4. C. Phenolphthalein
5. C. Vinegar
6. C. Both A and B
7. B. Dark Pink (Magenta) and Green
8. D. Hydrochloric acid (It is a mineral acid, whereas others are organic/natural acids)
9. B. a-4, b-3, c-2, d-1
10. A. Milk of Magnesia is a base
11. C. Sodium bicarbonate
12. A. Salt and Water
13. D. Soap solution
14. D. They have crystallizing properties.
15. A. H_2O
16. B. Vitamin C
17. D. 1 and 3 only
18. B. Window cleaner
19. C. Slaked lime
20. C. Both A and B can be used
21. A. Acidity increases.
22. A. It turns blue.
23. B. Neutralization
24. D. Formic acid
25. B. Red
26. A. Red
27. C. Acid + Base
28. c) Soda lime
29. A. Litmus
30. A. OH^-
31. D. Fruit juice
32. D. Heat release
33. A. Fungi and Algae
34. B. Use of chemical fertilizers
35. A. Acidic
36. A. Yellow colour of turmeric changes to red in basic solution.

II. Fill in the blanks with correct answers:

- 37. Citric acid
- 38. Natural
- 39. Base
- 40. Citric
- 41. Salt and water
- 42. Lichen
- 43. No colour change (Remains yellow)
- 44. Sodium chloride NaCl
- 45. Red
- 46. Vitamin C
- 47. February 28
- 48. Calcium hydroxide

III. Match the following:

49.

- 1 — i (Hydrochloric acid : Non-vegetarian digestion)
- 2 — ii (Soda lime : Base)
- 3 — iii (Turmeric : Natural indicator)
- 4 — iv (Salt : Acid + Base)

50.

- 1 — i (Litmus : Natural indicator)
- 2 — ii (Hydroxide : Base)
- 3 — iii (Turmeric : Yellow indicator)
- 4 — iv (Salt : Neutralization)
- 5 — v (Citric acid : Lemon juice)

51.

- 1 — iv (Phenolphthalein : Man-made indicator)
- 2 — iii (Lichens : Source of obtaining litmus)
- 3 — i (Acetic acid : Vinegar)
- 4 — v (Sodium hydroxide : Base)
- 5 — ii (Neutralization reaction : Salt + Water)

IV. State True or False. If false, correct the sentence:

- 52. **False.** (Correct statement: Tap water is generally neutral.)
- 53. **True.**
- 54. **False.** (Correct statement: Neutralization is a reaction between an acid and a base.)
- 55. **False.** (Correct statement: Lime water is basic, so it turns red litmus paper to blue.)
- 56. **False.** (Correct statement: Turmeric is a natural indicator.)
- 57. **False.** (Correct statement: Common salt is a neutral salt.)
- 58. **False.** (Correct statement: Acid rain contains a high content of sulfuric acid and nitric acid.)
- 59. **False.** (Correct statement: Curd contains lactic acid.)
- 60. **False.** (Correct statement: Excessive use of chemical fertilizers increases soil acidity.)
- 61. **False.** (Correct statement: Ascorbic acid is the source of Vitamin C.)
- 62. **True.**
- 63. **True.**
- 64. **False.** (Correct statement: Turmeric indicator changes colour only in basic substances, not in acidic ones.)

V. Answer the following in a word or a sentence each:

65. Yellow.
66. HCl
67. Acidic substance.
68. Sodium chloride NaCl.
69. Lichens.
70. Base.
71. Acetic acid.
72. Calcium oxychloride CaOCl_2 .
73. Calcium hydroxide.
74. Indicators whose odour/smell changes in acidic or basic media (e.g., onion, vanilla).
75. Acharya Prafulla Chandra Ray.
76. A solution extracted from lichens that turns red in acidic solutions and blue in basic solutions.

VI. Short Answer Questions (2 Marks Each):

77. Salt is formed when an acid reacts with a base in a neutralization reaction, producing salt and water.
$$\text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water}$$
78. An indicator is a substance that changes its colour or odour to show whether a given substance is acidic or basic.
Examples: Litmus, Turmeric, Phenolphthalein.
79.
 - a. **Acids:** Sour in taste and turn blue litmus paper red.
 - b. **Bases:** Bitter in taste, soapy to touch, and turn red litmus paper blue.
80.
 1. Litmus
 2. Turmeric (or China rose).
81. Soap solution is basic in nature. Turmeric is a natural indicator that turns red when it comes into contact with a basic substance.
82. Adding water to acid is highly exothermic and may cause the acid to splash out and cause burns. Hence, acid must always be added slowly to water with continuous stirring.
83. Turmeric contains a compound called curcumin, which chemically reacts with basic solutions causing its colour to change from yellow to red.
84. Litmus paper contains natural dyes that react specifically with hydrogen ions present in an acidic solution, causing a colour change to red.
85. Neutralization is an exothermic reaction. When H^+ ions from the acid react with OH^- ions from the base to form water, chemical energy is released as heat.
86. Turmeric is obtained directly from a plant source without chemical synthesis and can indicate basic nature through colour change, making it a natural indicator.
87. Common salt NaCl is formed by the neutralization reaction between a strong acid HCl and a strong base NaOH.
88.
 - a. **Acids:** Lemon juice, Orange juice, Curd, Vinegar.
 - b. **Bases:** Baking soda, Soap solution.
89.
 - a. **Acids:** Vinegar, Lemon juice.
 - b. **Bases:** Baking soda, Borax, Soda.

- c. (Note: Distilled water is neutral).
90. Rainwater containing dissolved atmospheric pollutants like sulphur dioxide and nitrogen dioxide, which form sulphuric acid and nitric acid, is called acid rain.
 91. Dip both red and blue litmus papers into distilled water. Neither paper will change colour, proving that distilled water is neutral.
 92. Test the product with a red litmus paper. Since the red litmus turns blue, ammonia present in window cleaners is basic in nature.
 93.
 - i. Lemon juice - Citric acid
 - ii. Curd - Lactic acid
 - iii. Tamarind - Tartaric acid
 - iv. Spinach - Oxalic acid
 94.
 - a. For eye wash: Boric acid
 - b. In carbonated beverages: Carbonic acid
 95.
 - a. Salt: Sodium chloride NaCl
 - b. Baking soda: Sodium bicarbonate NaHCO_3
 96. Lemon juice tastes sour because it contains citric acid, whereas lime water tastes bitter because it contains a base called calcium hydroxide.
 97.
 - (i) To remove grease stains: Ammonium hydroxide
 - (ii) Antacid: Magnesium hydroxide
 98.
 1. Sulphur dioxide SO_2
 2. Nitrogen dioxide NO_2
 99. Eggshells are made of calcium carbonate. When acetic acid in vinegar reacts with calcium carbonate, carbon dioxide gas CO_2 is released, forming bubbles.
 100. Turmeric is called the golden spice due to its rich yellow colour, wide culinary and medicinal uses, preservative qualities, and deep cultural value in India.
 101. Rose petal extract is a natural indicator. If the solution turns magenta/dark pink, it is acidic; if it turns green, it is basic; if there is no colour change, it is neutral.
 102. If a liquid turns blue litmus red and leaves phenolphthalein colourless, it is an acid. If it turns red litmus blue, turmeric red, and phenolphthalein pink, it is a base.
 103. Many can use litmus paper or China rose extract indicator because both give distinct and contrasting colour changes for acidic and basic solutions.
 104. Message can be written using turmeric paste on white paper (yellow). Spraying it with soap solution (base) turns the writing red. Spraying vinegar over it turns it back to yellow.

VII. Brief Answer Questions (3 Marks Each):

105.
 - a. **Natural Indicators:** Obtained directly from natural plant sources. *Examples:* Litmus, Turmeric, China Rose.
 - b. **Man-made (Synthetic) Indicators:** Synthesized chemically in laboratories. *Examples:* Phenolphthalein, Methyl Orange.
106. The chemical reaction between an acid and a base to form salt and water with the release of heat is called a neutralization reaction.

Acid + Base $\rightarrow$ Salt + Water + Heat

Example: $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

107.

- a. Phenolphthalein remains **colourless** in acidic and neutral solutions.
- b. It turns **deep pink** in basic solutions.

108. Our stomach produces hydrochloric acid for digestion. Excess acid production causes acidity and pain. Antacids contain mild bases like magnesium hydroxide, which neutralize the excess acid and relieve acidity.

109. Ant stings inject formic acid into the skin, causing pain and swelling. Calamine solution contains zinc carbonate (a mild base) which neutralizes the formic acid and soothes the skin.

110. Factory wastes often contain high concentrations of acids. If discharged directly into water bodies, they kill fish and aquatic life. Therefore, they are treated with basic substances to neutralize the acids before disposal.

VIII. Short Essay Questions (4 Marks Each):

111.

Ans:

Property	Acids	Bases
Taste	Sour taste	Bitter taste
Touch	Corrosive	Slippery/Soapy
Litmus Test	Turns blue litmus red	Turns red litmus blue
Turmeric Test	No color change (Yellow)	Turns red
Ions Formed	Produces H^+ ions	Produces OH^- ions

112.

- a. **Acids in Daily Life:** Hydrochloric acid HCl aids digestion in the stomach. Acetic acid (vinegar) and citric acid (lemons) are used for food preservation and flavouring.
- b. **Bases in Daily Life:** Sodium hydroxide and potassium hydroxide are used to make soaps and detergents. Magnesium hydroxide is used as an antacid to relieve stomach acidity.

113.

- a. Salts are ionic compounds produced by the reaction between acids and bases.
- b. **Uses:**
 - 1. Common salt NaCl is used in cooking and food preservation.
 - 2. Baking soda (NaHCO_3) is used in baking and antacids.
 - 3. Washing soda is used for laundry and softening hard water.
 - 4. Chemical fertilizers use various mineral salts for crop growth.

114.

- a. **Objective:** To prepare and test turmeric paper indicator.
- b. **Procedure:** Mix turmeric powder with a little water to form a paste. Apply it to filter paper and let it dry. Cut it into thin strips.
- c. **Observation:** Place a drop of soap solution on a strip; it turns red. Place a drop of lemon juice on another strip; it remains yellow.
- d. **Conclusion:** Turmeric acts as a natural indicator that turns red in basic solutions.

115.

- a. **Formation:** Salts are formed when the positive ions of a base combine with the negative ions of an acid during neutralization.
- b. **Uses:** Used as food preservatives (NaCl), baking agents, soil conditioners, and raw materials in manufacturing glass, soap, and medicines.

116.

- a. **a. Toothpaste:** Bacteria in the mouth produce acids from food residue, causing tooth decay. Toothpaste is mildly basic and neutralizes these mouth acids to protect teeth.
- b. **b. Ant bite treatment:** Ant stings inject acidic formic acid. Applying a basic substance like baking soda or calamine neutralizes the acid and stops pain.

117.

- a. **Milk in water:** Slightly acidic/neutral — Red litmus paper remains red.
- b. **Baking powder in water:** Basic — Red litmus paper **turns blue**.
- c. **Vinegar in water:** Acidic — Red litmus paper remains red.
- d. **Glucose in water:** Neutral — Red litmus paper remains red.

IX. Long Answer Questions (5 Marks Each):

118.

- i. **Acids:**
 - *Uses:* Digestion HCl, manufacture of fertilizers and batteries H_2SO_4 .
 - *Harmful effects:* Concentrated acids cause severe burns; acid rain damages soil, buildings, and aquatic life.
- ii. **Bases:**
 - *Uses:* Manufacturing soaps, paper, detergents, and neutralizing acidic soil.
 - *Harmful effects:* Strong bases are caustic and irritate skin and eyes.
- iii. **Salts:**
 - *Uses:* Essential for body fluid balance and food preservation.
 - *Harmful effects:* Excessive intake of salt leads to high blood pressure.

119.

- i. **Equation:**
 $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{Heat}$
(*Hydrochloric acid + Sodium hydroxide $\rightarrow$ Sodium chloride + Water*)
- ii. **Explanation:** In this reaction, hydrogen ions H^+ from hydrochloric acid combine with hydroxide ions OH^- from sodium hydroxide to form neutral water molecules. Sodium Na^+ and chloride Cl^- ions combine to form sodium chloride salt. Heat energy is released during the process.

120.

- i. **Acids:** Chemical substances that taste sour, release H^+ ions in aqueous solution, and turn blue litmus red. (e.g., vinegar, lemon juice).
- ii. **Bases:** Chemical substances that taste bitter, feel soapy, release OH^- ions in solution, and turn red litmus blue. (e.g., sodium hydroxide, lime water).
- iii. **Indicators:** Special substances that display distinct colour changes in acidic or basic solutions, allowing us to identify their chemical nature safely. (e.g., litmus, turmeric, phenolphthalein).

121.

A. The nature of soil may be acidic. B. The nature of soil may be basic (alkaline). C. A pH indicator can be used to test the nature of the soil. D. Acidic soil can be treated by adding lime. E. Basic (alkaline) soil can be treated by adding organic manure (compost).

122. Grape juice is acidic, so it causes China rose/red rose indicator to turn dark red/magenta.

When baking soda (a base) is added, it neutralizes the acid in the grape juice. As more baking soda is added, the solution becomes basic, causing the rose extract indicator to change colour from **red to green**.

123.

i. **Procedure using Turmeric Paper:**

1. Dip turmeric paper strips into all three liquids separately.
2. **Identification of Baking Soda Solution:** The bottle that turns the turmeric paper **red** contains baking soda solution (Base).
3. Take the turmeric paper that turned red and dip it into the remaining two liquids.
4. **Identification of Vinegar:** The bottle that changes the red turmeric paper **back to yellow** contains vinegar (Acid, as it neutralizes the base).
5. **Identification of Sugar Solution:** The liquid that causes no change in colour on either fresh yellow or red turmeric paper is the sugar solution (Neutral).

Electricity: Circuits and their Components

I. Choose the correct option:

1. (A) Metal cap (+) and Metal disc (-)
2. (B) Filament
3. (C) Tungsten
4. (B) From positive terminal to negative terminal
5. (B) Glows
6. (B) Open / Incomplete
7. (C) Battery
8. (C) Positive terminal of one to negative terminal of another
9. (B) Conductors
10. (C) Rubber
11. (C) Graphite (Pencil lead)
12. (B) Chemical energy
13. (B) To prevent electric shock (as an insulator)
14. (B) Its filament is broken
15. (B) Positive terminal
16. (B) Complete or break the circuit
17. (B) Conductor

II. Fill in the Blanks:

18. circuit (electric circuit)
19. conductors
20. plastic
21. positive (+)
22. negative (-)
23. filament
24. tungsten
25. positive (+), negative (-)
26. battery
27. negative (-)
28. switch
29. closed (complete)

- 30. open (incomplete)
- 31. conductors
- 32. insulators
- 33. chemical
- 34. fused (burnt)
- 35. positive (+)
- 36. negative (-)
- 37. conductor
- 38. insulators
- 39. conductor
- 40. insulator

III. Analogy Based Questions:

- 41. Negative terminal
- 42. Electrical insulator
- 43. Open circuit
- 44. Battery
- 45. Switch
- 46. Negative terminal
- 47. Electrical conductor
- 48. Does not glow (Off)

IV. Match the Following:

49.

- 1 — (C) Source of electrical energy
- 2 — (A) Gives light
- 3 — (B) Electrical insulator

50.

- 1 — B) Source of electrical energy in a circuit
- 2 — D) Combination of more than one electric cell
- 3 — A) Helps to start or stop the flow of electricity
- 4 — C) Gives light when electric current flows

51.

- 1 — C) Positive terminal (+) of an electric cell
- 2 — D) Light-emitting tungsten wire in a bulb
- 3 — B) Negative terminal (-) of an electric cell
- 4 — A) Example of an insulator

52.

- 1 — C) Metallic conductor
- 2 — B) Insulator that stops electric flow
- 3 — D) Non-metal yet a conductor
- 4 — A) Human body (Conductor)

53.

- 1 — C) Circuit completes and bulb glows
- 2 — D) Circuit incomplete and bulb does not glow
- 3 — A) Filament broken and current does not flow
- 4 — B) From positive terminal to negative terminal

V. Answer in One Sentence:

54. An electric cell is a simple device that converts stored chemical energy into electrical energy.
55. A battery is a combination of two or more electric cells connected systematically.
56. The very thin spiral wire inside an electric bulb that glows to emit light is called the filament.
57. Tungsten metal is used to make the filament of an electric bulb.
58. Materials that allow electric current to pass through them are called electrical conductors.
(e.g., Copper wire, Iron nail).
59. Materials that do not allow electric current to pass through them are called electrical insulators. (e.g., Rubber, Plastic).
60. A completely unbroken and continuous closed path through which electric current flows is called a closed circuit.
61. A circuit in which the path is broken at any point, preventing electric current from flowing, is called an open circuit.
62. In a simple electric circuit, current flows from the positive (+) terminal to the negative (-) terminal of the cell.
63. The main function of a switch is to complete (turn ON) or break (turn OFF) the electric circuit as needed.
64. A fused bulb means its internal filament wire is broken, making the circuit incomplete.
65. Pencil lead (graphite) is a good conductor of electricity.
66. Electric wires are covered with plastic to provide insulation and protect users from electric shocks.
67. An electric tester is a device used to check whether a given object is an electrical conductor or an insulator.
68. In a dry cell, energy is stored in the form of chemical energy.

VI. Answer in Two Sentences (2 Marks):

69. An electric cell consists of a metal cap at the top acting as the positive (+) terminal and a flat metal disc at the bottom acting as the negative (-) terminal. It contains chemicals inside.
70.
 - i. **Conductors:** Allow electricity to pass through them easily (e.g., Copper, Aluminium).
 - ii. **Insulators:** Do not allow electricity to pass through them (e.g., Rubber, Wood).
71.
 - i. **Closed Circuit:** The circuit path is complete, current flows, and the bulb glows.
 - ii. **Open Circuit:** The circuit path is broken (switch is OFF), current does not flow, and the bulb does not glow.
72. A bulb fuses when its filament breaks due to excessive current or old age. A fused bulb does not glow because the broken filament makes the electric circuit incomplete.
73. A battery is a combination of two or more cells. While connecting cells to make a battery, the positive (+) terminal of one cell must always be connected to the negative (-) terminal of the next cell.
74. Plastic and rubber are electrical insulators that prevent electric current from passing through. They are used as coverings to prevent users from getting severe electric shocks.
75. **Construction:** It consists of an electric cell, a bulb, and connecting wires with free ends.
Use: It is used to test whether a given material conducts electricity or not.
76. Both water and the human body are good conductors of electricity. Touching switches with wet hands allows electricity to flow easily through the water into our body, leading to a dangerous electric shock.

VII. Answer in Three Sentences (3 Marks):

77.

- i. Place the given object between the two free terminals of a conduction tester to complete the circuit.
- ii. If the tester bulb glows, the object is an **electrical conductor**.
- iii. If the tester bulb does not glow, the object is an **electrical insulator**.

78.

- i. **a. Electric Cell:** Top metal cap - Positive (+) terminal; Bottom metal disc - Negative (-) terminal.
- ii. **b. Electric Bulb:** Outer glass case, Filament, and two base Terminals.
- iii. *Role of Filament:* It heats up and glows to emit light when current passes through it.

79.

- i. **Closed Circuit:** The switch is in the 'ON' position, forming a complete path. Electric current flows from the positive to the negative terminal, causing the bulb to glow.
- ii. **Open Circuit:** The switch is in the 'OFF' position or a wire is disconnected, making the path incomplete. No current flows, and the bulb remains off.

80.

1. Assemble a simple tester using a cell, bulb, and connecting wires with open ends.
2. Touch the free wire ends to the two ends of the test material (e.g., iron nail or rubber eraser).
3. If the bulb lights up, it is a conductor (iron nail); if the bulb does not light up, it is an insulator (rubber eraser).

81.

- i. **Symbols:**
 - i. Cell: (Long thin line for (+), short thick line for (-))
 - ii. Bulb: (A circle enclosing an M-shaped loop)
 - iii. Switch ON: (Line connected to two dots/closed contact)
- ii. **Diagram Description:** Connect the cell, glowing bulb, and closed switch in a continuous series loop using straight wire lines.

82.

- i. **(A) 2 Major Reasons:**
 1. Cells are connected incorrectly (positive to positive terminal instead of positive to negative).
 2. Loose wire connections or a fused bulb.
- ii. **(B) Correct Method:** Connect the positive (+) terminal of the first cell to the negative (-) terminal of the second cell in series.

VIII. Answer in Four to Five Sentences (4 / 5 Marks):

83.

(Diagram Details)

- i. Draw a closed loop connecting the positive terminal of the cell to the switch, from the switch to the bulb, and from the bulb back to the negative terminal of the cell.
- ii. **Labels:** 1. Electric Cell, 2. Switch (ON position), 3. Electric Bulb, 4. Connecting Wires.

84.

- i. **(A) 4 Major Components & Functions:**
 1. **Electric Cell:** Provides the electrical energy needed for the circuit.
 2. **Connecting Wires:** Conduct electric current throughout the circuit path.
 3. **Switch:** Controls the flow of current by opening or closing the circuit.

4. **Electric Bulb:** Converts electrical energy into light (and heat) energy.
- ii. **(B) Importance of Plastic Coating:** Plastic acts as an insulator that prevents electric shocks and guards against short circuits.
- 85.
- i. **a. 4 Reasons:** 1. Fused bulb filament, 2. Incorrect cell polarity connection, 3. Exhausted/dead battery, 4. Loose wire contacts.
- ii. **b. Troubleshooting:** Replace with a new bulb; reconnect cell terminals correctly (+ to -); tighten all loose wire joins.
- iii. **c. Safety Rules:** 1. Never operate electrical switches with wet hands, 2. Never touch bare, damaged, or uninsulated live wires.
- 86.
- (A) Definitions & Examples:**
- a. Conductors: Materials that allow electricity to flow through them (e.g., Copper, Aluminium).
- b. Insulators: Materials that block the flow of electricity (e.g., Rubber, Wood).
- (B) Classification:**
- a. **Conductors:** Iron nail, Copper coin, Pencil lead (Graphite).
- b. **Insulators:** Rubber eraser, Glass bangle, Piece of dry wood.
- 87.
- (A) Battery:** A combination of two or more cells. In the correct connection, the positive (+) terminal of one cell contacts the negative (-) terminal of the next. In an incorrect connection, positive is placed against positive (current will not flow).
- (B) Energy Transformation:** In a dry cell, *chemical energy is converted into electrical energy*.
- (C) Torch Operation:** When turned 'ON', the switch completes the circuit connecting the internal batteries to the torch bulb, allowing current to flow and making the bulb glow.

The World Of Metals and Non-Metals

I. Fill in the blanks:

1. conductor
2. Magnesium Oxide (MgO)
3. Rust (Iron Oxide)
4. Gold (Au)
5. conductors (electrical conductors)
6. corrosion
7. rusting
8. chemical
9. reactive
10. Hydrogen (H₂)
11. Oxygen
12. Sodium (or Potassium)
13. Duralumin / Titanium alloy

I. Choose the correct option:

14. **D. Only i, ii, iii**
15. **C. Sodium**

16. **C. Mercury**
17. **B. Silver foil**
18. **B. Ductility**
19. **A. Sulphur dioxide**
20. **D. Phosphorus**
21. **A. Sodium**
22. **A. Aluminium**
23. **A. Acidic**
24. **C. When in contact with both air and water**
25. **B. Iron nail**
26. **D. Sodium**
27. **C. Generally, some metals are malleable.**
28. **B. i and iii**
29. **D. All of the above**
30. **A. Sonorous property**
31. **C. Zinc**
32. **C. Graphite**
33. **C. Aluminium**
34. **(B) Sulphur**
35. **(B) Galvanization**

III. State whether True or False:

36. **False** (Generally, non-metals do not react with acids)
37. **True**
38. **True**
39. **False** (Coal is a brittle non-metal and breaks into powder)
40. **True**
41. **False** (The handle is made of insulating plastic/wood; magnesium oxide is basic and turns red litmus blue)
42. **False** (Aluminium and copper are metals)
43. **False** (Metallic oxides are basic and turn red litmus paper blue)
44. **False** (Utensils are used because they are good thermal conductors, not electrical)

IV. Match the Following:

45.

- 1 — (C) Burns with a dazzling white light
- 2 — (A) Non-metal
- 3 — (B) Anti-rust coating

46.

- 1 — iii. Copper
- 2 — v. Gold
- 3 — i. Oxygen
- 4 — iv. Nitrogen
- 5 — ii. Chlorine

47.

- 1 — iii. Jewellery
- 2 — v. Tools / Implements
- 3 — iv. Food packaging
- 4 — vi. Fuel

5 — ii. Electric wire

6 — i. Thermometer

V. Fill in the blanks based on analogy:

48. Non-metal

49. Poor (or Insulating)

VI. Answer in One Sentence:

50. Chemically, rust is Hydrated Iron Oxide [$\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$].

51. Materials that easily allow heat to pass through them are called thermal conductors.

52. Copper and Iron.

53. Sulphur and Oxygen.

54. Graphite (a form of carbon).

55. Hydrogen gas.

56. Iodine.

57. Phosphorus reacts vigorously with atmospheric oxygen and catches fire, so it is stored under water.

58. Gold and Platinum.

59. When a metal reacts with oxygen, a metallic oxide (which is basic in nature) is formed.

60. Iodine (Tincture of Iodine).

61. Nitrogen (and Sulphur).

62. Copper.

63. Iron and Carbon (along with Chromium and Nickel).

64. A substance that allows electric current to flow through it easily is called an electrical conductor.

65. Substances that do not allow electric current to pass through them are called electrical insulators.

VII. Give Suitable Reasons:

66. Metals like gold and silver are highly lustrous, malleable, ductile, and unreactive towards air and moisture (do not corrode), making them ideal for jewellery.

67. Sodium and potassium are highly reactive metals that catch fire instantly when exposed to atmospheric air and moisture. Hence, they are kept stored under kerosene.

68. Wood and rubber are poor conductors of heat (insulators). Handles are made of these materials to prevent heat from transferring to hands while cooking.

69. Metals produce a ringing sound when struck with a hard object (sonorous property). Hence, bells are made of metals.

70. Silica gel is a moisture-absorbing agent. Packets are placed in shoe boxes to absorb moisture and keep the shoes dry and undamaged.

71. Steel is an alloy with extremely high tensile strength and toughness, allowing ropes made of steel wires to bear heavy loads without breaking.

VII. Answer in Two Sentences (2 Marks):

72. Wood and plastic are thermal insulators. Handles are coated with them so that heat from the utensil is not transferred to the user's hand during cooking.

73. No, an iron nail kept immersed in oil will not rust because oil prevents oxygen and moisture from coming into contact with the nail.

74.

- i. **Metals:** Lustrous, malleable, ductile, sonorous, and good conductors of heat and electricity.

- ii. **Non-metals:** Non-lustrous, brittle (non-malleable, non-ductile), and poor conductors of heat and electricity.

75.

- i. **Metals:** Copper, Iron, Aluminium.
- ii. **Non-metals:** Graphite, Sulphur, Oxygen, Nitrogen.

76. When a magnesium ribbon is burnt in air, it burns with a brilliant white flame to form a white powder called magnesium oxide (MgO).

77. Malleability is the physical property of metals by which they can be beaten into thin sheets using a hammer.

Example: Beating aluminium to make aluminium foil.

78. Ductility is the property of metals by which they can be drawn into long, thin wires.

Example: Drawing copper to make electrical copper wires.

79. Galvanization is the process of applying a thin protective coating of zinc over iron objects to prevent them from rusting.

80. An element is a pure form of matter that cannot be broken down into simpler substances by chemical reactions. There are 94 naturally occurring elements (118 in total).

81. I will choose **copper** or **iron** because they are metals that possess high thermal conductivity and high melting points, making them ideal for heating water quickly.

82. The iron nail immersed in **oil** will not rust because the oil layer cuts off the supply of atmospheric oxygen and water.

83. **Ans:** Corrosion is the gradual wearing away of a metal surface due to chemical reaction with atmospheric air, moisture, or chemicals. Iron has the highest susceptibility to corrosion (rusting).

84. Rusting is the slow chemical process in which iron reacts with atmospheric oxygen and water vapor to form a reddish-brown coating of hydrated iron oxide.

85. An alloy is a homogeneous mixture of two or more metals, or a metal and a non-metal.

Constituents of Steel: Iron and Carbon.

VIII. Answer in Three Sentences (3 Marks):

86.

- a. **Description:** Hold a magnesium ribbon with tongs and heat it over a flame. It burns with a dazzling white flame forming a white ash of magnesium oxide. Dissolving this ash in water gives a basic solution.
- b. **Equation:** $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

87.

Property	Metals	Non-Metals
Physical Nature	Hard, malleable, and ductile	Brittle (powdery on hammering)
Conductivity	Good conductors of heat & electricity	Poor conductors (insulators)
Oxide Nature	Form basic oxides	Form acidic oxides

88.

- a. **Reaction:** Magnesium reacts with oxygen to form Magnesium Oxide. Sulphur reacts with oxygen to form Sulphur Dioxide gas.

- b. **Differences:** Magnesium Oxide solution is **basic** in nature (turns red litmus blue), whereas Sulphur Dioxide solution is **acidic** in nature (turns blue litmus red).

VIII. Answer in Four to Five Sentences (4 / 5 Marks):

89. Magnesium, Magnesium oxide, no colour change

90.

- a. High electrical conductivity allows metals like copper to be used for electrical power lines.
- b. High thermal conductivity and high melting point make metals like aluminium suitable for cooking utensils.
- c. Non-metal oxygen is vital for the survival and respiration of all living organisms.
- d. Non-metals like nitrogen and phosphorus are used in fertilizers to enhance plant growth.

91.

- a. Heating iron makes it red-hot and soft.
- b. In this heated state, the malleability of iron increases significantly.
- c. This allows the blacksmith to easily hammer and shape the iron into required tools like axes or ploughshares.

92.

- a. **Activity:** Set up a simple circuit with an electric cell, switch, connecting wires, and a bulb leaving two free ends.
- b. Place an iron nail or copper wire across the two free ends to complete the circuit.
- c. When the switch is turned ON, the bulb glows immediately, demonstrating that metals conduct electricity well.

93.

- a. **Metals:** Copper (wiring and circuits), Aluminium (casing body), Gold/Silver (microchip connectors), Lithium (rechargeable battery).
- b. **Non-metals:** Silicon (metalloid - microprocessor chip), Oxygen and Carbon (display screen and outer polymer parts).
- c. **Role:** They facilitate swift electrical signal transmission, data processing, structural durability, and battery power storage.

94.

- a. **Good Conductors of Electricity:** Materials that easily allow electric current to pass through them.
Examples: Copper, Aluminium.
- b. **Poor Conductors (Insulators) of Electricity:** Materials that block or do not allow electric current to pass through them.
Examples: Rubber, Plastic (or Dry wood).

95.

- 1. **Painting:** Applying paint on the metal surface blocks exposure to air and moisture.
- 2. **Oiling/Greasing:** Applying grease on machine parts prevents rust formation.
- 3. **Galvanization:** Coating a thin protective layer of zinc over iron.
- 4. **Electroplating:** Coating with a corrosion-resistant metal like chromium.
- 5. **Alloying:** Mixing iron with carbon and nickel/chromium to prepare stainless steel.

Changes Around Us: Physical and Chemical

I. Multiple Choice Questions (1 Mark)

1. (B) Melting of ice into water
2. (C) The chemical composition of the substance does not change
3. (C) Digestion of food
4. (B) Magnesium oxide
5. (B) Basic
6. (C) Green
7. (B) Copper
8. (A) Calcium carbonate
9. (C) Both oxygen and water (moisture)
10. (B) Galvanisation
11. (B) Chemical change
12. (B) Physical change
13. (D) All of the above
14. (B) Hydrated Iron Oxide
15. (B) Making (folding) a paper boat
16. (B) Chemical
17. (B) Chemical change
18. (C) Burning of magnesium ribbon
19. (B) Erosion (Soil erosion)

II. Fill in the Blanks (1 Mark)

20. Physical
21. New
22. Physical
23. Physical
24. Physical
25. Chemical
26. Magnesium oxide
27. Magnesium hydroxide
28. Green (Ferrous sulphate)
29. Calcium carbonate
30. Ca(OH)_2 / Calcium hydroxide
31. Oxygen, Water / Moisture
32. Galvanisation
33. Crystallisation
34. Physical
35. Chemical
36. Chemical
37. Carbon dioxide (CO_2)
38. Physical
39. Ultraviolet (UV)
40. Chemical

III. Match the Analogy / Relationship (1 Mark)

41. Chemical change
42. Calcium carbonate + Water
43. Reversible physical change

44. Green colour
45. Crystallisation
46. Reversible physical change
47. Acid
48. Physical change

IV. Match the Following (1 Mark)

49. 1 – (C), 2 – (A), 3 – (B)
50. 1 – B, 2 – D, 3 – A, 4 – C
51. 1 – C, 2 – D, 3 – A, 4 – B
52. 1 – C, 2 – D, 3 – A, 4 – B

V & VI. Very Short Answer Questions (1 Mark)

53. Properties such as shape, size, color, and state of a substance are called its physical properties.
54. A change in which a substance undergoes a change in its physical properties without forming any new substance is called a physical change.
55. A change in which one or more new substances are formed is called a chemical change.
56. $4\text{Fe} + 3\text{O}_2 + \text{H}_2\text{O} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ (Iron + Oxygen + Water $\rightarrow$ Hydrated Iron Oxide/Rust).
57. The process of depositing a layer of zinc on iron to prevent it from rusting is called galvanisation.
58. Magnesium hydroxide $[\text{Mg}(\text{OH})_2]$.
59. Calcium carbonate (CaCO_3) .
60. The blue colour of the copper sulphate solution changes to green.
61. The process of obtaining large, pure crystals of a substance from its saturated solution is called crystallisation.
62. Enzymes present in the cut apple react with oxygen in the air, undergoing a chemical reaction.
63. Because air in coastal areas contains high humidity (moisture) and salt, which accelerates rusting.
64. Ultraviolet (UV) radiation.
65. Carbon dioxide (CO_2) gas.
66. Curdling of milk / Cooking of food.
67. Irreversible physical change.
68. A change affecting only the physical properties of matter without altering its chemical composition.
69. i) One or more new substances are formed. ii) It is usually irreversible and permanent.

VII. Short Answer Questions (2 Marks)

70.
 - a. **Physical Change:** No new substance is formed; usually reversible.
 - b. **Chemical Change:** One or more new substances are formed; irreversible/permanent.
71. Presence of Oxygen and Water/Moisture.
72. Galvanisation is the process of coating iron with a layer of zinc metal. It prevents iron from coming into direct contact with air and moisture, thereby preventing rust.
73. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ (Magnesium + Oxygen $\rightarrow$ Magnesium Oxide).
74. When CO_2 is passed through lime water, it reacts with calcium hydroxide to form insoluble white 'Calcium Carbonate', making the solution milky white.
75.
 - i) The blue copper sulphate solution turns green (due to iron sulphate formation).

- ii) A brown deposit of copper forms on the iron nail.
76. It is a chemical change because a new chemical compound is formed due to reaction with atmospheric oxygen, and it cannot be reversed.
77. Crystallisation is the process of separating pure solid crystals from a solution. It is a **physical change**.
78. i) Production of heat, light, or sound. ii) Evolution of gas or change in color/smell.
79. No. Tearing paper is a physical change (no new substance forms), whereas burning paper is a chemical change (ash and gases are formed).
80. Lemon juice (Citric acid) + Baking soda (Sodium hydrogen carbonate) $\rightarrow$ Carbon dioxide + Other salts + Water.
81. Coastal air carries high humidity and salt content, which speeds up the chemical process of rusting. Desert air is extremely dry.

VIII. Three Marks Questions

- 82.
- (A) Burning magnesium ribbon produces a brilliant white flame and forms a white powder, Magnesium Oxide: $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$.
- (B) Dissolving ash in water forms Magnesium Hydroxide ($\text{Mg}(\text{OH})_2$), which turns red litmus blue, proving it is basic in nature.
- 83.
- When an iron nail is placed in copper sulphate solution, iron displaces copper.
- Change 1:** Solution turns from blue to green (FeSO_4 formed).
 - Change 2:** Brown deposit of copper settles on the iron nail ($\text{CuSO}_4 + \text{Fe} \rightarrow \text{FeSO}_4 + \text{Cu}$).
- 84.
- Carbon dioxide (CO_2) gas.
 - Passing CO_2 through lime water turns it milky white due to calcium carbonate formation: $\text{CO}_2 + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$.
- 85.
- (A) Rusting is the chemical formation of hydrated iron oxide on the surface of iron when exposed to oxygen and moisture.
- (B) **Prevention:** 1. Painting or greasing the iron surface. 2. Galvanisation (coating with zinc).
- 86.
- Take water in a beaker, add a few drops of dilute sulfuric acid, and heat it.
 - When boiling, add copper sulphate powder continuously until no more dissolves (saturated).
 - Filter the solution and allow it to cool undisturbed to obtain pure blue copper sulphate crystals.

IX. Long Answer Questions (4 / 5 Marks)

- 87.
- (A) Iron reacts with oxygen and water to form rust ($4\text{Fe} + 3\text{O}_2 + \text{H}_2\text{O} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$), making structures weak over time.
- (B) Ships are continuously in contact with sea water, which is salty and accelerates corrosion.
- (C) Mixing iron with chromium, nickel, and manganese creates stainless steel, which does not rust.
- 88.

- a. Experiment demonstrating CO₂ test with lime water.
 - b. Mix baking soda and lemon juice in a test tube, collect the released gas via a glass tube, and pass it into fresh lime water.
 - c. $\text{CO}_2 + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$.
 - d. CO₂ specifically turns clear lime water milky due to insoluble CaCO₃ precipitate.
- 89.
- i. **Melting candle:** Physical (change of state); **Burning candle:** Chemical (produces CO₂, heat, light).
 - ii. **Cutting wood:** Physical (size change); **Burning wood:** Chemical (forms ash, smoke).
 - iii. **Photosynthesis:** Chemical (plants synthesize glucose and O₂ using sunlight).
 - iv. **Crystallisation:** Physical (separation of pure crystals, no new compound).
- 90.
- (A)
- a. **Physical:** No new substance, reversible, affects physical state/size.
 - b. **Chemical:** New substance formed, irreversible, affects chemical properties.
- (B) Ozone absorbs UV light and breaks down into oxygen (O₂). Since new oxygen molecules are produced, it is a chemical change.
- 91.
- a. A change in which new substances with different properties are formed is a chemical change.
 - b. i) Release/absorption of heat & light ii) Change in colour/odour iii) Gas evolution.
 - c. Crackers explode producing harmful gases, loud sound, heat, and toxic fumes, making it dangerous.
- 92.
- a. Add acid to baking soda, direct the gas produced into a test tube containing lime water using a delivery tube.
 - b. Step 1: Acid + Sodium hydrogen carbonate $\rightarrow$ CO₂ + Salt.
Step 2: $\text{CO}_2 + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$.
 - c. Calcium Carbonate (CaCO₃).
- 93.
- a. (A) Oxygen and water/humidity are mandatory. $4\text{Fe} + 3\text{O}_2 + \text{H}_2\text{O} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$.
 - b. (B) Saline sea water speeds up the electrochemical oxidation process of iron.
 - c. (C) Galvanisation creates a protective layer blocking moisture; stainless steel alters the chemical nature to resist corrosion.
- 94.
- a. (A) Magnesium Hydroxide is formed. It turns red litmus blue, confirming its basic nature.
 - b. (B) Iron being more reactive displaces copper from copper sulphate solution:
 $\text{CuSO}_4 + \text{Fe} \rightarrow \text{FeSO}_4 + \text{Cu}$. Solution turns green and copper deposits on the nail.
- 95.
- When landslides or rivers break rocks into smaller stones and sand, only the shape, size, and physical appearance of the rocks change. The chemical composition remains identical and no new substance is formed, so it is a physical change.

Exercise Answers (Textbook Solutions)

1. (a) Photosynthesis – **Chemical change**
(b) Dissolving sugar in water – **Physical change**

- (c) Burning of wood – **Chemical change**
 - (d) Melting of wax – **Physical change**
 - (e) Beating aluminium to make aluminium foil – **Physical change**
 - (f) Digestion of food – **Chemical change**
2. (a) **False** (*Correct: Cutting a log of wood into pieces is a physical change.*)
 (b) **False** (*Correct: Formation of manure from leaves is a chemical change.*)
 (c) **True**
 (d) **False** (*Correct: Iron and rust are two different chemical substances.*)
 (e) **True**
 3. (a) Calcium carbonate
 (b) Sodium hydrogen carbonate
 (c) Painting, Galvanisation
 (d) Physical
 (e) Chemical
 4. It is a **chemical change**. Citric acid in lemon juice reacts with sodium hydrogen carbonate (baking soda) to produce new substances, including carbon dioxide gas.
 5.
 - a. **Physical Change:** Melting of solid wax to liquid wax upon heating.
 - b. **Chemical Change:** Burning of wax vapor in air to yield heat, light, and CO₂.
 - c. **Another Example: Eating Food** (Chewing food is a physical change; Digestion of food is a chemical change).
 6. Curdling of milk is a chemical change because: i) A new substance (lactic acid/curd) is formed by bacterial action. ii) Taste and chemical nature change. iii) Curd cannot be converted back to milk.
 7. Cutting wood changes only its size and shape (no new substance = physical change). Burning wood yields completely new substances like ash, smoke, and gases (chemical change).
 8. Boil water with dilute sulfuric acid, dissolve copper sulphate powder until saturated, filter, and cool undisturbed to obtain blue crystals.
 9. Paint forms a barrier over iron, preventing direct exposure to atmospheric oxygen and water, thereby preventing rust.
 10. Air in coastal areas has high moisture and salt content, which speeds up rusting. Desert air is dry.
 11. **(ii) Process-B is a chemical change.**
 12. **(iii) Both Process-A and Process-B are chemical changes.**

Adolescence: A Stage Of Growth and Change

I. Fill in the blanks with appropriate answers:-

1. Germination
2. Puberty / Biological Maturity
3. Adolescence
4. Adam's Apple / Larynx
5. Excessive secretion of sebaceous (oil) glands
6. Secondary Sexual Characteristics
7. 28 to 30 days
8. Menstruation
9. 45 to 55 years
10. Iron and Vitamin B-12
11. Calcium and Vitamin D
12. Dorothy Hodgkin
13. Shuchi Scheme
14. Menstrual Hygiene Scheme (MHS) / Padhumai Penn Scheme
15. Cyberbullying
16. Addictive / Harmful substances
17. Nasha Mukta Bharat Abhiyaan (NMBA) / RKSK
18. 14446
19. Hormones
20. Behaviour

II. Identify whether the statements are True or False:-

21. False
22. True
23. True
24. False (10–19 years)
25. True
26. True
27. False
28. False
29. True
30. True
31. True
32. False (45–55 years)
33. True
34. False
35. False
36. True
37. True
38. False
39. True
40. False
41. False
42. True
43. True
44. True

45. **False**

III. State whether the statements are True or False:-

46. **True**

47. **True**

48. **False**

49. **True**

50. **False**

51. **True**

52. **True**

53. **False**

54. **True**

55. **True**

IV. Match the Following:-

56.

1. 10–19 years — **iii. Adolescence**
2. 28–30 days — **v. Menstrual cycle duration**
3. 14446 — **iv. National Toll-Free De-addiction Helpline**
4. 45–55 years — **i. Menstruation stops**
5. Iron — **ii. Production of blood**

57.

1. Calcium — **iv. Bone development**
2. Protein — **iii. Growth**
3. Hormones — **v. Chemicals**
4. Vitamin B-12 — **ii. Dorothy Hodgkin**
5. Physical health — **i. Sanitary pad**

58.

1. Karnataka — **iv. Shuchi Scheme**
2. Tamil Nadu — **v. Sanitary Napkin Scheme**
3. MHS — **i. Menstrual Hygiene Scheme**
4. RKSK — **ii. Rashtriya Kishor Swasthya Karyakram**
5. Biodegradable — **iii. Suvidha Hygiene Napkin Initiative**

V. Choose the correct option:-

59. **4. All of the above**
60. **1. Increases**
61. **4. All of the above**
62. **2. Adam's Apple**
63. **4. All of the above**
64. **3. Onset of the menstrual cycle**
65. **2. Have a positive impact**
66. **4. All of the above**
67. **3. It should be handled wisely**
68. **4. Say NO**

VI. Answer in one sentence each:-

69. **Answer:** Adolescence is the transitional phase of physical and psychological growth between childhood and adulthood (ages 10 to 19).
70. The protruding part of the grown voice box (larynx) visible in the throat region of adolescent boys is called Adam's Apple.

71. Hair appears in the armpits, pubic region, and on the face (beard/mustache) and chest in boys.
72. Features that develop during puberty which help distinguish males from females externally are called secondary sexual characteristics.
73. Menstruation naturally ends between the ages of 45 and 55 years (menopause).
74. The series of natural, cyclic biological changes taking place in the female reproductive system every 28–30 days to prepare for potential pregnancy is called the menstrual cycle.
75. The phase of the menstrual cycle lasting 3 to 7 days during which bleeding occurs is called the period of menstruation.
76. The natural biological process in which unfertilized egg and the uterine lining are shed through blood discharge via the vagina is called menstruation.
77. They engage more in social activities due to an increasing sense of independence, identity formation, and the desire to connect with peer groups.
78. Dorothy Crowfoot Hodgkin.

VII. Answer in 2–3 sentences each:-

79. Common myths include considering menstruation as impure or prohibiting girls from entering kitchens/worship places. These can be eradicated through scientific education, awareness campaigns, and open discussions in schools and homes.
80. The helpline number is **14446**. It offers free counselling, guidance, and information about rehabilitation facilities for individuals struggling with substance or drug addiction.
81. Hormones are chemical messengers secreted by endocrine glands directly into the bloodstream. They influence body growth, metabolism, reproductive maturity, moods, and behaviour.
82. The illegal, excessive, or non-medical consumption of substances like alcohol, tobacco, or narcotics that adversely affect physical and mental health is called drug abuse.
83. Puberty is the period during adolescence when hormonal changes lead to sexual maturity and the capability of reproduction.

84. Ramesh's Case:

A) Cause: Increased activity of sebaceous (oil) glands during adolescence leads to clogged skin pores with oil and dirt, causing pimples.

B) Management: He should wash his face regularly with mild soap, avoid squeezing the pimples, and consume a clean, balanced diet.

VIII. Answer in 4–5 sentences each:-

85. Pimples are skin inflammations caused when hair follicles get clogged with oil, dead skin cells, and bacteria.

Reasons in adolescents:

1. Hormonal surges trigger overactive sebaceous (oil) glands.
 2. Accumulation of excess sebum (oil) and bacteria in skin pores.
 3. Poor skin hygiene or sweating.
- 86.
1. Positive reinforcement and open communication from parents and teachers.
 2. A balanced, nutritious diet paired with regular physical activity.
 3. Creative pursuits like sports, music, art, and leadership opportunities.
 4. Supportive peer relationships and responsible digital device usage.
- 87.
1. Adolescent girls experience the onset of menstruation (menarche).
 2. Monthly menstrual flow results in blood loss.

3. Iron is crucial for synthesizing haemoglobin and rebuilding red blood cells.
 4. Higher iron intake through leafy greens, jaggery, and legumes prevents anaemia.
- 88.
1. Overactive sweat and oil glands can lead to body odour and skin infections.
 2. Proper hygiene prevents acne and bacterial buildup.
 3. Menstrual hygiene management prevents reproductive tract infections in girls.
 4. Cleanliness boosts overall self-esteem and physical wellness.

- 89.
1. **Proteins:** For rapid growth and muscle building.
 2. **Calcium & Vitamin D:** For bone density and skeletal growth.
 3. **Iron:** For blood creation and preventing anemia.
 4. **Carbohydrates & Fats:** To provide energy for daily activity.
 5. **Vitamins & Minerals:** For immune function and bodily repair.

90. Yes, physical activity is vital.

Reasons:

1. Builds strong bones and tone muscles.
 2. Helps manage stress, anxiety, and mood fluctuations.
 3. Prevents adolescent obesity and metabolic issues.
 4. Improves cardiovascular health and mental alertness.
- 91.
- **Cyberbullying:** It is the intentional harassment, intimidation, or embarrassing of individuals using digital technology, internet, or social media platforms.
 - **Prevention Steps:**
 1. Never share sensitive personal information online.
 2. Immediately block and report abusive accounts.
 3. Inform trusted adults, parents, or teachers promptly.
 4. Report serious offenses to the Cyber Crime Helpline (1930).

- 92.
1. Desire for greater autonomy and independent decision-making.
 2. Heightened self-consciousness about body image and physical appearance.
 3. Stronger reliance on and influence from peer groups.
 4. Sudden mood swings and intense emotional expressions.
 5. Seeking increased personal privacy.

IX. Answer in 5–6 sentences each:-

- 93.
1. Rapid surge in height and body weight.
 2. Changes in voice (voice cracking in boys, high pitch in girls).
 3. Appearance of acne and pimples on the face.
 4. Growth of body hair in pubic and underarm areas.
 5. Onset of menstruation in girls and broadening of shoulders in boys.
 6. Emotional volatility and cognitive shifts toward abstract reasoning.
- 94.
1. **Height Growth:** Sudden elongation of long bones in arms and legs.
 2. **In Boys:** Shoulders broaden, chest expands, and muscle mass increases significantly.

3. **In Girls:** Pelvic area widens to prepare for future reproductive capabilities, and breast tissue develops.
 4. **Voice Box:** Larynx enlarges markedly in boys, creating a visible Adam's apple.
 5. **Body Fat Distribution:** Shifts according to gender-specific hormonal pathways.
- 95.
1. Bathe daily using clean water and mild soap to reduce body odor.
 2. Wear clean, dry undergarments daily and avoid damp clothing.
 3. Wash the face twice daily to clear extra oil and prevent acne.
 4. Adolescent girls must change sanitary pads every 4–6 hours during menstruation.
 5. Practice hand hygiene before eating and after using washrooms.
- 96.
1. **Shuchi Scheme (Karnataka):** Free distribution of sanitary napkins to schoolgirls in rural areas.
 2. **RKSK (Rashtriya Kishor Swasthya Karyakram):** Comprehensive health education focusing on adolescent hygiene.
 3. **Suvidha Scheme:** Providing biodegradable sanitary pads at subsidized prices (₹1 per pad) at Jan Aushadhi Kendras.
 4. Provision of dedicated incinerators and girls' toilets in government schools.
- 97.
- **Definition:** A balanced social life involves maintaining healthy, constructive, and respectful relationships with family, friends, mentors, and the community.
 - **Impact on Adolescents:**
 1. Fosters empathy, team spirit, and leadership skills.
 2. Alleviates psychological distress, loneliness, and anxiety.
 3. Acts as a protective barrier against peer pressure and substance abuse.
 4. Strengthens emotional resilience and promotes prosocial behaviour.

Heat Transfer in Nature

I. Choose the correct alternative for each of the following:

1. (b) both are bad conductors of heat,
2. (b) Conduction
3. (c) Sea breeze
4. (b) From a higher temperature object to a lower temperature object
5. (c) Radiation
6. (b) Conduction
7. (b) Convection
8. (a) Radiation
9. (a) Land heats up faster than water (Convection)
10. (b) Cooling caused by evaporation
11. (c) Plastic
12. (b) They absorb more heat
13. (b) It helps the sweat on the body to evaporate faster

II. State whether the following statements are True or False:

14. **False** (Heat transfer in solids takes place through conduction)
15. **True**
16. **False** (Infiltration is higher in sandy soil)
17. **True**
18. **False** (Heat flows from higher to lower temperature)
19. **True**
20. **False** (In liquids and gases, heat is transferred through convection)
21. **True**
22. **True**
23. **True**
24. **False** (Radiation is responsible)
25. **True**
26. **False** (Wind blowing from land to sea at night is land breeze)
27. **True**

I. Fill in the blanks in the following:

28. higher, lower
29. Conduction
30. Convection
31. Radiation
32. Radiation
33. Sea Breeze
34. Land Breeze
35. Conductors
36. warm
37. cooling

II. Answer the following questions in one sentence each:

38. Heat is a form of energy that flows from one body to another due to a difference in temperature.
39. Temperature is the measure of the degree of hotness or coldness of a body.
40. Kelvin (K).

41. Heat transfer is the process where thermal energy moves from a region of higher temperature to a region of lower temperature.
42. Conduction.
43. Convection.
44. Radiation.
45. Materials that allow heat to pass through them easily are called conductors of heat.
46. Materials that do not allow heat to pass through them easily are called insulators or poor conductors of heat.
47. The cool air blowing from the sea towards the land during the daytime is called sea breeze.
48. The cool air blowing from the land towards the sea during the nighttime is called land breeze.
49. Evaporation.
50. Woollen fibers trap air between them, preventing the heat from our body from escaping.
51. Radiation.
52. Plastic and wood are bad conductors of heat, so the handles remain cool even when the utensil is hot.

III. Answer the following questions in two sentences each:

53.
 - a. **Good Conductors:** Copper, Aluminum.
 - b. **Poor Conductors (Insulators):** Wood, Plastic.
54. Light-colored clothes absorb very little heat and reflect most of the sunlight, keeping our body cool.
55. The process of water seeping through the soil layers and rock crevices from the surface into the ground is called infiltration.
56. High temperatures in the sun increase the rate of evaporation, causing water in wet clothes to turn into vapor quickly.
57. Conduction is the process of heat transfer from the hotter end to the colder end of an object without the actual movement of its particles.
Example: A metallic spoon becoming hot when left in a hot cup of tea.
58. Convection is the mode of heat transfer where heat is carried by the actual movement of particles. It occurs in liquids and gases.
59. Heat radiation is the transfer of heat via electromagnetic waves without needing any physical medium. Its specialty is that it can transfer heat even through a vacuum.
60.
 - a. **Conductors:** Materials allowing easy heat flow (e.g., Iron, Copper).
 - b. **Insulators:** Materials restricting heat flow (e.g., Glass, Rubber).
61. When nail polish remover or perfume is poured on our palm, it absorbs body heat and evaporates rapidly, giving a cool sensation on the skin.

IV. Answer the following questions in three sentences each:

62.
 1. **Time:** Sea breeze occurs during the day; land breeze occurs during the night.
 2. **Direction:** Sea breeze flows from sea to land; land breeze flows from land to sea.
 3. **Cause:** Sea breeze is caused because land heats faster during the day; land breeze is caused because land cools faster at night.
63. Wool is a poor conductor of heat. Its fibers trap air, which is also a bad conductor of heat. This trapped air prevents body heat from escaping into the cold environment, keeping us warm.

64. Light-colored clothes reflect most solar radiation, keeping us cool in summer. Dark-colored clothes absorb maximum solar radiation, helping to retain warmth in winter.

65.

1. Water at the bottom of the vessel gets heated, expands, becomes less dense, and rises.
2. Cold, denser water from the top moves down to take its place.
3. This colder water also gets heated and rises, setting up convective currents until all the water is heated.

V. Answer the following questions in four to five sentences each:

66.

Sea Breeze (Day): Land heats faster than the sea. Air above land rises as it gets warm. Cooler air over the sea moves toward the land to replace it.

Land Breeze (Night): Land cools faster than the sea. Warm air above the sea rises, and cooler air from the land rushes toward the sea, creating convection currents.

67. Rainwater falling on the soil surface seeps downward through pores and rock fissures in a process called infiltration. This water accumulates above hard, impermeable bedrock layers. The underground rock layers saturated with this stored groundwater are known as aquifers.

68. Hollow bricks trap air inside their empty spaces. Since trapped air is a poor conductor of heat, it prevents external solar heat from conducting through the walls into the house, keeping the interiors significantly cooler.

69. **Science and Daily Life Applications:**

(A) Explain Sea Breeze and Land Breeze based on heat convection (3 Marks):

During the day, warm air over the land rises, and cool air from the sea rushes in (Sea Breeze). At night, warm air over the sea rises, and cool air from land moves towards the sea (Land Breeze). These are natural convection currents.

(B) Reason for windows facing the sea in coastal areas (1 Mark):

To capture the cool sea breeze blowing during daytime and keep the rooms ventilated and cool.

70. **Experiment and Comparison Based:**

(A) Compare 3 modes of heat transfer with examples (3 Marks):

1. **Conduction:** Heat moves without particle movement (e.g., heating a metal rod).
2. **Convection:** Heat moves with actual particle motion (e.g., boiling water).
3. **Radiation:** Heat moves via waves without a medium (e.g., warmth from the Sun).

(B) Reason for free end of a spoon getting hot in hot water (1 Mark):

Conduction.

71. **Descriptive and Applied Questions:**

(A) 3 examples showing evaporation causes cooling (3 Marks):

1. Water staying cool in an earthen pot during summer.
2. Sweat evaporating from our skin on a hot day.
3. Applying sanitizer or acetone on the palm.

(B) Why two thin blankets are warmer than one thick blanket (2 Marks):

A layer of air gets trapped between the two thin blankets. Since trapped air acts as an insulator, it blocks body heat loss better than a single blanket.

72. Context-Based Analysis (5 Marks):

1. **Water moving upwards from bottom when heating:**
Phenomenon: Heat Convection.
Reason: Heated water becomes less dense and moves upward.
2. **Wearing white in daytime and dark at night in deserts:**
Phenomenon: Thermal Radiation/Reflection.
Reason: White reflects solar heat; dark retains heat during cold desert nights.
3. **Cool water in an earthen pot:**
Phenomenon: Evaporation.
Reason: Water seeping through pores absorbs latent heat to evaporate, cooling the remaining water.
4. **Sun rays heating the Earth:**
Phenomenon: Radiation.
Reason: Heat travels through vacuum as electromagnetic waves.
5. **Wood/Bakelite handles on cooking utensils:**
Phenomenon: Thermal Insulation.
Reason: Wood and Bakelite are poor conductors of heat, keeping handles safe to touch.

Measurement of Time and Motion

I. Choose the correct alternative for each of the following:

1. (B) m/s
2. (A) Speed
3. (C) Time taken to complete 1 oscillation
4. (B) Uniform motion
5. (B) Odometer
6. (C) Speedometer
7. (C) Oscillatory or Periodic motion
8. (C) A day
9. (A) Straight line
10. (A) Distance = Speed $\times$ Time
11. (B) 25 km
12. (B) Bob
13. (C) Second
14. (C) 60 km/h
15. (A) 1.8 km
16. d. Stopwatch
17. d. All of the above
18. c. 27 m
19. c. Both a and b (Shadow and Water clock)
20. a. Second
21. b. Meter

- 22. c. m/s
- 23. c. Speed

II. Fill in the blanks with suitable answers:

- 24. Second
- 25. Speed
- 26. Odometer
- 27. Oscillatory (or Periodic)
- 28. Bob
- 29. Speedometer
- 30. Uniform
- 31. Straight line
- 32. Speed
- 33. Time Period
- 34. Samrat Yantra (Jaipur)
- 35. Jaipur (Rajasthan)

III. Match the following:

- 36. Answer: [ii] 1-C, 2-D, 3-B, 4-A
 - (1) Basic unit of time - (C) Second
 - (2) Basic unit of speed - (D) m/s
 - (3) Time taken for 1 oscillation - (B) Time period
 - (4) Device that measures distance covered - (A) Odometer
- 37. Answer: [i] 1-B, 2-C, 3-D, 4-A
 - (1) Speedometer - (B) Instantaneous speed (km/h)
 - (2) Odometer - (C) Total distance travelled
 - (3) Simple pendulum - (D) Oscillatory motion
 - (4) Straight-line distance-time graph - (A) Uniform motion
- 38. Answer: [i] 1-C, 2-A, 3-B, 4-D
 - (1) A car moving on a straight road - (C) Rectilinear motion
 - (2) Motion of a swing - (A) Oscillatory motion
 - (3) Motion of the hands of a clock - (B) Circular motion
 - (4) A tree branch swaying in the wind - (D) Periodic motion

III. State whether the following statements are True or False:

- 39. False (The SI unit of time is Second)
- 40. True
- 41. False (Speedometer is used to measure speed directly)
- 42. True
- 43. True
- 44. False (Distance-time graph for uniform motion is a straight line)
- 45. True
- 46. True
- 47. False (Odometer displays total distance; Speedometer displays speed)
- 48. False (Distance between cities is measured in Kilo meters)

IV. Answer the following questions in one sentence each:

- 49. Speed is defined as the distance covered by an object per unit time.
- 50. Meter per second (m/s).
- 51. Second (s).

52. If an object moving along a straight line covers equal distances in equal intervals of time, its motion is called uniform motion.
53. If an object moving along a straight line covers unequal distances in equal intervals of time, its motion is called non-uniform motion.
54. The time taken by a simple pendulum to complete one full oscillation is called its time period.
55. The small metallic sphere suspended by a thread in a simple pendulum is called its bob.
56. It is used to measure the instantaneous speed of a moving vehicle directly in km/h.
57. It is used to measure the total distance traveled by a vehicle in kilometers.
58. It is a straight line.
59. Motion of a simple pendulum (or motion of the Earth revolving around the Sun).
60. $\text{Speed} = \text{Distance travelled} \div \text{Time taken}$

V. Answer the following questions in two sentences each:

61.
 1. In uniform motion, the object covers equal distances in equal intervals of time, whereas in non-uniform motion, it covers unequal distances in equal time intervals.
 2. The distance-time graph for uniform motion is a straight line, while for non-uniform motion, it is a curved line.
62. A simple pendulum consists of a small metallic bob suspended from a rigid stand by a thread. The to-and-fro motion of the pendulum about its mean position is called oscillatory motion.
63.

Speedometer: Measures and records the real-time instantaneous speed of a vehicle in km/h.

Odometer: Measures and records the total distance traveled by the vehicle in kilometers.
64. Sundials, Water clocks, and Sand clocks (Hourglasses).
65.
 1. It provides a visual representation to easily identify whether an object is in uniform or non-uniform motion.
 2. It helps to determine the position or speed of an object at any given instant of time.
66. The total time taken by the bob of a simple pendulum to complete one full oscillation (moving from one extreme position to another and back) is called its time period.
67. Speed is defined as the distance travelled by an object per unit of time. Its SI unit is **meter per second (m/s)**.
68. The speedometer displays the current running speed of the vehicle, while the odometer keeps a continuous record of the cumulative distance covered by the vehicle.
69.

Depends on: The length of the string/thread of the pendulum.

Does not depend on: The mass (weight) of the bob or the initial displacement (amplitude).

VI. Answer the following questions in three sentences each:

70. **One Oscillation:** The movement of the bob from its mean position to one extreme, then to the other extreme, and back to the mean position.
Time Period: The time taken to complete one such oscillation.

Measurement Method: Measure the total time taken for 20 complete oscillations using a stopwatch, then divide the total time by 20 to get the time period.

71.

1. Draw two perpendicular lines representing the X-axis (for Time) and Y-axis (for Distance).
2. Choose an appropriate scale on both axes according to the given dataset.
3. Plot the data points corresponding to distance and time, then join all points with a line.

72.

Relationship: Speed is the ratio of distance traveled to the time taken.

Formulas:

1. $\text{Speed} = \text{Distance} \div \text{Time}$
2. $\text{Distance} = \text{Speed} \times \text{Time}$
3. $\text{Time} = \text{Distance} \div \text{Speed}$

VII. Answer the following questions in four to five sentences each:

73.

Uniform Rectilinear Motion: An object moving along a straight path at a constant speed (covering equal distances in equal time intervals).

Example: A car moving on a straight, empty highway at a steady speed of 50 km/h.

Non-Uniform Rectilinear Motion: An object moving along a straight path with changing speed (covering unequal distances in equal time intervals).

Example: A bus moving through city traffic, continually slowing down and speeding up.

74. A Ghatika Yantra consisted of a small metallic bowl with a tiny hole at the bottom placed over a larger vessel filled with water. Water slowly entered the bowl through the aperture until it filled completely and sank in a fixed time interval. Each time the bowl sank, it marked one 'Ghatika' (approx. 24 minutes), and a gong or bell was struck to announce the passing of time.

VIII. Numerical Problems and Formula-based Questions:

75. Distance = 150 m, Time = 10 Speed (m/s) = $150 \div 10 = 15 \text{ m/s}$

To convert m/s to km/h, multiply by $18 \div 5$:

Speed (km/h) = $15 \times 18/5 = 3 \times 18 = 54 \text{ km/h}$

76. A train travels 180 km in 3 hours. Find its speed in km/h and m/s units.

○ **Solution:**

Distance = 180 km, Time = 3 hours

Speed (km/h) = $180 \div 3 = 60 \text{ km/h}$

To convert km/h to m/s, multiply by $5 \div 18$:

Speed (m/s) = $60 \times 5 / 18 = 50 \div 3 = 16.67 \text{ m/s}$

77.

Speed = 25 m/s = $25 \times 18/5 = 90 \text{ km/h}$

Distance = 360 km

Time = Distance $\div$ Speed = $360 \div 90 = 4 \text{ hours}$

78.

Speed = 50 km/h, Time = 2 hours

Distance = Speed $\times$ Time = $50 \times 2 = 100 \text{ km}$

IX. Questions for Practice:

1: Speed = Distance $\div$ Time = $180 \text{ km} \div 3 \text{ hours} = 60 \text{ km/h}$

- 2: Distance = Speed X Time = $60 \times 2.5 = 150$ km
- 3: Speed = Distance $\div$ Time = $200 \text{ m} \div 25 \text{ s} = 8 \text{ m/s}$
- 4: Time Period = Total Time $\div$ Number of Oscillations = $40 \div 20 = 2$ seconds
- 5: $72 \text{ km/h} = 72 \times \frac{5}{18} = 4 \times 5 = 20 \text{ m/s}$
- 6: Time = 15 min = $15 \times 60 = 900$ seconds
Distance = Speed X Time = $2 \text{ m/s} \times 900 \text{ s} = 1800 \text{ m} = 1.8 \text{ km}$

Life Processes in Animals

I. Four alternatives are given for each of the following. Choose the correct one and write (1 Mark):

1. (B) Plasma
2. (C) Haemoglobin
3. (B) White Blood Cells (WBC)
4. (C) Platelets
5. (B) Arteries
6. (B) Veins
7. (A) Pulse
8. (B) 72 to 80
9. (C) 4
10. (B) Atria
11. (B) Stethoscope
12. (C) Water
13. (B) Excretion
14. (C) Kidneys
15. (A) Ureters
16. (B) 1.0 L to 1.8 L
17. (B) Urea
18. (B) Dialysis
19. (C) Ammonia
20. (B) Uric acid

I. Fill in the blanks (1 Mark):

21. Arteries
22. Haemoglobin
23. Platelets
24. Heartbeat
25. Kidneys
26. Dialysis
27. Ammonia
28. Uric acid

II. Match the following (1 Mark):

29. Blood components and their functions:

Answer: (1)-D, (2)-A, (3)-B, (4)-C

- (1) Red Blood Cells (RBC) - (D) Transport of oxygen
- (2) White Blood Cells (WBC) - (A) Fight against germs
- (3) Platelets - (B) Blood clotting
- (4) Plasma - (C) Liquid part and transport of nutrients

30. Organs and their excretory functions:

Answer: (1)-B, (2)-D, (3)-A, (4)-C

- (1) Kidneys - (B) Filter blood and produce urine
- (2) Ureters - (D) Transport urine to the urinary bladder
- (3) Urinary Bladder - (A) Store urine
- (4) Urethra - (C) Excrete urine from the body

III. Answer the following questions in one sentence each (1 Mark):

- 31. Blood, blood vessels, and the heart.
- 32. Plasma.
- 33. Haemoglobin.
- 34. To fight against germs that enter the body and provide immunity.
- 35. Platelets.
- 36. Blood vessels that carry oxygen-rich blood from the heart to various parts of the body.
- 37. Blood vessels that carry carbon dioxide-rich blood from all parts of the body back to the heart.
- 38. The rhythmic throbbing movement in the arteries caused by blood spurting through them under high pressure.
- 39. 72 to 80 beats per minute.
- 40. Stethoscope.
- 41. The process of removal of toxic waste products produced in the cells of living organisms.
- 42. Kidneys.
- 43. Urea.
- 44. The process of artificially filtering waste products from the blood using a machine in patients with kidney failure.
- 45. Ammonia gas.
- 46. White semi-solid Uric acid.

IV. Answer the following questions in two sentences each (2 Marks):

- 47.
 - 1. Arteries carry oxygen-rich blood away from the heart, whereas veins carry carbon dioxide-rich blood back to the heart.
 - 2. Arteries have thick, elastic walls without valves, whereas veins have thin walls with internal valves to prevent backflow.
- 48.
 - Plasma:** Liquid part that transports nutrients and wastes.
 - RBC (Hemoglobin):** Transports oxygen.
 - WBC:** Fights infections.
 - Platelets:** Helps in blood clotting.
- 49. WBCs are essential because they defend the body by destroying disease-causing germs. Platelets are essential because they form a clot at the site of an injury, preventing excessive loss of blood.
- 50. Sponges and Hydra live in water, which brings food and oxygen as it enters their body. As the water flows out, it carries away waste materials and carbon dioxide, eliminating the need for a circulatory system.
- 51.
 - Ammonia:** Excreted by aquatic animals (e.g., Fishes).
 - Urea:** Excreted by terrestrial mammals (e.g., Humans).
 - Uric Acid:** Excreted by birds and reptiles (e.g., Lizards, Pigeons).

V. Answer the following questions in three sentences each (3 Marks):

52.

1. The human heart consists of 4 chambers: two upper chambers called atria and two lower chambers called ventricles.
2. The right side chambers (right atrium and right ventricle) receive carbon dioxide-rich blood from the body and send it to the lungs.
3. The left side chambers (left atrium and left ventricle) receive oxygen-rich blood from the lungs and pump it to the entire body.

53.

Main Organs: A pair of kidneys, a pair of ureters, a urinary bladder, and a urethra.

Pathway: Urine filtered in the kidneys -> passes through the ureters -> gets temporarily stored in the urinary bladder -> and is eliminated through the urethra.

54.

1. Dialysis is an artificial process of filtering toxic wastes from the blood when the kidneys fail to function.
2. Kidney failure can be caused by severe infections, physical injuries, high blood pressure, or diabetes.
3. Dialysis is necessary because the accumulation of toxic nitrogenous wastes in the blood can be fatal; hence periodic filtration is required to survive.

VI. Answer the following questions in four to five sentences each (4 and 5 Marks):

55. (a) Blood flows through arteries rapidly and under very high pressure as it is pumped directly by the heart. Thick and elastic walls prevent the arteries from bursting under high pressure.

(b) Pressure in veins is low, and blood flows against gravity from lower body parts to the heart. Valves ensure that blood flows only in one direction towards the heart and prevents backflow.

(c) If valves fail, blood will pool in the lower limbs due to gravity (causing varicose veins), leading to swelling, pain, and reduced efficiency in returning blood to the heart for oxygenation.

56.

This statement is incorrect. While complex multicellular animals require blood and a dedicated circulatory system, simple organisms do not.

Sponges and Hydra are primitive multicellular organisms that live in aquatic environments where water directly bathes their cells.

Surrounding water carries nutrients/oxygen directly inside and washes away carbon dioxide/wastes as it flows out, rendering blood and a circulatory system unnecessary.

57. (a) The internal partition wall called the **Septum** along with the four distinct chambers.

- (b) Mixing of blood reduces the oxygen-carrying capacity of blood supplied to body cells. This leads to inefficient cellular respiration, lower energy production, severe fatigue, organ stress, and eventual death.
- (c) Birds and mammals are warm-blooded (endothermic) animals that need a high amount of energy continuously to maintain a constant body temperature. Complete separation ensures a highly efficient oxygen supply.

58. **(a)** Ammonia is highly toxic and requires large amounts of water to dissolve, so aquatic animals excrete it. Urea requires a moderate amount of water, suited for terrestrial mammals. Uric acid requires very little water, making it ideal for animals needing water conservation.
- (b)** Excreting uric acid as a semi-solid paste conserves maximum water inside the body and eliminates the need to carry heavy liquid storage (urine), keeping body weight light for flight.
- (c)** Sweating helps regulate body temperature through evaporative cooling during hot weather. Since a large volume of water is lost as sweat, kidneys reabsorb more water to prevent dehydration, resulting in a smaller volume of concentrated urine.

Life Processes in Plants

I. Four alternatives are given for each of the following. Choose the correct one and write (1 Mark):

1. **(b) Xylem**
2. **(b) Phloem**
3. **(b) Stomata**
4. **(a) Guard cells**
5. **(c) Transpiration**
6. **(b) Transpirational pull (Suction pull)**
7. **(b) Root hairs**
8. **(c) Carbon dioxide**
9. **(b) Respiration**
10. **(b) From the air present between soil particles**

II. Fill in the blanks (1 Mark):

11. **Xylem**
12. **Phloem**
13. **Root hairs**
14. **Stomata**
15. **Transpiration**
16. **Guard cells**

III. Match the following:

17. **Answer: (1)-B, (2)-A, (3)-D, (4)-C**
- (1) Xylem - (B) Transport of water and minerals
 - (2) Phloem - (A) Transport of food
 - (3) Stomata - (D) Transpiration and gas exchange
 - (4) Root hairs - (C) Absorption of water from soil
18. **Answer: (1)-B, (2)-A, (3)-D, (4)-C**
- (1) Guard cells - (B) Movement of stomata and control of pores
 - (2) Transpirational pull - (A) Providing support to the plant and driving force for water to rise high
 - (3) Artificially coloured water experiment - (D) Demonstrating the ascent of water through xylem in the stem
 - (4) Slipping of root cells / Root hairs - (C) Helping to absorb oxygen from the air present between soil particles
19. **Answer: (1)-B, (2)-A, (3)-D, (4)-C**
- (1) Photosynthesis - (B) Food (glucose) preparation in leaves

- (2) Cellular respiration - (A) Breakdown of glucose releasing energy and carbon dioxide
- (3) Transpiration - (D) Keeping plant parts cool and maintaining water flow
- (4) Food transport through phloem - (C) Bidirectional transport through vascular tissue

IV. Answer the following questions in one sentence each (1 Mark):

20. Specialized conducting tissues (Xylem and Phloem) in plants that help in the transportation of water, minerals, and food.
21. To transport water and dissolved minerals from the roots upwards to the leaves.
22. To transport prepared food (glucose/sucrose) from the leaves to all other parts of the plant (Translocation).
23. They increase the surface area of roots for efficient absorption of water and minerals from the soil.
24. The process of transporting synthesized food from the leaves to various parts of the plant through phloem tissue.
25. Microscopic pores present on the underside of leaves that facilitate gaseous exchange and transpiration.
26. Guard cells.
27. The process of loss of excess water in the form of water vapor from the aerial parts of the plant (mainly through stomata).
28. Transpirational pull (Suction pull).
29. In the cytoplasm and mitochondria of plant cells.
30. From the air spaces present between soil particles.
31. Carbon dioxide (CO₂).

I. Answer the following questions in two sentences each (2 Marks):

32.
 1. Xylem transports water and minerals unidirectionally (upwards), while Phloem transports prepared food bidirectionally.
 2. Xylem cells are mostly dead at maturity, whereas Phloem cells are living tissue.
33. Transpiration is the loss of water vapor from leaves through stomata.

Uses:

 1. It creates a transpirational pull for the upward ascent of sap (water and minerals).
 2. It provides a cooling effect to the plant body against high temperature.
34.
 1. Facilitates exchange of gases CO₂ and O₂ during photosynthesis and respiration.
 2. Enables loss of excess water through transpiration.
35. Root hairs greatly increase the surface area in contact with soil particles. They absorb water through osmosis and mineral nutrients via active transport and diffusion from the soil moisture.
36.
 1. Photosynthesis occurs only during daytime in the presence of sunlight to synthesize glucose and release oxygen.
 2. Respiration occurs continuously day and night to break down glucose for energy release, producing carbon dioxide.

II. Answer the following questions in three sentences each (3 Marks):

37.

1. Absorption of water by roots creates a continuous root pressure at the base.
2. Transpiration in leaves creates a powerful suction pull at the top of xylem vessels.
3. Due to cohesion and adhesion properties of water molecules, water is pulled upwards continuously as an unbroken column to the top.

38.

1. Take a fresh twig with white flowers or a soft stem (e.g., Balsam plant).
2. Place its cut end in a beaker containing water mixed with red ink/dye for a few hours.
3. Cross-section of the stem and petals will show red-stained xylem vessels, proving that xylem in the stem transports water upwards.

39.

1. Yes, root cells need oxygen for cellular respiration to generate energy for active absorption.
2. When soil is overwatered (waterlogged), water displaces air trapped between soil particles.
3. Deprived of oxygen, roots resort to anaerobic respiration, producing toxic substances that cause root rot and ultimate death of the plant.

III. Answer the following questions in four to five sentences each (4 and 5 Marks):

40. Transpiration as a Necessary Evil:

(Note: Answered in detail under Question 41 below.)

41. (a) Justify this statement with three main uses of transpiration.

1. Generates transpirational pull required for long-distance transport of water/minerals in tall trees.
2. Prevents thermal damage to leaves by cooling the plant body through evaporative cooling.
3. Helps in maintaining cell turgidity and continuous absorption of minerals from soil.

(b) Low temperatures or high humidity during cloudy days slow down evaporation from stomata. Consequently, the suction pull drops significantly. This slows down the rate of ascent of xylem sap and reduces the transport speed of minerals to leaves.

42. Girdling/Ringing experiment on a coconut tree:

(a) Phloem tissue located in the outer bark layer.

(b) Critical evaluation: Removing the ring of bark disrupts the phloem pathway. Food synthesized in the leaves cannot reach the roots. Starved of glucose, root cells fail to generate ATP energy and die. Dead roots stop absorbing water and minerals, leading to the gradual wilting and ultimate death of the entire plant.

43. Photosynthesis and Respiration are complementary:

(a) During daytime, both processes occur; CO₂ produced in respiration is consumed in photosynthesis, and excess O₂ is released. At night, photosynthesis stops; plants only respire, taking in O₂ and releasing CO₂.

(b) At night, plants do not perform photosynthesis but continue respiration, releasing high concentrations of CO_2 around the tree. Sleeping

underneath may cause hypoxia or breathing discomfort due to reduced oxygen levels.

(c) Yes, plants respire continuously. However, during the day, the rate of photosynthesis is higher than respiration, so all CO_2 released internally is immediately consumed by leaves for photosynthesis.

44. Two potted plants experiment (Pot A and Pot B):

(a) Continuous waterlogging in Pot B displaced soil air, leading to anoxic conditions around roots. Lacking oxygen, root cells suffered metabolic damage, failed to perform active transport, rotted, and could no longer absorb water, causing the plant to wilt.

(b) Ensuring proper **soil drainage system** and periodic **tilling/aeration** of the soil.

(c)

1. Leaves are reduced to spines to minimize surface area for transpiration.
2. Stems become fleshy, green, and covered with a thick waxy cuticle to store water and carry out photosynthesis.

Chapter 11: Light: Shadows and Reflections

I. Choose the correct alternative and write. (1 Mark)

1. (c) Luminous source of light and heat
2. (c) Lightning
3. (b) It reflects sunlight
4. (c) Straight line path
5. (a) Left-right orientation
6. (c) Drivers can read it correctly in their rear-view mirror
7. (b) Cannot be captured on a screen
8. (c) Inverted and real
9. (b) Two reflections
10. (d) Multiple reflection
11. (a) Kaleidoscope
12. (c) Periscope
13. (b) When an opaque object blocks the light
14. (d) Pinhole camera
15. (a) A source of light, an object, and a screen
16. (b) 8 minutes 20 seconds
17. (a) One
18. (a) Plane mirror
19. (b) Rectilinear propagation (Straight-line motion)
20. (b) In a straight line
21. (b) Rectilinear propagation

II. Fill in the blanks (1 Mark)

22. Oiled paper or frosted glass that does not allow light to pass through completely, but allows light partially, are called **Translucent** objects.

III. Identify the relation in the first pair and fill in the blank appropriately for the third item: (1 Mark)

23. Glass : Transparent :: Wall : **Opaque**

24. Luminous object : Sun :: Non-luminous object : **Moon (or Book / Table)**

IV. Match the following (1 Mark)

25.

(i) Pinhole camera — **(C) Forms an inverted image**

(ii) Opaque object — **(D) Blocks light completely**

(iii) Transparent object — **(B) Light passes almost completely through it**

(iv) Shadow — **(A) The dark region formed behind an object**

26.

(i) If the torch is near the ball — **(D) Shadow is larger**

(ii) If the torch is far away — **(C) Shadow is smaller**

(iii) If the ball is removed from the setup — **(B) A bright spot appears on the screen**

(iv) If there are two torches on the left side of the ball setup — **(A) Two shadows appear on the screen**

V. Answer the following questions in one or two sentences: (1 or 2 Marks)

27. Sun, stars, burning candle, and glowing electric bulb.

28. Objects that do not emit light of their own are called non-luminous objects (e.g., Moon, chair, book).

29. Rectilinear propagation of light (Light travels in a straight line).

30. A shadow is formed when an opaque object comes in the path of light and blocks it.

31. The distances and relative angles between the source of light, the object, and the screen determine the size of the shadow.

32. The angle formed between the incident ray and the normal to the reflecting surface at the point of incidence.

33. The angle formed between the reflected ray and the normal to the reflecting surface at the point of incidence.

34. Convex mirror.

35. Generally, real and inverted (It forms a virtual and erect image only when the object is very close to the mirror).

36. Light passes through it partially, making objects on the other side appear blurred.

37. As the object moves closer to the concave mirror, the size of the image increases.

38. Convex mirror.

39. Because a shadow is merely a region of darkness formed due to the absence of light; hence, regardless of the object's colour, its shadow is always dark/black.

40. The image will appear at a distance of 2 meters behind the mirror.

VI. Answer the following questions in three sentences: (3 Marks)

41. Only the person using a straight pipe can see the candle flame. This is because light travels in a straight line (rectilinear propagation). Those using bent pipes cannot see the flame as light cannot bend around corners. Rekha see the candle.

42.

1. D is correct. A source of light emits light rays.

2. The boy (an opaque object) stands in the path of light and blocks it.

3. A dark area (shadow) is cast on the screen (ground/wall) situated behind the boy.

43.

1. The image is real and inverted.
 2. The image retains the natural colours of the tree.
 3. The image formed is smaller in size compared to the actual tree.
44. The letters of the name appear laterally inverted. The left side of the text appears on the right and vice versa in the mirror reflection.
- 45.
1. **At 9 AM:** The shadow is long because the Sun is slanting at a low angle in the sky.
 2. **At 12 PM:** The shadow is the shortest because the Sun is directly overhead.
 3. **At 4 PM:** The shadow becomes long again as the Sun slants towards the west.
46. When the bird flies very high, its shadow vanishes before reaching the ground as light bends around it and the ground is too far to act as a screen. When it flies closer to the ground, the ground acts as an effective screen, making the shadow visible.
- 47.
- Transparent Objects:** Allow light to pass through them completely (e.g., Clear glass, pure water).
- Translucent Objects:** Allow light to pass through them only partially (e.g., Butter paper, frosted glass).
- Opaque Objects:** Do not allow any light to pass through them (e.g., Wood, stone, metal sheet).
- 48.
1. The image is virtual and erect.
 2. The size of the image is equal to the size of the object.
 3. The distance of the image behind the mirror equals the distance of the object in front of it.
 4. The image is laterally inverted (left appears right, right appears left).
- 49.
1. A source of light.
 2. An opaque object to obstruct the light.
 3. A screen (such as a wall, ground, or sheet) on which the shadow is cast.
50. No, the colour of the shadow will not change. A shadow is simply an area devoid of light (darkness), so regardless of the colour of light used, the shadow remains dark/black.
51. Yes, by using a **convex mirror**, a small mirror can form a complete diminished image of a large object such as a tall tree or a distant building.

VII. Answer the following questions in four to five sentences: (4 and 5 Marks)

- 52.
- Yes, it is possible by using a **cylindrical object**.
- When light shines directly on the circular top or bottom face of the cylinder, it blocks the light in a circle, casting a **circular shadow** on the screen.
- When the cylinder is turned sideways and light shines on its curved side, it projects a **rectangular shadow** onto the screen.
- 53.
1. Take a 'Z'-shaped long tube or cardboard box with openings at both ends.
 2. Fit two plane mirrors inside the two bends at an angle of 45° to each other and facing parallel.
 3. Light rays coming from an overhead object enter the top opening, strike the first mirror, and reflect downwards at 90° .

4. These reflected rays travel down the tube, hit the second mirror, and reflect again at 90° toward the observer's eye, making hidden objects visible.
54. When two plane mirrors are placed inclined at an angle to each other, the light reflected from the first mirror acts as an incident ray for the second mirror.
This causes light to reflect back and forth multiple times between the two reflective surfaces.
As a result of these repeated reflections, multiple images of an object placed between them are formed.
Decreasing the angle between the mirrors increases the number of images formed (e.g., 3 images at 90° , 5 images at 60° , and infinite images when parallel).
55. Eclipses occur because light travels in straight lines and celestial bodies (Sun, Earth, and Moon) act as opaque objects in space.
Solar Eclipse: Occurs when the Moon comes directly between the Sun and the Earth in a straight line. The Moon blocks the sunlight and casts its shadow on certain areas of the Earth, preventing people in those regions from seeing the Sun.
Lunar Eclipse: Occurs when the Earth comes directly between the Sun and the Moon in a straight line. The Earth casts a massive shadow over the Moon, preventing sunlight from reaching the Moon's surface and causing it to darken.

Earth. Moon and the Sun

I. Four alternatives are given for each of the following questions. Choose and write the correct one:

1. (b) West to East
2. (c) 24 hours
3. (c) Day and night
4. (b) Change of seasons
5. (c) 365 days
6. (b) Earth's rotation from West to East
7. (a) East to West
8. (c) Moon
9. (b) The Earth comes between the Sun and the Moon
10. (b) The Moon comes between the Sun and the Earth
11. (a) Completely dark/hidden
12. (c) The ratio of their actual size to their distance from the Earth is the same
13. (a) Long in the morning, short at noon
14. (c) Apparent motion caused by the rotation of the Earth
15. (b) It lies directly along the rotational axis of the Earth
16. (b) The Northern Hemisphere is tilted towards the Sun, receiving light for more than 12 hours
17. (b) Summer Solstice

18. (c) Equal day and night (approximately 12 hours)

19. (b) It is close to the Equator

II. Fill in the blanks:

20. **Rotation**

21. **Revolution**

22. **Rotation**

23. **Tilt**

24. **Satellite**

25. **27.3**

26. **Revolutionary**

27. **Umbra**

28. **Penumbra**

29. **Solar Eclipse**

30. **Spring Tides**

31. **Neap Tides**

32. **Atmosphere (Air)**

33. **Tides**

34. **Sun**

III. State whether True or False:

35. **False** (*Earth comes between the Sun and Moon during a lunar eclipse*)

36. **False** (*Sunrise occurs earlier in Jharkhand than in Gujarat*)

37. **True**

38. **False** (*Never view a solar eclipse directly with naked eyes*)

39. **True**

40. **False** (*Rotation causes day and night, not revolution*)

41. **False** (*Umbra is the completely dark central region, not penumbra*)

42. **True**

43. **False** (*We always see the same side of the Moon*)

44. **True**

IV. Match the Following:

45. Motions

Column - A	Column - B
(1) Rotation	(B) Spinning on its own axis
(2) Revolution	(A) 365.25 days
(3) Earth's orbit	(C) Elliptical path

46. Parts of Shadow

Column - A	Column - B
(1) Eclipse	(C) Obscuration caused by shadows of celestial bodies
(2) Penumbra	(B) The faint outer part of the shadow

Column - A	Column - B
(3) Umbra	(A) The darkest part of the shadow

47. Solar Eclipse

Column - A	Column - B
(1) Position during Solar Eclipse	(C) Moon is in the middle
(2) Day of occurrence of Solar Eclipse	(A) New Moon day
(3) Total Solar Eclipse	(B) Corona visible

48. Lunar Eclipse

Column - A	Column - B
(1) Position during Lunar Eclipse	(B) Earth is in the middle
(2) Day of occurrence	(C) Full Moon night
(3) Total Lunar Eclipse	(A) Reddish-brown Moon (Blood Moon)

49. Tides

Column - A	Column - B
(1) Tides	(B) Rise and fall of water twice a day
(2) Types of tides	(A) Spring and Neap
(3) Main cause of tides	(C) Gravitational pull of the Moon and Sun

V. Answer the following questions in one sentence:

50. A solar eclipse occurs when the Moon comes directly between the Sun and the Earth, casting its shadow on the Earth and blocking sunlight.
51. A lunar eclipse occurs when the Earth comes directly between the Sun and the Moon, casting its shadow on the Moon and blocking sunlight from reaching it.
52. The tilt causes the hemisphere inclined towards the Sun to experience longer days and shorter nights, while the opposite hemisphere experiences shorter days.
53. Viewing a solar eclipse directly can cause retinal damage due to intense solar radiation, whereas a lunar eclipse only involves reflected sunlight, which is harmless.
54. She will see Orion directly overhead today at **7:56 PM** (4 minutes earlier).
55. The North Pole receives 0 hours of sunlight (24 hours darkness), and the South Pole receives 24 hours of continuous sunlight.
56. The spherical Earth rotates on its axis, so the half facing the Sun experiences day while the opposite half is in darkness, experiencing night.

VI. Answer the following questions in two sentences:

57. **Aditya** was careless. Looking directly at the Sun with naked eyes during a solar eclipse can cause permanent visual impairment.
58. Although the Moon is tiny compared to the Sun, it is about 400 times closer to Earth than the Sun. As a result, both appear to be nearly the same visual size in the sky.
59. The team should carry **summer clothing**. In December, Australia (in the Southern Hemisphere) is tilted towards the Sun and experiences summer.

VII. Answer the following questions in three sentences:

60.
 1. **Definition:** Rotation is spinning on its own axis; Revolution is orbiting around the Sun.
 2. **Time taken:** Rotation takes 24 hours; Revolution takes 365.25 days.
 3. **Effects:** Rotation causes day and night; Revolution causes seasons.
61. Due to the tilt of Earth's axis, when the Northern Hemisphere is tilted towards the Sun, it gets direct light and experiences summer. At the same time, the Southern Hemisphere is tilted away from the Sun, receiving slanting rays and experiencing winter. Thus, seasons are opposite.
62.
 1. **Summer (June 21 - Summer Solstice):** Northern Hemisphere tilted towards the Sun.
 2. **Autumn (September 23 - Autumnal Equinox):** Equal day and night.
 3. **Winter (December 22 - Winter Solstice):** Northern Hemisphere tilted away from the Sun.
 4. **Spring (March 21 - Vernal Equinox):** Equal day and night again.
63. Place a torch (Sun), a large ball (Earth), and a small ball (Moon) in a straight line. Turn on the torch so that the shadow of the large ball falls upon the small ball, casting it into darkness. This shows how Earth blocks sunlight from hitting the Moon during a lunar eclipse.
64.
 1. **Solar Eclipse:** Sun – Moon – Earth (Moon in the middle).
 2. **Lunar Eclipse:** Sun – Earth – Moon (Earth in the middle).

VIII. Answer the following questions in four to five sentences:

65. Earth is much larger than the Moon, so its shadow easily covers the entire lunar surface, making a lunar eclipse visible to anyone on the night side of Earth. In contrast, the Moon is small and casts a very narrow central shadow (umbra) onto Earth's surface—often only a few kilo meters wide. Only observers inside this narrow path can witness a total solar eclipse.
66. If Earth's axis were completely vertical, there would be no seasonal variations throughout the year. Every region on Earth would experience equal periods of day and night (12 hours each) every single day. The equatorial region would remain perpetually hot, while the poles would remain perpetually cold. Weather patterns would become static and uniform year-round.
67. One year later on June 21, the stars will appear at the exact same position at midnight. Stars rise about 4 minutes earlier each day because Earth orbits the Sun while rotating. It takes Earth 23 hours and 56 minutes to complete one full rotation relative to distant stars (a sidereal day), which is 4 minutes shorter than a standard solar day (24 hours).