A WORD TO MY DEAR STUDENTS

It gives me great pleasure in presenting the Students' Support Material to all KV students of class X.

The material has been prepared keeping in mind your needs when you are preparing for final exams and wish to revise and practice questions or when you want to test your ability to complete the question paper in the time allotted or when you come across a question while studying that needs an immediate answer but going through the text book will take time or when you want to revise the complete concept or idea in just a minute or try your hand at a question from a previous CBSE Board exam paper or the Competitive exam to check your understanding of the chapter or unit you have just finished. This material will support you in any way you want to use it.

A team of dedicated and experienced teachers with expertise in their subjects has prepared this material after a lot of exercise. Care has been taken to include only those items that are relevant and are in addition to or in support of the text book. This material should not be taken as a substitute to the NCERT text book but it is designed to supplement it.

The Students' Support Material has all the important aspects required by you; a design of the question paper, syllabus, all the units/chapters or concepts in points, mind maps and information in tables for easy reference, sample test items from every chapter and question papers for practice along with previous years Board exam question papers.

I am sure that the Support Material will be used by both students and teachers and I am confident that the material will help you perform well in your exams.

Happy learning!
The Students' Support Material is a product of an in-house academic exercise undertaken by our subject teachers under the supervision of subject expert at different levels to provide the students a comprehensive, yet concise, learning support tool for consolidation of your studies. It consists of lessons in capsule form, mind maps, concepts with flow charts, pictorial representation of chapters wherever possible, crossword puzzles, question bank of short and long answer type questions with previous years’ CBSE question papers.

The material has been developed keeping in mind latest CBSE curriculum and question paper design. This material provides the students a valuable window on precise information and it covers all essential components that are required for effective revision of the subject.

In order to ensure uniformity in terms of content, design, standard and presentation of the material, it has been fine-tuned at KVS HQRS level.

I hope this material will prove to be a good tool for quick revision and will serve the purpose of enhancing students' confidence level to help them perform better. Planned study blended with hard work, good time management and sincerity will help the students reach the pinnacle of success.

Best of Luck.
## STUDENT SUPPORT MATERIAL

### ADVISORS

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shri Santosh Kumar Mall, IAS</td>
<td>Commissioner</td>
<td>KVS (HQ), New Delhi</td>
</tr>
<tr>
<td>Shri. Saurabh Jain, IAS</td>
<td>Additional Commissioner (Admn.)</td>
<td>KVS (HQ), New Delhi</td>
</tr>
<tr>
<td>Shri. U.N Khaware,</td>
<td>Additional Commissioner (Acad.)</td>
<td>KVS (HQ), New Delhi</td>
</tr>
</tbody>
</table>

### CO-ORDINATION TEAM KVS (HQ)

- Dr. E. Prabhakar, Joint Commissioner (Training/Finance)KVS(HQ), New Delhi.
- Smt. Indu Kaushik, Deputy Commissioner (Acad.), KVS (HQ), New Delhi.
- Shri Ravindra Kumar Sharma, Assistant Education Officer, KVS(HQ), New Delhi.

### CONTENT TEAM

- Dr. P. Devakumar, Deputy Commissioner, Bengaluru Region.
- Ms. Jolly R David, TGT (Science), KV RWF, Yelahanka Bengaluru.
- Ms. Neeta Wage, TGT (Science), KV Hebbal, Bengaluru.
- Ms. Seemasaraswat, TGT (Science), KV 1 Jalahalli Bengaluru.
- Ms. Saraswathy Chandran, TGT (Science), KV 1 Jalahalli Bengaluru.
- Ms. K. Annapoorna Pai, TGT (Science), KV 1 Jalahalli Bengaluru.

### REVIEW TEAM

- Dr. P. DTS Rao, Deputy Commissioner, KVS(RO), Bengaluru.
- Dr. A. K. Mishra, Assistant Commissioner, KVS (RO), Bengaluru.
- Ms. Suganthisa Mala Solomon, Principal, KV MEG & Centre, Bengaluru.
- Ms. Malar Denny, TGT (Science), KV MEG & Centre, Bengaluru.
- Ms. Arti Prasad, TGT (Science), KV NAL, Bengaluru.
- Ms. M N Madhumathi, TGT (Science), KV MG Railway Colony, Bengaluru.
- Ms. Neeta Wage, TGT (Science), KV Hebbal, Bengaluru.
- Ms. Stella Simon, TGT (Science), KV MEG & Centre, Bengaluru.
# INDEX

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>CONTENTS</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNIT 1: Materials: Nature and behaviour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 1: Chemical reactions and Equations</td>
<td>10-38</td>
</tr>
<tr>
<td></td>
<td>Ch. 2: Acids, Bases and Salts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 3: Metals and non-metals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 4: Carbon and its Compounds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 5: Periodic classification of elements</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>UNIT 2: The Living World</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 6: Life Process</td>
<td>39-69</td>
</tr>
<tr>
<td></td>
<td>Ch. 7: Control and coordination</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 8: How do organisms reproduce</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 9: Heredity and evolution</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>UNIT 3: Natural phenomena</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 10: Light - Reflection and refraction</td>
<td>70-100</td>
</tr>
<tr>
<td></td>
<td>Ch. 11: Human eye and the colourful world</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 12: Electricity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 13: Magnetic effects of electric current</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>UNIT 4: Natural Resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 14: Sources of energy</td>
<td>101-122</td>
</tr>
<tr>
<td></td>
<td>Ch. 15: Our environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ch. 16: Management of Natural resources</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sample paper with the new pattern will be available on the CBSE website</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Examination tips</td>
<td>123</td>
</tr>
</tbody>
</table>
Theme: Materials

Unit I: Chemical Substances - Nature and Behaviour

Chemical reactions: Chemical equation, balanced chemical equation, implication of a balanced chemical equation, types of chemical reactions: Combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.

Acids, bases and salts: Their definitions in terms of furnishing of H+ and OH- ions, General properties, examples and uses, concept of pH scale (Definition relating to logarithm not required), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.

Metals and nonmetals: Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and its prevention.

Carbon compounds: Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes and alkynes), difference between saturated hydrocarbons and unsaturated hydrocarbons. Chemical properties of carbon compounds (combustion, oxidation, and addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

Periodic classification of elements: Need for classification, early attempts at classification of elements (Dobereiner’s Triads, Newland’s Law of Octaves, Mendeleev’s Periodic Table), Modern periodic table, gradation in properties, valence, atomic number, metallic and non-metallic properties.
Theme: The World of the Living

Unit II : World of Living

Life processes: ‘Living Being’. Basic concept of nutrition, respiration, transport and excretion in plants and animals.

Control and co-ordination in animals and plants: Topic movements in plants; Introduction of plant hormones; Control and co-ordination in animals; Nervous system; Voluntary, involuntary and reflex action; Chemical co-ordination: animal hormones.

Reproduction: Reproduction in animals and plants (asexual and sexual) reproductive health-need and methods of family planning. Safe sex vs HIV / AIDS. Child bearing and women’s health.

Hereditary and Evolution: Heredity; Mendel’s contribution - Laws for inheritance of traits: Sex determination: brief introduction; Basic concepts of evolution.

Theme: Natural Phenomena

Unit III: Natural Phenomena

Reflection of light by curved surfaces; Images formed by spherical mirrors, center of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification. Refraction; Laws of refraction, refractive index. Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens. Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses. Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life.

Theme: How Things Work

Unit IV: Effects of Current


Magnetic effects of current: Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming’s Left Hand Rule, Electric Motor, Electromagnetic induction. Induced potential difference, Induced current. Fleming’s Right Hand Rule, Electric Generator, Direct Current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

Theme: Natural Resources

Unit V: Natural Resources

Sources of energy: Different forms of energy, conventional and non-conventional sources of energy: Fossil fuels, solar energy; biogas; wind, water and tidal energy; Nuclear energy. Renewable versus non-renewable sources of Energy.

Management of natural resources: Conservation and judicious use of natural resources. Forest and wildlife; Coal and Petroleum conservation. Examples of people’s participation for conservation of natural resources. Big dams: advantages and limitations; alternatives, if any. Water harvesting. Sustainability of natural resources.

PRACTICALS

Practical’s should be conducted alongside the concepts taught in theory classes.

LIST OF EXPERIMENTS

1. Finding the pH of the following samples by using pH paper / universal indicator:
   a) Dilute Hydrochloric Acid
   b) Dilute NaOH solution
   c) Dilute Ethanoic Acid Solution
   d) Lemon juice
   e) Water
   f) Dilute Hydrogen Carbonate solution

   Studying the properties of acids and bases (HCl&NaOH) by their reaction with:
   a) Litmus solution (Blue/Red)
   b) Zinc Metal
   c) Solid Sodium carbonate

2. Performing and observing the following reactions and classifying them into:
   a) Combination reaction
   b) Decomposition reaction
   c) Displacement reaction
   d) Double displacement reaction
      (i) Action of water on quick lime
      (ii) Action of heat on ferrous sulphate crystals
      (iii) Iron nails kept in copper sulphate solution
      (iv) Reaction between sodium sulphate and barium chloride solutions

   OR

3. Observing the action of Zn, Fe, Cu and Al metals on the following salt solutions:
   a) ZnSO₄ (aq)
   b) FeSO₄ (aq)
   c) CuSO₄ (aq)
d) \( \text{Al}_2(\text{SO}_4)_3 \) (aq)

Arranging Zn, Fe, Cu and Al (metals) in the decreasing order of reactivity based on the above result.

4. Studying the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also plotting a graph between V and I.

5. Determination of the equivalent resistance of two resistors when connected in series and parallel.

6. Preparing a temporary mount of a leaf peel to show stomata.

7. Experimentally show that carbon dioxide is given out during respiration.

8. Study of the following properties of acetic acid (ethanoic acid):
   i) odour
   ii) solubility in water
   iii) effect on litmus
   iv) reaction with sodium Hydrogen Carbonate

9. Study of the comparative cleaning capacity of a sample of soap in soft and hard water.

10. Determination of the focal length of:
    i) Concave mirror
    ii) convex lens
    by obtaining the image of a distant object.

11. Tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. Measure the angle of incidence, angle of refraction, angle of emergence and interpret the result.

12. Studying (a) binary fission in Amoeba, and (b) budding in yeast with the help of prepared slides.

13. Tracing the path of the rays of light through a glass prism.

14. Finding the image distance for varying object distances in case of a convex lens and drawing corresponding ray diagrams to show the nature of image formed.

15. Identification of the different parts of an embryo of a dicot seed (Pea, gram or red kidney bean).
### QUESTION PAPER DESIGN

**Class: IX AND X (2019-20)**

**Subject: Science (086)**

**Maximum Marks: 80**

**Duration: 3 Hours**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Typology of Questions</th>
<th>Objective Type * (01 mark)</th>
<th>SA (03 marks)</th>
<th>LA (05 marks)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Remembering:</strong> Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.</td>
<td>07</td>
<td>02</td>
<td>01</td>
<td>22.5%</td>
</tr>
<tr>
<td>2</td>
<td><strong>Understanding:</strong> Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas</td>
<td>04</td>
<td>02</td>
<td>02</td>
<td>25%</td>
</tr>
<tr>
<td>3</td>
<td><strong>Applying:</strong> Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.</td>
<td>04</td>
<td>01</td>
<td>02</td>
<td>21.25%</td>
</tr>
<tr>
<td>4</td>
<td><strong>Analyzing and Evaluating:</strong> Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations. Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.</td>
<td>05</td>
<td>02</td>
<td>01</td>
<td>20%</td>
</tr>
<tr>
<td>5</td>
<td><strong>Creating:</strong> Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.</td>
<td>-</td>
<td>03</td>
<td>-</td>
<td>11.25%</td>
</tr>
</tbody>
</table>

All questions would be compulsory. However, an internal choice of approximately 33% would be provided.

2) **Internal Assessment:** 20 Marks
   - Periodic Assessment – 05 marks + 05 marks
   - Subject Enrichment (Practical Work) – 05 marks
   - Portfolio – 05 marks

**Note:** Objective Section would have 10 MCQ. Besides this, the section would include VSA, Assertion-Reasoning type questions etc.
CHAPTER 1 - CHEMICAL REACTIONS AND EQUATIONS

1. During chemical reactions, chemical composition of substances changes or new substances are formed.

2. Chemical reactions can be written in chemical equation form which should be always balanced.

3. Types of Chemical Reactions

<table>
<thead>
<tr>
<th>S NO</th>
<th>Types of reactions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Combination reaction</strong></td>
<td>2Mg +O₂→2MgO</td>
</tr>
<tr>
<td></td>
<td>A single product is formed from two or more reactants.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>Decomposition reaction</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A single reactant breaks down to yield two or more products.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) Thermal decomposition</td>
<td>2Pb(NO₃)₂ → 2PbO + 4NO₂ +O₂</td>
</tr>
<tr>
<td></td>
<td>ii) Electrolysis</td>
<td>2H₂O→2H₂ +O₂</td>
</tr>
<tr>
<td></td>
<td>iii) Photo chemical reaction</td>
<td>2AgBr→2Ag +Br₂</td>
</tr>
<tr>
<td>3</td>
<td><strong>Displacement reaction</strong></td>
<td>Zn + CuSO₄→ ZnSO₄ + Cu</td>
</tr>
<tr>
<td></td>
<td>One element is displaced by another element.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>Double displacement reaction</strong></td>
<td>AgNO₃+NaCl → AgCl +NaNO₃</td>
</tr>
<tr>
<td></td>
<td>Exchange of ions between reactants.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>Redox reaction</strong></td>
<td>CuO + H₂→ Cu + H₂O</td>
</tr>
<tr>
<td></td>
<td>Both oxidation and reduction take place simultaneously</td>
<td></td>
</tr>
</tbody>
</table>

4. i) **Exothermic reaction**: A chemical reaction in which heat energy is evolved.
   \[ \text{C + O}_2 \rightarrow \text{CO}_2 \text{ (g) + heat} \]

ii) **Endothermic reaction**: A chemical reaction in which heat energy is absorbed.
   \[ \text{ZnCO}_3 + \text{Heat} \rightarrow \text{ZnO} + \text{CO}_2 \]

5. **Redox reaction**: Chemical reaction in which both oxidation and reduction take place simultaneously.
   **Oxidation**: Reaction that involves the gain of oxygen or loss of hydrogen.
Reduction: Reaction that shows the loss of oxygen or gain of hydrogen
ZnO + C → Zn + CO
ZnO is reduced to Zn - reduction
C is oxidized to CO ------oxidation

6. Effects of oxidation reactions in our daily life:
   a) **Corrosion**: It is an undesirable change that occurs in metals, when they are attacked by moisture, air, acids and bases.
   - Corrosion (rusting) of iron: Fe₂O₃. xH₂O (Hydrated iron oxide)
   - Corrosion of copper: CuCO₃.Cu (OH)₂ (Basic copper carbonate)
   - Corrosion of silver: Ag₂S (Silver sulphide)
   - Corrosion of Aluminum: Al₂O₃ (Aluminum oxide)

   b) **Rancidity**: Undesirable change that takes place in oil containing food items due to the oxidation of fatty acids.

   **Preventive methods**
   1. Adding antioxidants to the food materials.
   2. Storing food in air tight container
   3. Flushing out air with nitrogen gas.
   4. Refrigeration

   **MIND MAP**

   ![MIND MAP Image]

   - **Displacement Reaction**: Fe + CuSO₄ → FeSO₄ + Cu
   - **Double Displacement**: TiBr₄ + H₂SO₄ → Br₂O₄ + HCl
   - **Combination Reaction**: 2Mg + O₂ → 2MgO
   - **Decomposition Reaction**: CaCO₃ → CaO + CO₂
   - **Redox Reaction**: Cu + H₂O → CuO + H₂
   - **Electrolysis**: 2H₂O → 2H₂ + O₂
   - **Photochemical**: 2AgBr → 2Ag + Br₂
CROSSWORD

Complete the crossword below. Put the correct word.

Across
2. Both oxidation and reduction take place
4. Process of loss of oxygen
6. Reaction of two elements combined together to get a single product
8. Process of gain of oxygen
9. What does iron do when placed in copper sulphate solution
10. Metal extensively used in industries and infrastructure

Down
1. Change where new substances produced
3. When oil foods are kept for long time
5. Single compound broken down into two or more products
7. All chemical reactions should be ----
Very short answer questions. (1 mark)

1. Identify in the following reaction:
   \[ 2\text{PbO} + \text{C} \rightarrow 2\text{Pb} + \text{CO} \]
   a) the substance oxidised and 
   b) The substance reduced.
   Ans: a) Carbon is oxidized to CO. 
   b) PbO is getting reduced to Pb.

2. A shiny brown coloured element “x” on heating in air becomes black incolour. Name the element “x” and the black coloured compound formed.
   Ans: Element ‘x’ is Copper and the black coloured compound is cupric oxide CuO

Short answer type questions (2 mark)

1. Classify the following reaction as combination, decomposition, displacement and double displacement reaction:-
   a) \[ \text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl} \]
   Ans: Double displacement reaction.
   b) \[ 3\text{CuSO}_4 + 2\text{Al} \rightarrow \text{Al}_2 (\text{SO}_4)_3 + 3\text{Cu} \]
   Ans: Displacement reaction.
   c) \[ \text{ZnCO}_3 \rightarrow \text{ZnO} + \text{CO}_2 \]
   Ans: Decomposition reaction
   d) \[ \text{C} + \text{O}_2 \rightarrow \text{CO}_2 \]
   Ans: Combination reaction

2) What is a precipitation reaction? Give an example.
   Ans. Reaction in which an insoluble substance or precipitate is formed
   \[ \text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl} \]

Short answer type questions (3 mark)

1. Give an example, each for thermal decomposition and photochemical decomposition reactions. Write balanced equation for the same.
   Ans. Thermal decomposition - Heating of lime stone.
   \[ \text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2 \]
   Photochemical decomposition - Action of light on silver bromide.
   \[ 2\text{AgBr} \rightarrow 2\text{Ag} + \text{Br}_2 \]

Very long answer type questions (5 mark)

1. (i) Write chemical equations for the following and balance them.
   a) Zinc carbonate(s) \( \rightarrow \) Zinc oxide + Carbon dioxide
   Ans. \[ \text{ZnCO}_3 \rightarrow \text{ZnO} + \text{CO}_2 \]
   b) Potassium bromide (aq) + Barium iodide (aq) \( \rightarrow \) Potassium iodide + Barium bromide.
   Ans. \[ 2\text{KBr} + \text{BaI}_2 \rightarrow 2\text{KI} + \text{BaBr}_2 \]
   c) Nitrogen + Hydrogen \( \rightarrow \) Ammonia
   Ans. \[ \text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3 \]
ii) What happens when electricity is passed through acidified water?

**Ans.** Decomposition of water takes place resulting in the formation of hydrogen and oxygen.

**MCQ**

Which among the following is following is (are) double displacement reaction(s)?

1. i) Pb + CuCl₂ → PbCl₂ + Cu  
   ii) Na₂SO₄ + BaCl₂ → BaSO₄ + 2NaCl  
   iii) C + O₂ → CO₂  
   iv) Zn + 2HCl → ZnCl₂ + H₂  

   a) (i) and (iv)  
   b) (ii) only  
   c) (i) and (ii)  
   d) (iii) and (iv)

2. Which of the following is not a physical change?
   a) Boiling of water to give water vapour  
   b) Melting of ice to give water  
   c) Dissolution of salt water  
   d) Combustion of liquefied Petroleum Gas (LPG)

3. Which of the following observations help(s) us to determine that a chemical change has taken place?
   a) Change in temperature  
   b) Evolution of gas  
   c) Change in colour  
   d) All of these

4. The following reaction is used for preparation of oxygen gas in the laboratory
   2KClO₃(s) → 2KCl (s) + 3 O₂ (g)  
   Heat
   Catalyst
   Which of the following statement(s) is (are) correct about the reaction?
   a) It is a decomposition reaction and endothermic in nature.  
   b) It is a combination reaction  
   c) It is a decomposition reaction and is accompanied by release of heat.  
   d) It is a photochemical decomposition reaction and exothermic in nature.

5. Chemically the rust is
   a) Ferric sulphate  
   b) Hydrated ferrous oxide  
   c) Ferric oxide  
   d) Hydrated ferric oxide

**Ans:** 1. b)  2. d)  3. d)  4. a)  5. d)

**Reasoning and assertion type questions:**

The following questions consists of two statements- Assertion (A) and Reason(R). Answer these questions selecting appropriate option given below:

a) Both A and R are true and R is correct explanation of A  
b) Both A and R are true and R is not correct explanation of A  
c) A is true but R is false  
d) A is false but R is true

1. **Assertion (A)** - Calcium Carbonate when heated gives calcium oxide and water  
   **Reason (R)** – on heating CaCO₃, decomposition reaction takes place.

2. **Assertion (A)** - White silver chloride turns grey in sunlight.  
   **Reason (R)** – Decomposition of silver chloride in presence of sunlight takes place to form silver metal and chlorine gas.

**Ans:** 1. d) A is false but R is true  
   2. a) Both A and R are true and R is correct explanation of A
CHAPTER 2--ACIDS, BASES AND SALTS

Acids: Substances which turn blue litmus solution red are called acids. Acids are sour in taste.

Bases: Substances which change red litmus solution blue are called bases. They are bitter in taste.

Mineral Acids: Acids which are obtained from minerals like sulphates, nitrates, chlorides etc. are called mineral acids, e.g., H₂SO₄(Sulphuric acid), HNO₃(Nitric acid) and HCl(Hydrochloric acid).

Organic Acids: Acids which are obtained from plants and animals are called organic acids, e.g. citric acid, ascorbic acid, tartaric acid, lactic acid, acetic acid.

Hydronium Ions(H₃O⁺): They are formed by reaction of H⁺ (from acid) and H₂O. It is because H⁺ is unstable.

Strong Acids: Acids which dissociate into ions completely are called strong acids. E.g. H₂SO₄, HCl

Weak Acids: Acids which do not dissociate into ions completely are called weak acids E.g. Citric acid, acetic acid.

Chemical properties of acids
(i) Acids react with active metals to give salt and hydrogen gas.

(ii) Acids react with metal carbonate and metals hydrogen carbonate to give salt, water and carbon dioxide.

(iii) Acids react with bases to give salt and water. This reaction is called neutralization reaction.

(iv) Acids react with metals oxides to give salt and water.

Chemical properties of Bases
(i) Reaction with Metals – Certain metals such as Zinc, Aluminium and Tin react with alkali solutions on heating and hydrogen gas is evolved.

(ii) Reaction with acids – Bases react with acids to form salt and water.

Indicators - Indicators are substances which indicate the acidic or basic nature of the solution by their colour change.

Universal Indicator: A universal indicator is a mixture of indicators which shows a gradual but well-marked series of colour changes over a very wide range of change in concentration of H⁺ ion.

pH scale: A scale for measuring hydrogen ion concentration in a solution.
The pH of a solution is defined as the negative logarithm of hydrogen ion concentration in moles per litre.
pH = -log [H⁺]
pH = -log [H₃O⁺]
where [H+] or [H₃O⁺] represents concentrations of hydrogen ions in solution.
The pH of a neutral solution is 7.
The pH of an acidic solution is < 7.
The pH of a basic solution is > 7.
## Some Important Compounds and their uses

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Chemical name</th>
<th>Chemical formula</th>
<th>Preparation</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washing soda</td>
<td>Sodium carbonate decahydrate</td>
<td>Na₂CO₃.10H₂O</td>
<td>Na₂CO₃ + 10H₂O → Na₂CO₃.10H₂O</td>
<td>Manufacture of borax, caustic soda, softening of hard water</td>
</tr>
<tr>
<td>Baking soda</td>
<td>Sodium hydrogen carbonate</td>
<td>NaHCO₃</td>
<td>NaCl+NH₃+CO₂+H₂O → NaHCO₃ +NH₄Cl</td>
<td>Used as antacid, ingredient of baking powder</td>
</tr>
<tr>
<td>Bleaching powder</td>
<td>Calcium oxychloride</td>
<td>CaOCl₂</td>
<td>By the action of chlorine on dry slaked lime Ca(OH)₂,Cl₂CaOCl₂+H₂O</td>
<td>Bleaching clothes, used as oxidizing agent, disinfecting water, manufacture of chloroform</td>
</tr>
<tr>
<td>Plaster of Paris</td>
<td>Calcium sulphate hemihydrate</td>
<td>CaSO₄.1/2H₂O</td>
<td>CaSO₄.2H₂O₃73K (Heat) → CaSO₄.1/2 H₂O +1.1/2H₂O</td>
<td>Plastering fractured bones, making toys, decorative materials, statues</td>
</tr>
</tbody>
</table>

### EQUATIONS OF ACIDS, BASES AND SALTS

- Acid + Metal → Salt + Hydrogen gas
- H₂SO₄ + Zn → ZnSO₄ + H₂
- Base + Metal → Salt + Hydrogen gas
- 2NaOH + Zn → Na₂ZnO₂ + H₂
  (Sodium zincate)
- Base + Acid → Salt + Water
- NaOH (aq) + HCl (aq) → NaCl (aq) + H₂O (l)
- Acids give hydronium ions in water
- HCl + H₂O → H₃O⁺ + Cl⁻
- Bases generate OH⁻ ions in water
- NaOH(s) + H₂O → Na⁺(aq) + OH⁻(aq)

### Reactions of Important Chemical Compounds

- On heating, baking soda liberates CO₂
  2NaHCO₃ → Heat → Na₂CO₃ + H₂O + CO₂
Plaster of Paris
On mixing plaster of Paris with water, gypsum is obtained
\[ \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} + \frac{1}{2} \text{H}_2\text{O} \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O} \]

MIND MAP

**Acids, Bases and salts**

**Indicators**

**pH Value**

**Salts**

- Washing soda
- Baking soda
- Bleaching powder

QUESTION BANK

**Very Short Answer Type Questions (1mark)**

1. Write the name of the products formed by heating gypsum at 373K. Write one use of it.
   **Ans:** Plaster of Paris and water. It is used for plastering fractured bone.

2. Write the chemical name and formula of the compound which is used as an antacid.
   **Ans:** Sodium bicarbonate, \( \text{NaHCO}_3 \)

**Short Answer Type Questions (2mark)**

1. Given below are the pH values of different liquids. 7.0, 14.0, 4.0, and 2.0. Which of these could be that of a) lemon juice b) distilled water c) sodium hydroxide solution d) tomato juice.
   **Ans:** a) lemon juice- 2.0 b) distilled water- 7.0 c) sodium hydroxide solution- 14.0 d) tomato juice- 4.0
2. What is baking powder? How does it make the cake soft and spongy?
**Ans:** Baking powder is a mixture of sodium hydrogen carbonate and tartaric acid. On heating it liberates CO₂ which makes the cake soft and spongy.

**Short Answer Type Questions (3 mark)**

1. Write the chemical name of Plaster of Paris. Write a chemical equation to show the reaction between Plaster of Paris and water. Name the compound produced in this reaction.
**Ans:** Calcium Sulphate hemihydrate.

\[
\text{CaSO}_4\cdot\frac{1}{2}\text{H}_2\text{O} + \frac{1}{2}\text{H}_2\text{O} \rightarrow \text{CaSO}_4\cdot2\text{H}_2\text{O}
\]

The compound produced is Gypsum.

2. A gas X reacts with lime water and forms a compound Y which is used as bleaching agent in the chemical industry. Identify X and Y. Give the chemical equation of the reaction involved.
**Ans:** X is chlorine, Y is CaOCl₂ (calcium oxy chlorine) used as bleaching agent.

\[
\text{Ca (OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}
\]

**Long answer type questions (5 mark)**

1. a) A milk man adds a very small amount of baking soda to fresh milk. Why does he shift the pH of the fresh milk from 6 to slightly alkaline?
   b) Mention pH range within which our body works?
   c) Explain how antacids give relief from acidity.
   d) Mention the nature of tooth pastes. How do they prevent tooth decay?
**Ans:** a) It is done to prevent the formation of lactic acid which spoils the milk
   b) pH range 7.0 - 7.8
   c) Antacids neutralizes excess of acid in our body and gives relief.
   d) Basic. Neutralize the acid formed in the mouth

2. a) Crystals of a substance changed their color on heating in a closed test tube but regained it after some time when they were allowed to cool down. Name the substance and write its formula. Explain the phenomenon.
   b) How is sodium carbonate prepared? Give two uses of the compound
**Ans:** a) Copper sulphate, CuSO₄·5H₂O. It is blue. It becomes white on heating due to loss of water molecule.

\[
\text{CuSO}_4\cdot5\text{H}_2\text{O} \xrightarrow{\text{Heat}} \text{CuSO}_4+5\text{ H}_2\text{O}
\]

It regains its colour by absorbing water from atmosphere

\[
\text{CuSO}_4+5\text{ H}_2\text{O} \xrightarrow{\text{Heat}} \text{CuSO}_4\cdot5\text{H}_2\text{O}
\]

b) Prepared by passing CO₂ through ammoniacal brine

Used for production of washing powder & manufacture of glass

**MCQ**

1. Which of the following gives the correct increasing order of acidic strength?
   a) Water < Acetic acid < Hydrochloric acid
   b) Water < Hydrochloric acid < Acetic
   c) Acetic acid < Water < Hydrochloric acid
   d) Hydrochloric acid < water < Acetic acid
2. Which of the following salts does not contain water of crystallisation?
   a) Blue vitriol  b) Baking soda  c) Gypsum  d) Washing soda

3. Common salt, besides used in kitchen, can also be used as the raw material for making:
   i) Washing soda     iii) bleaching powder
   ii) Baking soda     iv) slaked lime
   a) i) and ii)     c) i), ii) and iii)
   b) i) and iii)    d) i), iii) and iv)

4. The acid having highest hydrogen ion concentration is one with
   a) pH=2.5       b) pH = 1.8       c) pH=7       d) pH=10

5. The pH of gastric juices released during digestion is:
   a) less than 7    b) more than 7    c) equal to 7    d) equal to 0

   Ans: 1. a)       2. b)       3. c)       4. b)       5. a)

Reasoning and assertion type questions

The following questions consists of two statements - Assertion (A) and Reason (R).
Answer these questions selecting appropriate option given below:
   a) Both A and R are true and R is correct explanation of A
   b) Both A and R are true and R is not correct explanation of A
   c) A is true but R is false
   d) A is false but R is true

1. Assertion (A) - The aqueous solutions of glucose and alcohol do not show acidic character.
   Reason (R) – Aqueous solutions of glucose and alcohol do not give H⁺ ions.

2. Assertion (A) - Carbonic acid is weak acid.
   Reason (R) – It ionized completely in aqueous solution.

   Ans: 1. a) Both A and R are true and R is correct explanation of A
         2. c) A is true but R is false
# CHAPTER 3: METALS AND NON-METALS MIND MAP

## PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th></th>
<th>METAL</th>
<th>NON-METALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUSTRE</td>
<td>LUSTROUS</td>
<td>NON-LUSTROUS</td>
</tr>
<tr>
<td>HARDNESS</td>
<td>HARD</td>
<td>BRITTLE</td>
</tr>
<tr>
<td>MALLEABILITY</td>
<td>MALLEABLE</td>
<td>NON-MALLEABLE</td>
</tr>
<tr>
<td>DUCTILITY</td>
<td>DUCTILE</td>
<td>NON-DUCTILE</td>
</tr>
<tr>
<td>CONDUCTIVITY</td>
<td>GOOD CONDUCTOR OF HEAT AND ELECTRICITY</td>
<td>BAD CONDUCTOR OF HEAT AND ELECTRICITY</td>
</tr>
<tr>
<td>PHYSICAL STATE</td>
<td>GENERALLY SOLID</td>
<td>SOLID, LIQUID OR GAS</td>
</tr>
<tr>
<td>SONOROUS</td>
<td>MAKES SOUND WHEN STRUCK</td>
<td>DOES NOT MAKE SOUND WHEN STRUCK</td>
</tr>
<tr>
<td>MELTING AND BOILING POINT</td>
<td>HIGH MELTING POINT AND BOILING POINT</td>
<td>LOW MELTING POINT AND BOILING POINT</td>
</tr>
</tbody>
</table>

### Exceptional properties of metals and non-metals

1. Mercury (Metal) is liquid at room temperature
2. Iodine (Non-metal) is lustrous
3. Diamond (Carbon, non-metal) is the hardest substance
4. Graphite (Carbon, Non-metal) is a good conductor of electricity
5. Sodium and potassium (Metals) can be cut with a knife
6. Gallium and caesium (Metals) melt when kept on palm (Low M.P.)
EXTRACTION OF METALS

Ore

Concentration of ore

- Metals of high reactivity
  - Electrolysis of molten ore NaCl
    - Pure Metal 2Na + Cl2

- Metals of medium reactivity
  - Carbonate ore ZnCO3
    - Calcination (Less air)
  - Sulphide ore ZnS
    - Roasting (Excess air)
      - Oxide of metal ZnO
      - Reduction to metal ZnO + C
      - Purification of metal (Electrolysis)

- Metals of low reactivity
  - Sulphide ores HgS
    - Roasting HgO
      - Metal Hg
    - Refining (Electrolysis)

Corrosion

Silver sulphide Black

Silver, Copper, Iron

Basic Copper carbonate Green layer

Hydrated Iron Oxide (Rust - Brown layer)

Galvanisation (Layer of Zinc on Iron)

Prevention

Alloys

- Stainless steel
- Manganese
- Brass
- Bronze
- Solder

Prevention
Across
1  Protecting Iron
5  Hardest Substance
9  A metal that has amphoteric oxide
10 Sulphide ores are subjected to________.
**Down**
1. Most ductile metal
2. Homogenous mixture of metals
3. A Metal which gets rusted
4. Burns with dazzling white flame
5. Liquid at room temperature
6. Minerals from which metal is extracted
7. Impurity in ore

**QUESTION BANK**

**VERY SHORT ANSWER TYPE (1 MARK)**

1. Differentiate between the oxides of magnesium and sulphur.
2. Name one metal which is a poor conductor of heat

**SHORT ANSWER TYPE (2 MARK)**

1. Give Reasons
   a. Sodium and potassium are stored in kerosene
   b. Ionic compounds have higher melting point

2. Differentiate between metals and non-metals based on
   a. Malleability
   b. Electrical conductivity

**SHORT ANSWER TYPE (3 MARK)**

1. Show the formation of magnesium chloride with the help of electron dot structure
2. What happens when
   a. Zinc reacts with copper sulphate solution
   b. Aluminum reacts with steam
   c. Sodium reacts with water
   Give balanced equations for each.

**LONG ANSWER TYPE (5 MARK)**

1. With the help of labelled diagram explain how copper metal is purified after extraction
2. Explain
   a. How is zinc obtained from sulphide and carbonate ores? Differentiate between the two giving chemical reactions
   b. What are the advantages of alloying? Name the constituents of bronze.
MCQ

1. Which of the following is a liquid non-metal at room temperature:
   (a) Mercury   (b) Bromine   (c) Chlorine   (d) Sulphur

2. Which of the following is not an ionic compound:
   (a) KCl   (b) MgCl₂   (c) CCl₄   (d) NaCl

3. Aqua regia is called as royal water because it dissolves gold its composition is 1:3 concentrated.
   (a) H₂SO₄: HNO₃   (b) HNO₃: H₂SO₄   (c) HNO₃: HCl   (d) HCl: HNO₃

4. Which one of the following four metals would be displaced from the solution of its salt by other three metals?
   (a) Mg   (b) Ag   (c) Zn   (d) Cu

5. Alloys are homogenous mixtures of a metal with a metal or non-metal. Which of the following alloys contain non-metal as one of its constituents.
   (a) Brass   (b) Bronze   (c) amalgam   (d) stainless steel.

Answers 1. (b) 2. (c) 3. (c) 4. (b) 5. (d)

ASSERTION QUESTIONS:
The following questions consists of two statements-Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is correct explanation for A.
(b) Both A and R are true and R is not the correct explanation for A.
(c) A is true but R is false.
(d) A is false but R is true.

1. **Assertion:** Nitrogen is a non-metal.
   **Reason:** Nitrogen has 5 valance electrons.
   **Ans:** (b) Both A and R are true and R is not the correct explanation for A.

2. **Assertion:** Zinc oxide is amphoteric in nature.
   **Reason:** Zinc oxide reacts with both acids and bases.
   **Ans** (a) Both A and R are true and R is correct explanation for A.
The chemical symbol of Carbon is C. Its atomic number is 6 and mass number is 12. It is a non-metallic element.

**ALLOTROPES OF CARBON**

- **Diamond** – It is very hard, possesses 3-D network structure and is a poor conductor of electricity.
- **Graphite** – It is soft, has hexagonal planar layered structure and is a good conductor of electricity.
- **Fullerene** – It has a spheroidal cage-like structure. C_{60} fullerene has a soccer ball structure.

**VERSATILE NATURE OF CARBON**

- **Catenation**: Self-linking property of carbon atoms through covalent bonds to form a long chain and rings.
- **Tetravalency**: Carbon has a valency of four. It has the tendency to form covalent bond.

**ISOMERISM** - The phenomenon in which a compound has the same molecular formula but different structures is called isomerism.

**ISOMERS** - The compounds which have the same molecular formula but different structures and different properties are called isomers.

**FUNCTIONAL GROUPS**: Atoms or group of atoms responsible for the chemical properties of an organic compound.
In a hydrocarbon chain, one or more hydrogens can be replaced by some other element. In such compounds, the element replacing hydrogen is referred to as a **heteroatom**.
HOMOLOGOUS SERIES – A series of compounds having the same functional group and similar chemical properties but differ by –CH₂ unit between two successive members.

**Ethanol, C₂H₅OH**
- Reaction with sodium: 2Na + 2C₂H₅OH → 2C₂H₅ONa + H₂
- Dehydration reaction: C₂H₅OH → H₂C=CH₂ + H₂O

**Ethanoic Acid, CH₃COOH**

**Esterification reaction:**
\[
\text{CH₃COOH} + \text{C₂H₅OH} \xrightarrow{\text{H₂SO₄}} \text{CH₃COOC₂H₅} + \text{H₂O}
\]

**Soaps**
The reaction between an ester and a free base to give original alcohol and carboxylic acid back is called saponification reaction because this reaction is used in the preparation of soaps.

**Detergents**
Sodium salts of long chain sulphonic acids.

**Chemical Properties**
- **Oxidation** – The process of addition of oxygen or removal of hydrogen. Substance which provides oxygen is called an oxidising agent.
  \[\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}\]

- **Combustion** – It is a process of burning a substance where CO₂ and H₂O are formed with the evolution of heat.
  \[\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} + \text{Heat}\]

- **Addition – Unsaturated hydrocarbons react with hydrogen in presence of catalyst to give saturated hydrocarbons.**
  \[\text{CH}_2 = \text{CH}_2 + \text{H}_2 \xrightarrow{\text{Ni} \text{catalyst}} \text{CH}_3\text{CH}_3\]

- **Substitution** – One or more atoms of hydrogen are replaced by other atoms.
  \[\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{HCl} \text{(In presence of sunlight)}\]

**Covalent Bonding**
- A bond formed by the mutual sharing of electrons.
  - Single covalent bond Ex – H₂
  - Double covalent bond Ex – O₂
  - Triple covalent bond Ex – N₂
CROSSWORD

ACROSS

1. Self-linking property of carbon
4. Acid having functional group –COOH
6. Hydrogenation of vegetable oil is ---- reaction
8. Simplest hydrocarbon
9. IUPAC name of next higher homologous of ethanol
10. The substance used in making perfumes and flavoring agents

DOWN

2. Hydrocarbon burns in air with sooty flame.
3. The functional group present in methanol.
5. Chlorination of alkanes is -------- reaction
7. The active ingredient of all alcoholic drinks.

Question Bank

Answer the following questions.

Very short answer questions (1 mark)

1. Which of the following formulae represents a saturated hydrocarbon?
   \[ C_nH_{2n}, C_nH_{2n+2}, C_nH_{2n-1} \]

2. Draw the electron dot structure of Ethene.
Short answer question (2 mark)
1. Why is the conversion of ethanol to ethanoic acid an oxidation reaction?
2. What is meant by denatured alcohol? What is the need to denature alcohol?

Short answer question (3 mark)
   a) Name A, B and C.
   b) Write the chemical equation for the conversion of A to B
   c) What is the role of conc.H₂SO₄ in above equation? (HOTS)

Long answer question (5 mark)
1. An organic compound with molecular formula C₂H₄O₂ produces brisk effervescence on addition of sodium carbonate /bicarbonate.
   a) Identify the organic compound.
   b) Name the gas evolved.
   c) How will you test the gas evolved?
   d) Write the chemical equation for the above reaction.
   e) List two important uses of the above compound (HOTS)
2. a. List two reasons for carbon forming a large number of compounds.
   b. Name the type of bonding found in most of the carbon compounds. Why does carbon form compounds mainly by this kind of bonding?
   c. Give reason.
      (i) Carbon compounds generally have low melting and boiling points.
      (ii) Carbon compounds generally do not conduct electricity.

MCQ
1. This is an example of a saturated hydrocarbon
   a) C₂H₄  c) C₂H₄
   b) C₂H₆  d) C₃H₆
2. The name of this compound would end with
   a) –ane  c) –ol
   b) –ene  d) –al
3. The reaction in which C₂H₄ is converted into C₂H₆ in the presence of a catalyst is called –
   a) Oxidation  c) Substitution
   b) Addition  d) Dehydration
4. Hard water is caused due to the presence of –
   a) Salts of Ca and Mg.  
   b) Salts of Na and K  
   c) Scum  
   d) Detergents.

5. This is an example of a molecule having a ring of Carbon atoms.
   a) Propene  
   b) Benzene  
   c) Butyne  
   d) Propyne.

**ASSERTION – REASON QUESTIONSM**

The following questions consists of two statements- Assertion(A) and Reason(R)-answer the questions selecting the appropriate option given below,

a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true.

1. **Assertion (A).** Butane exhibits isomerism.
   **Reason(R).** Butane is a saturated hydrocarbon.

2. **Assertion (A).** Carbon forms strong and stable covalent bonds.
   **Reason(R).** Carbon is tetravalent and the Carbon atom is small in size.
CHAPTER 5
PERIODIC CLASSIFICATION OF ELEMENTS

Dobereiner’s Triads
Dobereiner observed that when elements were arranged into groups of three in the order of their increasing atomic masses, the atomic mass of the middle element was the arithmetic mean of rest of the two.

Limitation
Could be applied only to limited number of elements. Only three sets could be identified.

Newlands’ Law of Octaves
Newlands found that every eighth element has chemical properties when they are arranged in increasing order of their atomic masses.

Limitations
- Could be valid up to calcium only
- Newlands assumed that only 56 elements existed in nature and no more elements would be discovered.

Mendeleev's Periodic Classification

Mendeleev’s Periodic Law states that the properties of elements are the periodic function of their atomic masses.

Merits of Mendeleev’s Periodic Table
- Mendeleev left some blank spaces for undiscovered elements.
- Mendeleev predicted the discovery of some elements and named them as eka-boron, eka-aluminium and eka-silicon.
- Noble gases discovered later could be placed without disturbing the existing order.

Limitations of Mendeleev’s Periodic Table
- Position of Hydrogen- Could not assign a correct position to hydrogen as hydrogen resembles alkali metals as well as halogens
- Position of Isotopes- Isotopes are placed in same position though they have different atomic masses
- Separation of chemically similar elements while dissimilar elements are placed in the same group.

Modern Periodic Classification
Modern Periodic Law states that properties of elements are the periodic function of their atomic numbers.
Groups in Modern Periodic Table:

<table>
<thead>
<tr>
<th>Group</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>Alkali metals</td>
</tr>
<tr>
<td>Group 2</td>
<td>Alkaline earth metals</td>
</tr>
<tr>
<td>Groups 3 to 12</td>
<td>Transition elements</td>
</tr>
<tr>
<td>Group 13</td>
<td>Boron family</td>
</tr>
<tr>
<td>Group 14</td>
<td>Carbon family</td>
</tr>
<tr>
<td>Group 15</td>
<td>Nitrogen family</td>
</tr>
<tr>
<td>Group 16</td>
<td>Oxygen family</td>
</tr>
<tr>
<td>Group 17</td>
<td>Halogens</td>
</tr>
<tr>
<td>Group 18</td>
<td>Noble gases</td>
</tr>
</tbody>
</table>

Periods in Modern Periodic Table

<table>
<thead>
<tr>
<th>Period</th>
<th>No of elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; period</td>
<td>2 (H,He)</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; and 3&lt;sup&gt;rd&lt;/sup&gt; period</td>
<td>8 (Li,Be,B,C,N,O,F,Ne)</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt; and 5&lt;sup&gt;th&lt;/sup&gt; period</td>
<td>18</td>
</tr>
<tr>
<td>6&lt;sup&gt;th&lt;/sup&gt; period</td>
<td>32</td>
</tr>
<tr>
<td>7&lt;sup&gt;th&lt;/sup&gt; period</td>
<td>Incomplete period</td>
</tr>
</tbody>
</table>

Trends in Modern Periodic Table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Variation along the group</th>
<th>Variation along the period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valency</td>
<td>Remains the same</td>
<td>Increases up to group 14 then decreases</td>
</tr>
<tr>
<td>Atomic radii</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Metallic character</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Electropositive character</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Electronegativity</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
</tbody>
</table>
**DIAGRAMS**

Döbereiner’s triads

<table>
<thead>
<tr>
<th>Li</th>
<th>Ca</th>
<th>Cl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na</td>
<td>Sr</td>
<td>Br</td>
</tr>
<tr>
<td>K</td>
<td>Ba</td>
<td>I</td>
</tr>
</tbody>
</table>

Notes of music:

<table>
<thead>
<tr>
<th>sa (do)</th>
<th>re (re)</th>
<th>ga (mi)</th>
<th>ma (fa)</th>
<th>pa (so)</th>
<th>da (la)</th>
<th>ni (ti)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Li</td>
<td>Be</td>
<td>B</td>
<td>C</td>
<td>N</td>
<td>O</td>
</tr>
<tr>
<td>F</td>
<td>Na</td>
<td>Mg</td>
<td>Al</td>
<td>Si</td>
<td>P</td>
<td>S</td>
</tr>
<tr>
<td>Cl</td>
<td>K</td>
<td>Ca</td>
<td>Cr</td>
<td>Ti</td>
<td>Mn</td>
<td>Fe</td>
</tr>
<tr>
<td>Co and Ni</td>
<td>Cu</td>
<td>Zn</td>
<td>Y</td>
<td>In</td>
<td>As</td>
<td>Se</td>
</tr>
<tr>
<td>Br</td>
<td>Rb</td>
<td>Sr</td>
<td>Ce and La</td>
<td>Zr</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
NEWLAND'S OCTAVES

<table>
<thead>
<tr>
<th>Group Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements</td>
<td>H</td>
<td>He</td>
<td>Li</td>
<td>Be</td>
<td>B</td>
<td>C</td>
<td>N</td>
<td>O</td>
<td>F</td>
<td>Ne</td>
<td>Na</td>
<td>Mg</td>
<td>Al</td>
<td>Si</td>
<td>P</td>
<td>S</td>
<td>Cl</td>
<td>Ar</td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td></td>
<td>Li</td>
<td>Be</td>
<td>B</td>
<td>C</td>
<td>N</td>
<td>O</td>
<td>F</td>
<td>Ne</td>
<td>Na</td>
<td>Mg</td>
<td>Al</td>
<td>Si</td>
<td>P</td>
<td>S</td>
<td>Cl</td>
<td>Ar</td>
</tr>
<tr>
<td>Group 2</td>
<td>K</td>
<td>Ca</td>
<td>Sc</td>
<td>Ti</td>
<td>V</td>
<td>Cr</td>
<td>Mn</td>
<td>Fe</td>
<td>Co</td>
<td>Ni</td>
<td>Cu</td>
<td>Zn</td>
<td>Ga</td>
<td>Ge</td>
<td>As</td>
<td>Se</td>
<td>Br</td>
<td>Kr</td>
</tr>
<tr>
<td>Group 3</td>
<td>Rb</td>
<td>Sr</td>
<td>Y</td>
<td>Zr</td>
<td>Nb</td>
<td>Mo</td>
<td>Tc</td>
<td>Ru</td>
<td>Rh</td>
<td>Pd</td>
<td>Ag</td>
<td>Cd</td>
<td>In</td>
<td>Sn</td>
<td>Sb</td>
<td>Te</td>
<td>I</td>
<td>X</td>
</tr>
<tr>
<td>Group 4</td>
<td>Cs</td>
<td>Ba</td>
<td>Hf</td>
<td>Ta</td>
<td>W</td>
<td>Re</td>
<td>Os</td>
<td>Ir</td>
<td>Pt</td>
<td>Au</td>
<td>Hg</td>
<td>Tl</td>
<td>Pb</td>
<td>Bi</td>
<td>Po</td>
<td>At</td>
<td>Rn</td>
<td></td>
</tr>
</tbody>
</table>

**Periodic Table**

- **Metals**: Elements on the left side of the table, including the group 1 elements (alkali metals) and group 2 elements (alkaline earth metals).
- **Non-metals**: Elements on the right side of the table, including halogens (group 17) and noble gases (group 18).
- **Transition Metals**: Elements in the middle of the table, including lanthanides (group 14) and actinides (group 15).

Table 8.6 Modern Periodic Table

- **Groups 1-12**
- **Groups 13-18**

**References**

- Science

---

35
CROSSWORD

Question Bank: - Periodic Classification of Elements

Very Short Answer Type Questions (1 mark)
Q1. Give an example of Dobereiner’s triad.
Q2. What is the basis of Mendeleev’s periodic table?

Short Answer Type Questions(2 marks)
Q1. State the modern periodic law for classification of elements. How many groupsand periods are there in the modern periodic table?

Q2. An element 'M' has atomic number 11.
   (i) Write its electronic configuration.
   (ii) State the group to which 'M' belongs.
   (iii) Is 'M' a metal or a non-metal?
   (iv) Write the formula of its chloride.

Q3. Name two elements that show chemical properties similar to bromine. Give reason.

Q4. An atom has electronic configuration 2, 8, 2.
   (i) What is the atomic no. of this element?
(ii) Is it a metal or non-metal?

**Short Answer Type Questions (3 marks)**

Q1. The elements Li (Z = 3), Na (Z = 11) and K (Z = 19) belong to group 1
(i) Predict the periods they belong.
(ii) Which one of them is least reactive?
(iii) Which one of them has the largest atomic radius? Give reason to justify.

Q2. F, Cl and Br are the elements each having seven valence electrons.
    Pick the element (i) with the largest atomic radius (ii) which is most reactive. Justify
    your answer.

Q3. Nitrogen (Z = 7) and Phosphorus (Z = 15) belong to same group 15 of the periodic table.
    Write the electronic configuration of these two elements. Which of these two is more
    electronegative? Why?

**Long Answer Type Questions (5 marks)**

Q1. (i) How does atomic size vary along the group? Give reason.
(ii) Why are metals electropositive in nature?
(iii) What are metalloids? Give an example.

Q2. Name-
(i) Two elements that have a single electron in their outermost shells.
(ii) Two elements that have two electrons in their outermost shells.
(iii) Two elements with filled outermost shell.
(iv) Two elements that belong to halogen family.
(v) An element which is tetravalent and forms the basis of organic chemistry.

**MCQ**

1. Identify the metal with the electronic configuration 2,8,2
   (a) Sodium  (b) Chlorine  (c) Magnesium  (d) Lithium

2. Which of the following elements would lose an electron easily:
   (a) Mg  (b) Ca  (c) K  (d) Cl₂
3. Out of the elements given below which one of them is the most non-metallic;
   (a) Fluorine  (b) Oxygen  (c) Chlorine  (d) Calcium

4. Which of the following atoms has the smallest size;
   (a) K(19)  (b) Na(11)  (c) B(5)  (d) C(6)

5. According to Mendeleev’s periodic law the elements are arranged in the periodic table as per their.
   (a) Increasing atomic number  (b) Increasing atomic mass
   (b) Decreasing atomic number  (d) Decreasing atomic mass.

   Answers: 1. (c)  2. (c)  3. (a)  4. (d)  5. (b)

ASSERTION QUESTIONS:

The following questions consists of two statements- Assertion (A) and Reasons (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is correct explanation for A.
(b) Both A and R are true and R is not the correct explanation for A.
(c) A is true but R is false.
(d) A is false but R is true.

1. **Assertion**: Fluorine is more reactive than chlorine.
   **Reasons**: Fluorine and chlorine belong to the 17th group called Halogens.
   **Ans**: (b) Both A and R are true and R is not the correct explanation for A.

2. **Assertion**: Silicon is a metalloid.
   **Reasons**: Silicon shows only non-metallic properties.
   **Ans**: (c) A is true but R is false.
CHAPTER 6: LIFE PROCESSES

MIND MAP
DIAGRAMS
**Figure 6.1** Human alimentary canal

**Figure 6.2** Human respiratory system
Figure 6.3
Sectional view of the human heart

Figure 6.4
Schematic representation of transport and exchange of oxygen and carbon dioxide

Figure 6.5
Excretory system in human beings

Figure 6.6
Structure of a nephron
CROSSWORD

ACROSS
1. Balloon like structures in the lungs
4. Green pigment in plants
7. Helps in absorption of food
8. Involved in exchange of gases in plants

DOWN
1. Carries oxygenated blood
2. Prevents backflow of blood
3. End product of carbohydrate digestion
5. Helps in clotting of blood
6. Pumps blood to all parts of the body

QUESTION BANK

VERY SHORT ANSWER TYPE (1 MARK)

1. Which tissue transports soluble products of photosynthesis?
   Ans: Phloem

2. What is the role of saliva in digestion of food?
   Ans: Digests starch
SHORT ANSWER TYPE (2 MARK)

1. Differentiate between blood and lymph
   *Hint: Colour, presence of RBC, direction of flow*
2. What is the advantage of a four chambered heart in humans?
   *Separates oxygenated and deoxygenated blood*
3. Give two points of difference between arteries and veins
   *Hint: Direction of flow, oxygenated/deoxygenated blood, thick/thin wall*

SHORT ANSWER TYPE (3 MARK)

1. Write the function of the following:
   a) Bile (*Emulsifies fat*)
   b) Hydrochloric acid (*Kills bacteria/acidic medium*)
   c) Villi (*Absorption of food*)

2. Complete the following:

   ![Diagram of glucose metabolism]

   a) Ethanol and carbon dioxide
   b) Lactic acid
   c) Carbon dioxide and water

3. Write the difference between aerobic and anaerobic respiration?

<table>
<thead>
<tr>
<th>Aerobic respiration</th>
<th>Anaerobic respiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. End products - Carbon dioxide &amp; Water</td>
<td>2. End products – Ethanol &amp; Carbon dioxide</td>
</tr>
<tr>
<td>3. More energy is released (38 ATP)</td>
<td>3. Less energy is released (2 ATP)</td>
</tr>
<tr>
<td>4. Takes place in cytoplasm &amp; mitochondria</td>
<td>4. Takes place in only cytoplasm</td>
</tr>
<tr>
<td>5. Complete oxidation of glucose takes place.</td>
<td>5. Incomplete oxidation of glucose takes place.</td>
</tr>
</tbody>
</table>
**LONG ANSWER TYPE (5 MARK)**

1. What is double circulation? What is its advantage? Show with labelled diagram.
   
   *Hint: Blood flows twice through the heart in one cycle, separation of oxygenated/deoxygenated blood*

2. How is urine produced? How is it regulated? *Hint: Filtration, selective reabsorption; Amount of water, with hormonal regulation*

**CHOOSE THE BEST OPTION FROM EACH OF THE FOLLOWING**

1. Amoeba shows the following kind of nutrition –
   
   a) Autotrophic  
   b) Holozoic  
   c) Saprotrophic  
   d) Parasitic

   ANS: (b)

2. The process by which blood is cleared of metabolic wastes in case of kidney failure is called
   
   a) Artificial kidney  
   b) Dialysis  
   c) Transplantation  
   d) Filtration

   ANS: (b)

3. In Human beings the process of digestion of food begins in:
   
   a) Stomach  
   b) Food Pipe  
   c) Mouth  
   d) Small Intestine

   ANS: (c)

4. Which of the following organisms have parasitic mode of nutrition?
   
   a) Penicillium  
   b) Plasmodium  
   c) Paramecium  
   d) Rhizobium

   ANS: (b)
5. When air is blown from mouth into a test tube containing lime water, the lime water turned milky due to presence of –
   a) Oxygen
   b) Nitrogen
   c) Water vapours
   d) Carbon dioxide

   ANS: (d)

**ASSERTION (A) and REASON(R)**

The following two questions consists of two statements-ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below
   a) Both A and R are true and R is the correct explanation for A
   b) Both A and R are true and R is not the correct explanation for A
   c) A is true but R is false
   d) A is false but R is true

i) **ASSERTION (A):** Aerobic respiration require less energy as compared to anaerobic respiration.
   **REASON(R):** Mitochondria is the power house of the cell.
   ANS-(d)

ii **ASSERTION (A):** Energy is required to carry out different life processes.
   **REASON(R):** Energy is obtained in the form of ATP in the mitochondria.
   ANS-(a)
CHAPTER 7 - CONTROL AND COORDINATION

Stimulus:- The change in the environment to which an organism respond and react is called stimulus.

Control & co-ordination in animals takes place by :- a) Nervous system) Hormonal system (Endocrine glands)

Parts of Nervous system:- a) Brain b) Spinal cord c) Nerves

Neuron:- Is the structural and functional unit of Nervous system

Parts of Neuron:- a) Dendrites, b) cell body c) Axon

Synapse:- Junction between two adjacent nerves

Reflex action- spontaneous, involuntary and automatic response to a stimulus to protect us from harmful situations. E.g. On touching a hot objects unknowingly we instantly withdraw our hand.

Nervous system- (1) Central Nervous System (CNS)

(2) Peripheral Nervous System (PNS)

(i) Autonomic Nervous System  (ii) Voluntary Nervous System

Brain (i) Centre of coordination of all activities (ii) Thinking is involved (iii) Complex process

Parts of Brain- Refer to figure 7.3 page no. 118 of N.C.E.R.T Textbook

Fore brain  Cerebrum - (i) Main thinking and largest part of the brain.

(ii) It has 3 main areas-

a. Sensory area- to receive impulses from sense organs via Receptors

b. Motor area- control voluntary movements

c. Association areas- Reasoning, learning & intelligence.

Thalamus- It relays sensory information to the cerebrum.

Hypothalamus- It forms the link between Nervous system & Endocrine system

Mid brain- It connects fore brain and hind brain

Hind Brain- connects the fore brain and hind brain

Cerebellum- controls & coordinates muscular movements, maintaining body posture and equilibrium.

Pons- acts as a bridge between brain and spinal cord

Medulla Oblongata- Controls involuntary actions like blood pressure, salivation, vomiting etc.

Spinal cord: - cylindrical or tubular structure is extending downwards from the medulla oblongata.

Protection of the brain & the spinal cord-

(i) Bony outer covering: skull for the brain and vertebral column for the spinal cord.

(ii) Cerebrospinal fluid present in between the three membranes.

Hormones- (i) are chemical messenger secreted by endocrine glands

(ii) Are secreted in small amounts & may act in nearby places or distant places.

(iii) do not take part in the reaction & are destroyed immediately.

Important Endocrine glands, the hormone they secrete & their function

Refer to figure 7.7 page no. 124 of N.C.E.R.T text book

Coordination in plants- only chemical coordination is present in plants.

Tropic movements- the movements of plants in the direction of stimulus (positive) or away from it (negative) are called tropic movements. E.g. Phototropism, Geotropism, Chemotropism.

Refer to figure 7.4 & 7.5 page no. 121 of N.C.E.R.T text book

Plant hormones (Phytohormones)
PLANT HORMONES (PHYTOHORMONES)

The four types of plant hormones responsible for control and coordination in plants are:

1) Auxins
2) Gibberellins
3) Cytokinins

4) Abscisic acid (ABA)

While auxins, gibberellins and cytokinins promote the growth of a plant, abscisic acid prevents or hampers the growth of a plant.

**Auxins**
Auxins hormone controls a plant response to light and gravity. It is made by the cells present at the tip of a stem and roots. This hormone moves the plant away from light and towards gravity. It speeds up the growth of stem and slows down the growth of roots.

*This diagram explains the bending of a plant stem or shoot towards light by the action of ‘auxin hormone’.*
Auxins promote cell enlargement, cell differentiation and fruit growth

**Gibberellins**
Gibberellins hormone works in the presence of auxin hormone and promotes cell enlargement and cell differentiation. It also promotes fruit growth, elongation of shoots and in breaking the dormancy in seeds and buds.

**Cytokinins**
This hormone promotes cells division in plants and breaks dormancy in seeds and buds. They also delay ageing in leaves and promotes the opening of stomata.

**Abscisic acid**
This hormone inhibits the growth of a plant. Therefore abscisic acid promotes dormancy in seeds and buds. It promotes closing of stomata, wilting and falling of leaves and detachment of fruit and flower from the plant.
### Important Endocrine glands, the hormone they secrete & their function

Refer to figure 7.7 page no. 124 of N.C.E.R.T text book

<table>
<thead>
<tr>
<th>No.</th>
<th>GLAND</th>
<th>HORMONES</th>
<th>FUNCTION</th>
<th>TARGET SITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hypothalamus</td>
<td>i) Releasing hormones (RH)</td>
<td>-Regulates secretion of pituitary hormones.</td>
<td>Pituitary gland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Inhibiting hormones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Pituitary Gland</td>
<td>i) Growth hormone (GH)</td>
<td>-Controls growth- dwarfism &amp; gigantism.</td>
<td>-Most tissues</td>
</tr>
<tr>
<td>4.</td>
<td>Thyroid Gland</td>
<td>i) Thyroxin</td>
<td>-Basal metabolic rate, RBC formation.</td>
<td>-Body tissues</td>
</tr>
<tr>
<td>7.</td>
<td>Adrenal Gland</td>
<td>i) Adrenaline</td>
<td>-Increase alertness, pupillary dilation, piloerection, sweating, and heartbeat.</td>
<td>-Body tissues</td>
</tr>
<tr>
<td>8.</td>
<td>Pancreas</td>
<td>i) Insulin</td>
<td>-regulates glucose homeostasis</td>
<td>-Tissues</td>
</tr>
<tr>
<td>9.</td>
<td>Testis</td>
<td>i) Testosterone</td>
<td>-develops male reproductive organs &amp; accessory sexual characters.</td>
<td>-Male body tissues</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Androgens</td>
<td>-influence male sexual behavior.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Ovary</td>
<td>i) Estrogen</td>
<td>- develops female reproductive organs, accessory sexual characters &amp; female secondary behavior.</td>
<td>-Female body tissues</td>
</tr>
</tbody>
</table>
MIND MAP

Human Nervous System

Central Nervous System

Brain

Spinal Cord

Somatic nervous system

Forebrain

Mid brain

Hindbrain

Cranial nerves

Peripheral Nervous System

Visceral nervous system

Autonomic nervous system

Sympathetic

Spinal

Parasympathetic

DIAGRAMS

Figure 7.3 Human brain
Figure 7.1 (a) Structure of neuron, (b) Neuromuscular junction

Figure 7.7 Endocrine glands in human beings (a) male, (b) female
QUESTION BANK

VERY SHORT ANSWER TYPE QUESTIONS 1 mark

1. Name the hormone which helps in regulating sugar level in our blood? Name the gland which secretes this hormone?
2. State the main function of abscisic acid
3. Write name of three hormones secreted by the pituitary gland
4. Mention one example of chemotropism.

(SHORT ANSWER TYPE QUESTIONS) 2 MARK

1. Name the following:
   a) Necessary for thyroid glands
   b) Necessary to maintain sugar level of the body
2) Draw the diagram of a nerve cell and label the following on it :
   (a) Nucleus (b) Dendrites
3) How does our body maintain blood sugar level?

SHORT ANSWER QUESTIONS (3 MARK)

1. A compound of iodine is compulsorily added to common salt in small quantity.
   (a) Why is it important for us to have iodized salt in our diet?
   (b) Name the disease caused by its deficiency.
   (c) Write the symptoms of the disease.
2. What is reflex action? Describe the steps involved in reflex action.
3) Name the following:
   Response of plants to light, chemical and water.

LONG ANSWER QUESTIONS (5 Mark)

1. Name the plant growth hormone which is synthesized at the shoot tip. Explain briefly why a plant bends towards light during its growth.
2. Draw the diagram of human brain and label the parts. Write the function of cerebellum and pons
3) What is reflex action? Describe the steps involved in reflex action.
4) Name the following:
   Response of plants to light, chemical and water.

CHOOSE THE BEST OPTION FROM EACH OF THE FOLLOWING:

1. Junction of two neurons is called.
   a) Synapse
   b) Synapsis
   c) Joint
   d) Junction

ANS-(a)
2. Which of the following is a plant hormone?
   a) Insulin
   b) Thyroxin
   c) Oestrogen
   d) Cytokinin

ANS- (d)

3. Electrical impulse travels in a neuron from –
   a) Dendrite → axon → axon end → cell body.
   b) Cell body → dendrite → axon → axon end.
   c) Dendrite → cell body → axon → end.
   d) Axon end → axon → cell body → dendrite.

ANS- (c)

4. Which one of the endocrine glands is known as master gland?
   a) Pituitary
   b) Adrenal
   c) Thyroid
   d) Parathyroid

ANS- (a)

5. The growth of tendrils in pea plants is due to
   a) Effect of light
   b) Effect of gravity
   c) Rapid cell division in tendrillar cells in contact with the support
   d) Rapid cell divisions in tendrillar cells that are away from the support.

ANS- (d)

**ASSERTION (A) and REASON(R)**

The following two questions consists of two statements-ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
   c) A is true but R is false
d) A is false but R is true
   i) ASSERTION (A): Insulin regulates blood sugar level.
   **REASON(R):** insufficient secretion of insulin will cause diabetes.
   ANS- (a)
ii ASSERTION (A): a nerve impulse is an electrochemical event.
   **REASON(R):** In a nerve impulse there are changes in the resting potential which spread down the nerve fiber
   ANS- (a)
CHAPTER: 8 HOW DO ORGANISMS REPRODUCE

**REPRODUCTION**

**ASEXUAL**
- In plants
  - Vegetative propagation eg. Rose
  - Fragmentation eg. Spirogyra
- In animals
  - Binary eg. Amoeba
  - Multiple eg. Plasmodium
  - Spore formation eg. Fungi
  - Regeneration eg. Planaria
  - Budding eg. Hydra

**SEXUAL**
- In plants
  - Anther
    - Stamen
    - Carpel
    - Female ovary
    - Male testis
    - Pollen
    - Ovule
    - Ovary
    - Male gamete
    - Female gamete
    - Embryo
    - Zygote
- In animals
  - Female ovary
  - Male testis
  - Embryo
  - Zygote
  - Egg
  - Sperm
  - Embryo
1. **Advantages of Vegetative Propagation**

   It allows quicker and easy propagation/exact copy of the parent/ seedless plant propagation.

2. **Disadvantages of Vegetative Propagation**

   Vegetative propagation doesn’t favour much variation and evolution of new species.

3. **Regeneration** is the ability of an organism to regenerate the lost part (e.g.: arm regeneration in star fishes). Sometimes, an organism can be made from its fragmented body parts e.g. *Planaria*.

4. Flower is the reproductive part of the plant. A complete flower has four whorls-sepal, petals, stamens and carpels.

5. **Unisexual flowers and bisexual flowers**

<table>
<thead>
<tr>
<th>Unisexual flowers</th>
<th>Bisexual flowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have either stamen or carpel e.g. Watermelon, papaya</td>
<td>Have both stamen and carpel e.g. hibiscus, rose mustard</td>
</tr>
</tbody>
</table>

6. **Pollination: ** Transfer of pollen grains from anther lobe to the stigma of the flower.

   ![Pollination Diagram]

   Self-pollination  
   Cross pollination

7. **Post pollination changes in plants**

   Growth of pollen tube/motion of male gametes towards the ovule/ fertilization

8. **Fertilized ovule develops in to seed and ovary develops into fruit**

9. **Unisex and bisexual organisms**

<table>
<thead>
<tr>
<th>Unisexual organisms</th>
<th>Bisexual organisms (Hermaphrodites)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have only male or female reproductive organs e.g. Human beings, cats, dogs (in animals) Watermelon, Papaya (in plants)</td>
<td>Have both male and female reproductive organs. E.g. Flatworms, earthworms, leeches. (in animals) Hibiscus, mustard (in plants)</td>
</tr>
</tbody>
</table>

10. **The fusion of male and female gamete is called fertilization.**
11 Parts and functions

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testis: sperm production</td>
<td>Ovary: Egg production</td>
</tr>
<tr>
<td>Vas deferens: Sperm conducting path</td>
<td>Fallopian tube: Site of fertilization</td>
</tr>
<tr>
<td>Urethra: Common passage for urine and sperms</td>
<td>Uterus: Site of implantation</td>
</tr>
<tr>
<td>Seminal vesicle and prostate gland: Nutrition and mobility</td>
<td>Vagina: Opening of birth canal</td>
</tr>
</tbody>
</table>

12 On reaching puberty, one egg is produced every month by one of the ovaries. The release of egg by the ovary is called ovulation, which takes place at 12-16th day of menstrual cycle. During that time, if sexual contact takes place, sperm fuses with the egg producing zygote which get implanted in the uterus.

13 It is through placenta glucose and oxygen are given to the developing embryo and waste materials are removed from embryo and given to the mother’s blood.

14 Common birth control measures

   (a) Physical barrier methods like condoms and vaginal diaphragm
   (b) Chemical methods like oral or vaginal pills
   (c) Surgical methods like tubectomy in females and vasectomy in males
   (d) IUCD - Copper T

15 STD are sexually transmitted diseases spread through sexual contact with the infected person. Common bacterial STDs are syphilis and gonorrhoea. AIDS (Acquired ImmunoDeficiency Syndrome) and warts are examples of viral STDs.

IMPORTANT DIAGRAMS

![Figure 8.1 Binary fission in Amoeba](image1)

![Figure 8.2 Multiple fission in Plasmodium](image2)
Figure 8.3 Regeneration in Planaria

Figure 8.5 Leaf of Bryophyllum with buds

Figure 8.6 Spore formation in Rhizopus

Figure 8.7 Longitudinal section of flower

Figure 8.8 Germination of pollen on stigma

Figure 8.9 Germination
CROSSWORD

Across
1. Plasmodium reproduces by this method
4. Male reproductive part of a flower
5. Also called ‘future shoot’
6. Female reproductive part of a flower
7. A contraceptive that creates a mechanical barrier
9. An organism that reproduces by budding and regeneration
11. The leaves of this plant produce buds for reproduction

Down
2. Embryo gets rid of waste through
8. The lower flask shaped part of the carpel.
3. A STD
10. I am the blueprint of life
QUESTION BANK

Very short answer questions (1 mark)

1. Name the plant in which vegetative propagation takes place by leaves.
   Ans) Bryophyllum.

2. Write scientific term for the following:
   a) Release of ovum from ovary.
      Ans. Ovulation
   b) Onset of menstrual cycle in a female.
      Ans) Menarche.

3. Where does fertilization takes place in human female?
   Ans.) Oviduct (fallopian tube)

Short answer questions (2 mark)

1. What is the importance of DNA copying in reproduction?
   Ans. DNA copying is essential for transferring genetic material from one generation to another.

2. How is pollination different from fertilization?
   Ans. Pollination is the process of transfer of pollen grains from the anther lobe to the stigma of the flower, while fertilization is the process of fusion of male gamete and female gamete to form the zygote.

3. What is the role of seminal vesicles and the prostate gland?
   Ans: Seminal vesicle and prostate gland help in nutrition and mobility of sperms.

Short answer questions (3 mark)

1. What are the advantages of vegetative propagation?
   Ans: Quick/easy/economical method/can creates exact copies of the parent/only method for the propagation of seedless plants.

2. How does the embryo get nourishment inside the mother’s body?
   Ans: the embryo gets nutrition, oxygen and gets rid of waste materials through Placenta.

3. a) What is AIDS?
   b) Name the causative organism?
   c) List the important modes of transmission of the disease.
      Ans.a) Acquired immuno deficiency syndrome.
      b) HIV (Virus)
      c) i) Through infected blood transfusion
         ii) Contaminated syringes.
         iii) Infected mother to child.
         iv) Sexual contact
4. What are the different methods of contraception?
   Ans. a) Barrier method: condoms used by males /vaginal diaphragm used by females.
   b) Chemical method: e.g. oral pills /vaginal pills used by females
   c) Surgical method: vasectomy in males /tubectomy in females

Long answer questions (5 mark)

1. Explain the process of fertilization in plants with the help of neat labeled diagram
   Ans. Hints: Formation of pollen tube, movement of male gametes towards the ovule.
   Fertilization: Fusion of male and female gamete.

   Neat labelled diagram: fig 8.8, Page No. 135 of NCERT Text book

10. Describe the different methods of asexual reproduction seen in animals with the help of neat labelled diagrams.
   Ans. Description for the following:
       1. Fission : binary and multiple fission
       2. Regeneration
       3. Bud formation

   Fig: 8.1, 8.2, 8.3, 8.4 (NCERT) Page No. 129 to 131 of NCERT Text book

MCQ

1. Pollen grains are produced by
   (a)Ovary   (b) Ovule   (c) Corolla   (d) Anther

2. Most common method of reproduction in majority of fungi is :
   (a)Spore formation   (b) Budding   (c) Binary fission   (d) Multiple fission.

3. What provides oxygen and nutrition to the developing embryo in the female body
   (a) Fallopian tube   (b) Ovary   (c) Uterus   (d) Placenta

4. Which of the following is caused by Virus
   (a) AIDS   (b) Gonorrhoea   (c) Syphilis   (e) All the above.

5. The time period for the development of fetus inside the mother’s body is called:
   (a) Gestation   (b) Ovulation   (c) Menarche   (d) Menopause

   Answers:1. (d)  2. (a)  3. (d)  4. (a)  5. (a)
ASSERTION QUESTIONS:

The following questions consists of two statements-Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is correct explanation for A.
(b) Both A and R are true and R is not the correct explanation for A.
(c) A is true but R is false.
(d) A is false but R is true.

1. **Assertion:** In human beings the female produces two types of gametes.
   **Reason:** Female has two X chromosomes.
   **Ans:** (d) A is false but R is true.

2. **Assertion:** A bisexual flower produces ova as well as the pollen.
   **Reason:** Ova and pollen are produced in the carpel.
   **Ans:** (c) A is true but R is false.
CHAPTER 9
HEREDITY AND EVOLUTION

FLOW CHART

HEREDITY
Transmission of characters/trait from one generation to another

VARIATION
Difference in the character/trait shown by individuals of a species during reproduction

ENVIRONMENTAL VARIATION
Variation due to education, diet, chemicals, environment etc.

ACQUIRED TRAITS
Characteristics of an organism that are not inheritable. Ex: language, art etc. They are not genetically controlled.

INHERITED TRAITS
Characteristic of the organisms that are inherited (caused due to change in DNA)

GENETIC VARIATION
Genetic variation in population gives rise to mutation (sudden inheritable change in gene), meiosis (reductional division which required for gamete formation) and sexual reproduction (fusion of gametes leading to variation in offspring).

RULES FOR INHERITANCE OF TRAITS (Mendalism)
Studied by GJ Mendel on pea plant. Factors (genes) are the carriers of trait.
1. Law of dominance
2. Law of segregation
3. Law of Independent assortment

SEX DETERMINATION
A mechanism by which sex of new born is determined.

NATURAL SEX DETERMINATION
Sex of the child is determined naturally. Ex: humans, drosophila, X0 determination eg: insects.

ARTIFICIAL SEX DETERMINATION
Modification of species by the process of selective breeding in order to produce a new strain of organism.

64
EVOLUTION
A gradual change in group of living beings to produce new forms.

FACTORS RESULTING IN EVOLUTION

SPECIATION
Development of one or more species from pre-existing species.

SPECIES CLASSIFICATION
—is reflection of evolutionary relationship

ACQUIRED TRAIT
characters which are not inherited

INHERITED TRAIT
Change in characters of organisms that are caused due to change in DNA

MECHANISM OF SPECIATION

ACCUMULATION OF VARIATION-
No two individuals are identical to each other. While we acquire a common body design, subtle changes are also inherited.

NATURAL SELECTION-
It is process by which nature selects and consolidates those organisms which are more suitably adapted and possesses favourable variations.

PHYSICAL BARRIERS

HUMAN EVOLUTION – All humans begins present today belongs to species Homo Sapiens which evolved bipedal location, high cranial capacity, opposable thumbs etc and dominates today’s life.

EVIDENCE FOR EVOLUTION

HOMOLOGOUS ORGANS- organs having same basic structure but different function.

ANALOGOUS ORGAN- organs having different basic structure but similar appearance and function.

FOSSILS – remains or impressions of dead organisms that lived in past.

GENE FLOW-
the alteration of the frequencies of alleles of particular genes in a population, resulting from interbreeding with organisms from another population having different frequencies.

GENETIC DRIFT-
It is the random change in the frequency of alleles (gene pair) in a population over successive generations.

MIGRATION-
Migration is the movement of populations, groups or individuals. In genetic terms, migration enables gene flow: the movement of genes from one population into another. If the two populations originally had different gene frequencies and if selection is not operating, migration (or, to be exact, gene flow) alone will rapidly cause the gene frequencies of the different populations to converge.
DEFINITIONS:
1) GENE - Functional unit of DNA.
2) GENOTYPE - Genes inherited from both the parents, may or may not be expressed are called genotype.
3) PHENOTYPE - Expressed structural and functional traits as a result of genes as well as environment.
4) FOSSIL - Dead remain of plant and animal.

CROSSWORD

ACROSS
2. A functional unit of trait.
5. Organs having different basic structure but similar appearance and function.
6. Sudden changes in the genetic form of organisms which are passed on to the next generation.
7. Remains or impressions of dead organisms that lived in past.

DOWN
1. An individual having two different alleles for the same trait.
4. Reductonal division which required for gamete formation.

3. Theory of inheritance of acquired character is given by
Answer the following questions (1 mark)

1. Mention the ways by which variant genotypes are produced in an organism?
2. How are fossils helpful in developing evolutionary relationships?

Answer the following questions (2 mark)

1. How do Mendel’s experiments show that traits may be dominant or recessive?
2. Does genetic combination of father play a significant role in determining the sex of the child?
   Show with the help of a flow chart.

Answer the following questions (3 mark)

1) Sameer’s father is a wrestler and has a well-built body. He was awarded as Mr. India when he was young. Sameer is his only son. As Sameer grew older, everyone expected him to have the same body build up as his father. But he is thin. His friends tease him and he feels depressed by it.
   a) Is it true that a wrestler’s son should also have heavy muscles?
   b) What type of character is it; acquired or inherited?
   c) What are the values shown by Sameer’s friends? (VBQ)
2) When a tall plant is crossed with a dwarf plant. What will be the ratio of tall to dwarf plants in F1 generation? Show with a help of Mendel’s cross.[HOTS]

Answer the following questions (5 marks)

1. How has the method of ‘artificial selection’ by humans helped in the evolution of different vegetables?
2. How do Mendel’s experiments show that traits are inherited independently?

CHOOSE THE BEST OPTION FROM EACH OF THE FOLLOWING:

1. Two pea plants one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds produce F1 progeny having round, yellow (RrYy) seeds. When F1 plants are selfed, the F2 progeny will have the following combination of characters

   (a) 15:1
   (b) 9:3:3:1
   (c) 9:3:4
   (d) 12:3:1

ANS-(b)
2. Some dinosaurs had feathers although they could not fly but birds have feathers that help them to fly. In the context of evolution this means that-
   (a) Reptiles have evolved from birds
   (b) There is no evolutionary connection between reptiles and birds
   (c) Feathers are homologous structure in both the organisms
   (d) Birds have evolved from reptiles.

ANS-(d)

3. The genetic constitution of an organism is called.
   (a) Genotype
   (b) Phenotype
   (c) Variation
   (d) Gene.

ANS-(a)

4. Two coloured flowers on crossing results in 3 red and 1 white flower progeny. The nature of the cross is-
   (a) Cross pollination
   (b) Self-pollination
   (c) Double fertilization
   (d) No fertilization

ANS-(a)

5. A basket of vegetable contains carrot, potato, radish, and tomato. Which of them represent the correct homologous structure
   (a) Carrot and potato
   (b) Carrot and tomato
   (c) Radish and carrot
The following two questions consists of two statements-ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below.

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

i) ASSERTION (A): Evolution is extremely slow process.
REASON(R): New characters are accumulated in an organisms during its life time.

ANS-(c)

ii ASSERTION (A): Geographical isolation cannot be major factor in speciation of asexually reproducing organism.
REASON(R): Asexually reproducing organisms do not require any other organism for reproduction.

ANS-(a)
Chapter - 10

LIGHT - REFLECTION AND REFRACTION

REFLECTION - Bouncing back of light rays to the same medium, when they fall on smooth shiny object. Laws of reflection:
1st law - Incident ray, reflected ray and normal all lie in same plane at same point.
2nd law - Angle of incidence = Angle of reflection

REFRACTION - Bending of light when it passes from one medium to another. Laws of refraction:
1st law - The incident ray, the refracted ray, and the normal at a point of incidence all lie in the same plane.
2nd law - The ratio of sine of angle of incidence to the sine of angle of refraction is a constant for a given pair of media. Sin i / Sin r = constant (r) Snell's law

MIRROR
Mirror is a shiny polished object (glass) which reflects most of the rays of light falling upon it. One side of mirror is polished with suitable material to make the other side reflective.

Types of Image formed by
- Real Image: Image which is formed in front of the mirror and it can be obtained on a screen is called real image.
- Virtual Image: Image which is formed behind the mirror and cannot be obtained on a screen is called virtual image.
- Plain Mirror: A mirror having a flat surface is called plane mirror.
- Spherical Mirror: Mirrors having curved reflecting surface are called spherical mirrors. A spherical mirror is a part of a sphere.

Types of Mirror
**Spherical Mirror**

**Important terms in the case of spherical mirror**

- **Pole**: The centre of reflecting surface of a spherical mirror is known as Pole. Pole lies on the surface of spherical mirror. Pole is generally represented by ‘P’.
- **Centre of Curvature**: The centre of sphere; of which the reflecting surface of a spherical mirror is a part; is called the centre of curvature of the spherical mirror. Centre of curvature is not a part of spherical mirror rather it lies outside the mirror. Centre of curvature is denoted by letter ‘C’.
- **Radius of Curvature**: The radius of sphere; of which the reflecting surface of a spherical mirror is a part; is called the **Radius of Curvature** of the spherical mirror. The radius of curvature of a spherical mirror is denoted by letter ‘R’.
- **Principal Axis**: Imaginary line passing through the centre of curvature and pole of a spherical mirror is called the Principal Axis.
- **Focus or Principal Focus**: Point on principal axis at which parallel rays; coming from infinity; converges after reflection is called the Focus or Principal Focus of the spherical mirror. Focus is represented by letter ‘F’.

**Image Formation**

Formation of image depend upon the position of the object. There are six possibilities of the position of object in the case of concave mirror.

Uses of Concave Mirror
1. Used in torches, search light and headlight of vehicle.
2. Used to see large image of face as shaving mirror.
3. Used by dentist to see large images of the teeth.
4. Large concave mirror used to focus sunlight (heat) in solar furnaces.

Uses of Convex Mirror
- Used as rear-view mirror in vehicles because it gives erect image. It also helps the driver to view large area.

Convex mirror:
- Spherical mirror with reflecting surface curved outwards is called convex mirror.

Uses of Concave Mirror
- Used in torches, search light and headlight of vehicle.
- Used to see large image of face as shaving mirror.
- Used by dentist to see large images of the teeth.
- Large concave mirror used to focus sunlight (heat) in solar furnaces.

**Image Formation**

There are only two possibilities of position of object in the case of a convex mirror, i.e. object at infinity and object between infinity and pole of a convex mirror.
### Sign Convention for Reflection by Spherical Mirror

1. The object is always placed to the left side of mirror.
2. All distance should be measured from pole (P); parallel to principal axis.
3. Take P' as origin. Distances measured right of the origin (+x-Axis) are taken positive and left of the origin (−x-Axis) are taken negative.
4. Perpendicular to and above principal axis (+y-Axis) are taken positive. Perpendicular to and below principal axis (−y-Axis) are taken negative.

#### Image Formation by Concave Mirror for Different Position

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>At infinity</td>
<td>At the focus F</td>
<td>Highly diminished, point-size</td>
<td>Real and inverted</td>
</tr>
<tr>
<td>Beyond C</td>
<td>Between F and C</td>
<td>Diminished</td>
<td>Real and inverted</td>
</tr>
<tr>
<td>At C</td>
<td>At C</td>
<td>Same size</td>
<td>Real and inverted</td>
</tr>
<tr>
<td>Between C and F</td>
<td>Beyond C</td>
<td>Enlarged</td>
<td>Real and inverted</td>
</tr>
<tr>
<td>At F</td>
<td>At infinity</td>
<td>Highly Enlarged</td>
<td>Real and inverted</td>
</tr>
<tr>
<td>Between F and F</td>
<td>Behind the mirror</td>
<td>Enlarged</td>
<td>Virtual and erect</td>
</tr>
</tbody>
</table>

#### Image Formation by Convex Mirror for Different Position

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>At infinity</td>
<td>At the focus F, behind the mirror</td>
<td>Highly diminished, point-size</td>
<td>Virtual and erect</td>
</tr>
<tr>
<td>Between infinity and pole F of the mirror</td>
<td>Between P and F, behind the mirror</td>
<td>Diminished</td>
<td>Virtual and erect</td>
</tr>
</tbody>
</table>

See figure - 10.2

See figure - 10.1
Index of Refraction, \( n \)

\[ n = \frac{c}{v} \]

*\( c \): the speed of light in a vacuum \( 3 \times 10^8 \) m/sec

*\( v \): speed of light in the medium.

*\( n \): medium's index of refraction

**Centre of curvature** - A lens, either a convex lens or a concave lens has two spherical surfaces. Each of these surfaces form a part of sphere. The centre of these two spheres are called centre of curvature represented by \( C \) and \( C' \).

**Principal axis** - Imaginary straight line passing through the two centres of curvature.

**Optical Centre** - The central point of lens is its optical centre (O). A ray of light, when passes through 'O' it remains **undeviated** i.e. it goes straight.

**Aperture** - The effective diameter of the circular outline of a spherical lens.

**Focus of lens** - Beam of light parallel is principal axis, after reflection from 1) Convex lens, converge to the point on principal axis, denoted by \( F \), known as Principal focus 2) Concave lens, and appear to diverge from a point on the principal axis, known as principal focus.

**CONVEX LENS** - A lens may have two spherical surfaces, bulging outwards, is called double convex lens (or simply convex lens). It is also known as converging lens.

**CONCAVE LENS** - A lens bounded by two spherical surfaces, curved inwards is known as double concave lens (or simply concave lens). It is also known as diverging lens because it diverges the light.

---

**POSITION OF THE OBJECT** | **POSITION OF THE IMAGE** | **SIZE OF THE IMAGE** | **NATURE OF THE IMAGE**
--- | --- | --- | ---
At infinity | At the focus \( F_2 \) | Highly diminished, point-size | Real and inverted
Beyond \( 2F_1 \) | Between \( F_2 \) and \( 2F_2 \) | Diminished | Real and inverted
At \( 2F_1 \) | At \( 2F_2 \) | Same size | Real and inverted
Between \( F_1 \) and \( 2F_1 \) | Beyond \( 2F_2 \) | Enlarged | Real and inverted
At \( F \) | At infinity | Highly Enlarged | Real and inverted
Between \( P \) and \( F \) | Behind the mirror | Enlarged | Virtual and erect

---

**Object position** | **Image position** | **Size of image** | **Nature of image**
--- | --- | --- | ---
At infinity | At the focus \( F_1 \) | Highly diminished point size | Virtual and erect
Between infinity and optical centre of the lens | Between \( F_1 \) and \( O \) | Diminished | Virtual and erect

---

The degree of convergence or divergence of light ray achieved by a lens is known as power of a lens. It is defined as the reciprocal of its focal length. Represented by \( P \) i.e. \( P = \frac{1}{f} \). SI unit – **Dioptre** (D).
IMPORTANT FORMULAE

- Relationship between focal length and radius of curvature of a mirror $f = R/2$
- Mirror formula $1/v + 1/u = 1/f$ (V-image distance, U-object distance, f-focal length)
- Magnification produced by mirror $m = h'/h = -v/u$
- Snell’s law $\frac{\sin i}{\sin r} = n$ (refractive index)
- Absolute refractive index $n = c/v$
- Lens formula $1/v - 1/u = 1/f$
- Magnification produced by lens $m = h'/h = v/u$
- Power of lens $P = 1/f$ when focal length is in cm $P = 100/f$

RAY DIAGRAMS

Fig 10.1

NATURE, IMAGE AND ITS FORMATION (CONCAVE MIRROR)
FIG – 10.2
NATURE, IMAGE AND ITS FORMATION (CONVEX MIRROR)

Object at infinity                           Object between infinity and pole

Fig- 10.3
NATURE, IMAGE AND ITS FORMATION (CONVEX LENS)

Fig-10.4
NATURE, IMAGE AND ITS FORMATION (CONCAVE LENS)

a) Object at infinity
b) Object (any point between infinity and O)
**CROSSWORD**

Across

1. A transparent medium bounded by the spherical surfaces.
2. Ratio of height of the image to the height of object
5. The medium where the speed of light is less.
8. An instrument which is used to see details of distant object.
11. Unit of power
12. The mirror used by dentist to see patient’s teeth
3. Form of energy that enables to see.
4. The nature of the image formed by the convex lens when the object is placed between optical center and focus.
6. A converging lens.
7. The size of the image formed by the concave lens.
9. The lens having negative power

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

1. Refractive index of water is 4/3 and that of the glass is 3/2 with regard to air. What is the refractive index of glass with respect to the water?  [Ans 9/8]
2. What is the power of concave lens of focal length 200cm?
3. The radius of curvature of spherical mirror is 20cm. What is its focal length?
4. What is the angle of reflection when a ray of light fall normally on a plane mirror?
5. What is the magnification produced by a plane mirror.
6. What is the nature of image formed by concave mirror if magnification produced by mirror is +3?

**Answer the following questions (2mark)**

1. An object 2cm high produce areal image 3 cm high, when placed at a distance of 15cm from concave mirror. Calculate the position of the image. (HOTS)
2. The power of a focal length is – 4D. State the nature of lens and any two characteristics of the image formed by the lens.
3. State two examples based on phenomenon of refraction of light in everyday life situation.
4. Distinguish between real and virtual image.
5. Name the type of mirror used in the following situations:
   a) Headlights of car
   b) Rear – view mirror of vehicles
6. An object is placed at a distance of 10 cm from convex mirror of focal length 15 cm. Find the position and nature of image.

**Answer the following questions (3 mark)**

1. The refractive index of alcohol and turpentine oil with respect to air are 1.36 and 1.47 respectively. Find the refractive index of turpentine oil with respect to alcohol. In which of the two media the speed of light will be more.
2. a) Define power of a lens and give its unit.
   b) A convex lens forms a real and inverted image of needle at a distance of 50cm from it. Where is the needle placed in front of this lens if the size of the image is equal to the size of the object? Also find power of the lens.

77
3. Two thin lenses of focal lengths +20 cm and – 15 cm are kept in contact. What is the focal length and power of the combination?

4. An object 2 cm high is placed at a distance of 16 cm from a concave mirror which produces a real image 3 cm high.
   a) Find the position of the image
   b) What is the focal length of mirror?

**Answer the following questions (5 mark)**

1. Draw a ray diagram in each of the following cases to show the formation of an image, when an object is placed
   a) Between optical center and principal focus of a convex lens.
   b) Between F and 2F of concave lens
   c) At 2F of convex lens

Write the characteristic of image formed in each case.

2. A 1 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 15 cm. Find the nature, position, size and magnification of the image. (HOTS)

3. Find the size, nature and position of image formed when an object of size 1 cm is placed at a distance of 15 cm from concave mirror of focal length 10 cm.

4. Draw the ray diagram for the different positions of the images formed by concave mirror.

**MCQ**

1. A convex mirror used for the rear view on an automobile has a focal length of 2.5 m. A car is located at a distance of 4 m from the mirror.
   In the above scenario the sign that should be assigned to f and u is-
   a) u positive, f negative
   b) f positive, u negative
   c) f and u are positive
   d) f and u negative

2. In a concave mirror an erect and virtual image is formed when the object is placed-
   a) Between C and F
   b) Beyond C
   c) Between P and F
   d) At C

3. The diameter of the reflecting surface of a spherical mirror is called its-
   a) Centre of curvature
   b) R=2f
   c) Aperture
4. The magnification (m) of a lens can be calculated by using the formula—
   a) m=-v/u  
   b) m=v/u  
   c) m=h'/h  
   d) both b and c

5. If a ray of light that is incident on a convex lens is parallel to its principal axis, the refracted ray passes through
   a) F_2  
   b) 2F_2  
   c) O  
   d) Principal axis.

Ans) 1.b 2.c 3.c 4.d 5.a

**ASSERTION – REASON QUESTIONS**

The following questions consists of two statements- Assertion(A) and Reason(R)—answer the questions selecting the appropriate option given below,

a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

1. Assertion (A). 1.33 is the absolute refractive index of water.
   Reason (R). Air is optically denser than water.

2. Assertion (A). The value of F in a concave mirror is taken as –ve and in a convex mirror is taken as +ve.
   Reason (R). All distances measured to the right of the origin are taken as +ve and those measured along the left of the origin are taken as –ve.

Ans) 1.c 2.a
CHAPTER 11-HUMAN EYE AND COLOURFUL WORLD

Power of accommodation:

- Ability of the eye lens to adjust its focal length.
- Relaxation of ciliary muscles \( \rightarrow \) lens becomes thin \( \rightarrow \) increase in focal length.
- Contraction of ciliary muscles \( \rightarrow \) lens becomes thick \( \rightarrow \) focal length decreases.

Near Point (N): The point at closest distance, at which an object can be seen clearly by the eye is called Near Point (N) of the eye. The distance of the near point of a normal eye is called the least distance of distinct vision. It is represented by \( d \). For a normal eye, value of least distance of distinct vision is \( d = 25 \text{cm} \).

Far Point (F): The most distant point at which an object can be seen clearly is called Far Point (F) of the eye. For a normal eye, far point lies at infinity.

Rods: Respond to the intensity of light and enable vision in dim light.

Myopia or Near-sightedness:

- Eye cannot see distant objects clearly.
- Image of distant object forms in front of retina.
- Reasons: (i) Excessive curvature of eye lens.
  (ii) Elongation of eyeball
Correction: using concave lens

Hypermetropia or Far-sightedness:

- Eye cannot see nearby objects clearly.
- Image of object nearby forms behind retina.
- Reasons: (i) Focal length of eye lens is too long.
  (ii) Eyeball becomes small
Correction using convex lens

Presbyopia:

- Eye suffers from myopia as well as from hypermetropia.
- Due to gradual weakening of ciliary muscles and diminishing flexibility of eye lens.
  Correction using bifocal lens

Cataract: Milkiness of eye lens due to aging can be cured by surgery

Dispersion of Light:
Splitting of light into its component colours.
White light disperses into its seven-colour components in the order VIBGYOR (violet, Indigo, Blue, Green, Yellow, Orange, And Red).

Red light bends least, Violet the most.

Rainbow is formed due to refraction, dispersion and total internal reflection of sunlight by tiny droplets of water

Atmospheric Refraction: Refraction of light by the earth’s atmosphere Twinkling of stars, Advanced sunrise, Delayed sunset, Flattening of disc of sun at sunrise and sunset are due to atmospheric refraction
Tyndall effect:
- When a beam of light strikes fine particles in air, path of the beam becomes visible.
- Very fine particles scatter mainly blue light while particles of larger size scatter light of longer wavelengths.

DEFECTS OF VISION

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of defect</th>
<th>Type of defect</th>
<th>Reason</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>Presbyopia</td>
<td>Decrease in power of accommodation</td>
<td>Ageing, leading to weak ciliary muscles and loss of flexibility of eye lens.</td>
<td>Use of eye glasses having bifocal lens.</td>
</tr>
<tr>
<td>4.</td>
<td>Cataract</td>
<td>Milkiness of eye lens</td>
<td>Ageing, leading to partial or complete loss of eye sight.</td>
<td>Surgery.</td>
</tr>
</tbody>
</table>

SOME NATURAL PHENOMENON & CAUSES

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Phenomenon</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Multicolored light coming out of a triangular slab</td>
<td>Dispersion of light</td>
</tr>
<tr>
<td>2.</td>
<td>Rainbow</td>
<td>Refraction, dispersion of light and total internal reflection of light in rain drops</td>
</tr>
<tr>
<td>3.</td>
<td>Twinkling of stars, Advanced sunrise, Delayed sunset, Flattening of disc of sun at sunrise and sunset</td>
<td>Atmospheric refraction of sunlight</td>
</tr>
<tr>
<td>4.</td>
<td>Blue colour of sky, Reddening of sun at sun rise and sunset Tyndall effect</td>
<td>Scattering of light</td>
</tr>
</tbody>
</table>
**Mind map**

**HUMAN EYE AND THE COLOURFUL WORLD**

- **CORNEA**
- **IRIS**
- **PUPIL**
- **LENS**
- **RETINA**
- **CILIARY MUSCLES**

**POWER OF ACCOMODATION**

- Controls the size of the pupil
- Acts as a screen

**DEFECTS OF VISIONS**

- MYOPIA
- HYPERMETROPIA
- PRESBYOPIA

**REFRACTION**

- Atmospheric refraction
- Dispersion
- Twinkling of stars

**TWINKLING OF STARS**

- Planets are large sized, the twinkling will be nullified

**SPECTRUM**

- The band of colour formed by dispersion

**THE COLOUR SEQUENCE IS VIBGYOR**

- Recombination of spectrum of white light

**NEAR POINT**

- 25 cm

**FAR POINT**

- Infinity

**SPLITTING OF WHITE LIGHT INTO THE CONSTITUENT COLOURS**

**SPLITS WHITE LIGHT INTO THE SPECTRUM**

**THE COLOUR SEQUENCE IS VIBGYOR**

**RECOMBINATION OF SPECTRUM OF WHITE LIGHT**

**HUMAN EYE**

**TWINKLING OF STARS**

*Figure 11.9 Apparent star position due to atmospheric refraction*
FORMATION OF RAINBOW MYOPIA

SCATTERING OF LIGHT
DISPERSION OF WHITE LIGHT

HYPERMETROPIA

RECOMBINATION
QUESTION BANK

1 mark questions (very short answer questions)

1. What is the far point and near point of the human eye with normal vision?
   Answer: For normal vision, the near point is about 25cm and far point is infinity. Thus, a normal eye can see objects clearly that are between 25cm and infinity.

2. List the three phenomenon of light which is responsible for formation of rainbow in sky?
   Answer: Refraction, dispersion and total internal reflection.

2 mark questions

1. Why are ‘danger’ signal lights red in colour?
   Answer: Danger signals are red in colour because the red coloured light having lower wavelength is scattered the least by fog or smoke. Therefore, it can be seen clearly from a distance.

2. Give reasons why the planets do not twinkle

   Ans Planets are much closer to the earth as compared to the stars they are bigger when we observe them from earth. Planets are made up of large number of point sources. Due to atmospheric refraction each point source will appear to twinkle, the total effect will be nullified.

Short Answer Type Questions (3 marks)

1. A person needs a lens of power 4.5 D for correction of her vision.
   (a) What kind of defect in vision is she suffering from?
   (b) What is the focal length of the corrective lens?
   (c) What is the nature of the corrective lens?
   Answer: (a) Hypermetropia.                (b) f=1/4.5 = 0.22m
   (c) Convex lens

2. Ritu needs a lens of power -2D for correct of her vision.
   a) What kind of defect in vision is she suffering from?
   b) What are the possible cause of this defect?
   c) What is the nature of corrective lens?
   Answer: (a) Ritu is suffering from myopia or short sightedness.
   (b) Two possible causes of this effect are: Increase in size of eye ball or decrease in focal length of eye lens.
   (c) Concave lens / diverging lens

Long answer type questions (5 marks)

1. Explain myopia and hypermetropia with the help of ray diagrams and show how these defects can be corrected?
   Answer: (a) Explanation of Myopia and Hypermetropia
   (b) Fig.11.2&11.3 NCERT TEXTBOOK
   (c) The type of lens: Concave lens, convex lens
2. What is meant by dispersion and recombination? Explain with the help of a diagram? What is a spectrum? Name the various colours of spectrum of white light in proper sequence.

**Answer:** The splitting of white light into its component colours on passing through a prism is called dispersion. When an inverted prism is kept in the path of these seven colours, they combine to form white light. This is called recombination. The band of seven colours formed due to dispersion of white light is called ‘spectrum’. Seven colours of spectrum are violet, indigo, blue, green, yellow, orange and red also known as ‘VIBGYOR’

(Fig11.5&11.6 NCERT TEXT BOOK)

**MCQ**

1. Aging causes weakness of the_________ resulting in presbyopia.
   a) Lens c) Ciliary muscles
   b) Retina d) Optic nerve

2. In the condition myopia the person
   a) Cannot see far off things
   b) Can see things close by clearly
   c) Can be corrected using a concave lens
   d) All of the above.

3. Twinkling of stars is a phenomenon that occurs due to
   a) Refraction b) Reflection
   c) Varying conditions of the earth’s atmosphere d) a and c.

4. In a spectrum of light the colour that has the least wavelength is -
   a) Red b) Violet c) Green d) Yellow.

5. The eye defect Hypermetropia can be corrected by using a-
   a) Plano convex lens b) Double convex lens
   c) Plano concave lens d) Double concave lens

Ans)1.c 2.d 3.d 4.b 5.b
ASSERTION – REASON QUESTIONSM

The following questions consists of two statements- Assertion(A) and Reason(R)-answer the questions selecting the appropriate option given below,

a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true.

1. Assertion (A). The sky appears dark to people flying at high altitudes.
   Reason(R). The atmosphere is denser close to the earth.

2. Assertion (A). A rainbow always appears on the same side as the sun.
   Reason(R). A rainbow is a natural spectrum which occurs after a shower.

Ans) 1.b  2.d
CHAPTER 12: ELECTRICITY

MIND MAPS

Electricity

Static

Charges at rest

Current

Charger in motion

Electric current

I = Q/T
Flow of charge per unit time

SI unit is ampere (A)

Measured using ammeter

1 Ampere = 1 coulomb/1 second

Electric potential difference

Work done in moving a unit of charge from one point to another

SI unit volt

1 volt = 1 joule/1 coulomb

Measured by voltmeter

Ohm’s law

The relation between electric current and potential difference

V = I or V = IR

R is constant called resistance

SI Unit is Ohm

Length of conductor R ∝ L

Depends on

Area of cross section R ∝ (L/A)

Depends on

R ∝ (L/A) or R = ρ(L/A)

Where ρ is a constant known as resistivity or specific resistance.

Resistivity

SI unit is Ohm meter

Conductor

Insulator

Different potential difference across different resistor

Same current passes through each resistor

Voltage across each resistor is the same

Current divided in each branch

Resistance in series

V = V1 + V2 + V3

Equivalent resistance is

R = R1 + R2 + R3

Resistance in parallel

I = I1 + I2 + I3

Equivalent resistance is

1/R = 1/R1 + 1/R2 + 1/R3
1KWh = 1 unit
1 KWh = 3.6 x 10^6 joule

HEATING EFFECT OF CURRENT
Joule’s law of heating
\[ H = I^2RT \quad (I = \text{Current}, R = \text{Resistance}, T = \text{Time}) \]

PRACTICAL APPLICATIONS OF HEATING EFFECT
1. Examples of devices which work on this effect
   a. Toaster
   b. Oven
   c. Heating iron
   d. Room Heater
2. Electric bulb produces light due to heating effect by heating up tungsten (Tungsten is the filament in the bulb). It has a high melting point and is covered by a glass bulb. Inert atmosphere is provided by filling the bulb with nitrogen or argon (Inert gases) to prevent oxidation of the metal.
3. Fuse (Used in electric circuits) works on this effect
FORMULAE

1. \( I = \frac{Q}{T} \)  
   (Calculation of current)  
   **SI unit**: Ampere

2. \( V = \frac{W}{Q} \)  
   (Calculation of potential difference)  
   **SI unit**: Volt

3. \( R = \frac{V}{I} \)  
   (Ohm’s law, R is resistance)  
   **SI unit**: Ohm

4. \( \rho = \frac{RA}{L} \)  
   (Calculation of resistivity)  
   **SI unit**: Ohm metre

5. \( R = R_1 + R_2 + R_3 \)  
   (Resistance in series)  
   **SI unit**: Ohm

6. \( R = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \)  
   (Resistance in parallel)  
   **SI unit**: Ohm

7. \( H = I^2RT \)  
   (Joules law of heating)  
   **SI unit**: Joule

8. \( P = VI = I^2R = V^2R \)  
   (Calculation of power)  
   **SI unit**: Watt

9. \( E = P \times t \)  
   (Electric energy)  
   **SI unit**: Watt second (Joule)

DIAGRAMS

![Diagram of an electric circuit](image)

Figure 12.1
A schematic diagram of an electric circuit comprising - cell, electric bulb, ammeter and plug key

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Components</th>
<th>Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>An electric cell</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>2</td>
<td>A battery or a combination of cells</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>3</td>
<td>Plug key or switch (open)</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>4</td>
<td>Plug key or switch (closed)</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>5</td>
<td>A wire joint</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>6</td>
<td>Wires crossing without joining</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>7</td>
<td>Electric bulb</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>8</td>
<td>A resistor of resistance ( R )</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>9</td>
<td>Variable resistance or rheostat</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>10</td>
<td>Ammeter</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>11</td>
<td>Voltmeter</td>
<td>![Symbol]</td>
</tr>
</tbody>
</table>
Figure 12.3 Electric circuit for studying Ohm’s law

Figure 12.4 Resistors in series

Figure 12.5 Resistors in parallel

CROSSWORD
ACROSS
1. Rate of flow of charge
2. Ratio of potential difference to the current
6. Rate of consumption of electrical energy
7. SI unit of power

DOWN
1. Closed path for flow of electricity
3. SI unit of electric current
4. SI unit of charge
5. SI unit of potential difference

QUESTION BANK

VERY SHORT ANSWER TYPE (1 MARK)
1. Calculate the amount of charge flowing in a wire if it draws a current of 2A in 10 minutes.
   Ans: \[2 \times 10 \times 60 = 1200 \text{ C}\]
2. What happens to resistance of a conductor if area of cross-section is doubled?
   Ans: It halves
3. Which device helps to maintain a potential difference across a conductor?
   Ans: Cell or battery

SHORT ANSWER TYPE (2 MARK)
1. Draw a circuit diagram having the following components
   a. Bulb
   b. A two cell battery
   c. Ammeter
   d. A closed key
   Ans: Refer diagram 12.1
2. Why are heating elements made of alloys rather than metals?
   Ans: High resistivity, does not oxidise at high temperatures
3. What do we mean when we say that potential difference between two points is 1 volt?
   Ans: Definition

SHORT ANSWER TYPE (3 MARK)
1. If three resistors of 6\(\Omega\), 9\(\Omega\) and 21\(\Omega\) are connected in series to a 12V battery, find
   a) The total resistance of the circuit.
   b) The current flowing through the circuit.
   c) The potential difference across the 21 \(\Omega\) resistor.
   Ans. a) 36 \(\Omega\)  b) 0.33A  c) 6.93V
2. What are the advantages of connecting electrical devices in parallel with the battery rather than in series?
   Ans: (1) The current required by each device is different which is possible only in parallel.
(2) Potential difference is constant for all devices.
(3) Total resistance in the circuit is decreased

LONG ANSWER TYPE (5 MARK)

1. a) What is the function of fuse in an electric circuit?
   b) What would be the rating of the fuse for an electric kettle which is operated at 220V and consumes 500 W power?
   c) How is the SI unit of electric energy related to its commercial unit?

   Ans.  
   b) 2.2A flows through the circuit, fuse should be rated 3A.
   c) 1 KWh = 3.6 \times 10^6 J

2. a) State Ohms law. Give the graphical relation between V & I.
   b) An electric oven rated at 500W is connected to a 220V line and used for 2 hours daily. Calculate the cost of electric energy per month at the rate of Rs.5 per KWh.

   Ans. a) Ohms law state that current flowing in conductor is directly proportional to the applied potential provided that temperature and physical conditions remain the same.
   b) Energy consumed per day = 1 KWh  
   \[ (P \times t) \text{ cost for 30 days} = 1 \times 5 \times 30 = \text{Rs.150.00} \]

MULTIPLE CHOICE QUESTIONS

1. Two resistors of resistance 2 Ω and 4 Ω when connected to a battery will have
   (a) Same current flowing through them when connected in parallel
   (b) Same current flowing through them when connected in series
   (c) Same potential difference across them when connected in series
   (d) Different potential difference across them when connected in parallel

2. Electric current is measured by
   a) A voltmeter
   b) An ammeter
   c) A rheostat
   d) A potentiometer

3. How many electrons constitute a current of 1 ampere?
   a) 6\times10^{15}
   b) 6\times10^{18}
   c) 1.6\times10^{19}
4. What is the maximum resistance which can be made using five resistors each of 1/5 Ω?
   (a) 1/5 Ω
   (b) 10 Ω
   (c) 5 Ω
   (d) 1 Ω

5. The resistivity does not change if
   (a) The material is changed
   (b) The temperature is changed
   (c) The shape of the resistor is changed
   (d) Both material and temperature are changed

**Assertion and reasoning questions**

The following three questions consists of two statements – ASSERTION(A) and REASON(R). Answer these questions selecting the appropriate option given below.

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true.

6. **Assertion (A):** If a graph is plotted between potential difference and current a linear graph is obtained.
   **Reason(R):** current is directly proportional to the potential difference.

7. **Assertion (A):** A cell converts chemical energy into electrical energy.
   **Reason(R):** A cell maintains a potential difference across its terminals due to chemical reactions.

Ans) 1.b 2.b 3.b 4.d 5.c 6.a7.b
CHAPTER 13- MAGNETIC EFFECTS OF ELECTRIC CURRENT

Magnet is an object that attracts objects made of iron, cobalt & nickel. When a magnet suspended freely it will align in North-South direction. Like poles repel each other and unlike poles attract each other.

Magnets are used: (i) In radio & stereo speakers, (ii) In refrigerator doors, (iii) in audio & video cassettes players, (iv) in hard discs & floppies of computers & (v) in children’s toys.

**Magnetic field**: The area around a magnet where the magnetic force can be detected by a unit North Pole is called a magnetic field. It is a quantity that has both direction & magnitude.

**Magnetic field lines**: Magnetic field is represented by field lines. The path traced by a unit north pole in a magnetic field is a field line. Magnetic field lines are called as Magnetic lines of force.

Refer to figure 13.3 & 13.4 page no. 225 of N.C.E.R.T Text book)

Properties of Magnetic field lines:
(i)They do not intersect each other. (ii)It is taken by convention that magnetic field lines emerge from North Pole and merge at the South Pole. Inside the magnet, their direction is from South Pole to North Pole. Therefore magnetic field lines are closed curves. (iii)The density of the field lines gives the strength of the magnetic field.

Magnetic field lines due to a current through a straight conductor (wire) - consist of series of concentric circles whose direction is given by the Right hand thumb rule.

**Right hand thumb rule**: If a current carrying straight conductor is held in your right hand such that the thumb points towards the direction of current, then the wrapped fingers show the direction of magnetic field lines.

Refer to figure 13.7, page no. 228 of N.C.E.R.T Text book)

**Magnetic field lines due to a current through a circular loop**
(Refer to figure 13.8, page no. 228 of N.C.E.R.T Text book)

The strength of the magnetic field at the center of the loop (coil) depends on:
(i)The radius of the coil- The strength of the magnetic field is inversely proportional to the radius of the coil. If the radius increases, the magnetic strength at the center decreases. (ii)The number of turns in the coil: As the number of turns in the coil increase, the magnetic strength at the center increases, because the current in each circular turn is having the same direction, thus the field due to each turn adds up.

(iii)The strength of the current flowing in the coil: as the strength of the current increases, the strength of the magnetic fields also increases.

**Solenoid**: (Refer to figure 13.10, page no. 229 of N.C.E.R.T Text book)

(i) A coil of many turns of insulated copper wire wrapped in the shape of a cylinder is called a Solenoid.

Magnetic field produced by a Solenoid is similar to a bar magnet.
The strength of magnetic field is proportional to the number of turns & magnitude of current.

**Electromagnet**: An electromagnet consists of a long coil of insulated copper wire wrapped on a soft iron core. (Refer to figure 13.11, page no. 229 of N.C.E.R.T Text book)

**Fleming’s Left hand rule**: Stretch the thumb, forefinger and middle finger of left hand such that they are mutually perpendicular. Forefinger points in the direction of magnetic field and middle finger in the direction of current, then the thumb gives the direction of force acting on the conductor.

(Refer to figure 13.13, page no. 231 of N.C.E.R.T Text book)

**Electric motor**: A device that converts electric energy to mechanical energy.

(Refer to figure 13.15, page no. 232 of N.C.E.R.T Text book)
**Principle of Electric motor:** When a rectangular coil is placed in a magnetic field and a current is passed through it, force acts on the coil, which rotates it continuously. With the rotation of the coil, the shaft attached to it also rotates.

**Electromagnetic induction (principle of a generator):** The process by which a changing magnetic field induces a current in a conductor is called Electromagnetic induction.

**Fleming’s Right hand rule:**
Stretch the thumb, forefinger and middle finger of right hand such that they are mutually perpendicular. Forefinger points in the direction of magnetic field, the thumb gives the direction of motion of the conductor, then middle finger gives the direction of induced current.

Electric generator: A devise that converts mechanical energy to electric energy. (Refer to figure 13.19, page no. 236 of N.C.E.R.T Text book)

**Electric generator is of two types** - (i) A.C generator (ii) D. C generator

Principle of Electric generator: Electromagnetic induction

Domestic electric circuits: (Refer to figure 13.20, page 238 of N.C.E.R.T Text book)
We receive electric supply through mains supported through the poles or cables. In our houses we receive AC electric power of 220V with a frequency of 50Hz.

**The 3 wires are as follows** - (i) Live wire- (Red insulated, Positive)
(ii) Neutral wire- (Black insulated, Negative) (iii) Earth wire- (Green insulated) for safety measure to ensure that any leakage of current to a metallic body does not give any serious shock to a user.

**Short circuit:** is caused by touching of live wire and neutral wire

**Fuse:** is a protective device used for protecting the circuits from short circuiting and over loading

---

**MAGNETIC EFFECT OF ELECTRIC CURRENT**

- Safety measure
  - Fuse wire
  - Earth
- Domestic electric circuits
- Magnet and its Properties
  - (like poles repel each other and unlike poles attract each other)
- Magnetic field lines
  - <do not intersect each other>
- Solenoid
  - (Many turns of insulated copper wire wrapped)
- Right hand thumb rule (to show the direction of magnetic field lines)
- Fleming left hand rule
  - Electric motor
- Fleming right hand rule
  - Electromagnetic induction.
  - Electromagnet
Figure 13.1
Compass needle is deflected on passing an electric current through a metallic conductor.

Figure 13.2
Iron filings near the bar magnet align themselves along the field lines.

Figure 13.4
Field lines around a bar magnet.

Figure 13.5
A simple electric circuit in which a straight copper wire is placed parallel to and over a compass needle. The deflection in the needle becomes opposite when the direction of the current is reversed.

Figure 13.7
Right-hand thumb rule.
Figure 13.6
(a) A pattern of concentric circles indicating the field lines of a magnetic field around a straight conducting wire. The arrows in the circles show the direction of the field lines.
(b) A close up of the pattern obtained.

Figure 13.10
Field lines of the magnetic field through and around a carrying solenoid.

Figure 13.12
A current-carrying rod, AB, experiences a force perpendicular to its length and the magnetic field.

Figure 13.17
Current is induced in coil 2 when current in coil 1 is changed.

Figure 13.18
Fleming’s right-hand rule
Electric generator (AC)

Figure 13.20 A schematic diagram of one of the common domestic circuits
Question Bank

Very Short Answer Type Questions (1 mark)

Q.1 What is a solenoid?
Ans) A coil of many turns of insulated copper wire wrapped in the shape of a cylinder is called a Solenoid.

Q.2 What is the direction of the magnetic field lines inside a bar magnet?
Ans) from the south to North Pole.

Q.3 What is the direction of the magnetic field lines outside a bar magnet?
Ans) from the north to South Pole.

Short Answer Type Questions (2 mark)

Q.1 What is an electromagnet?
Ans) An electromagnet consists of a long coil of insulated copper wire wrapped on a soft iron core.

Q.2 What is the difference between a direct current and an alternating current? What is the frequency of AC in India?

<table>
<thead>
<tr>
<th>DC</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>The current flows in a single direction</td>
<td>Direction of current changes periodically (every 1/100 second in India)</td>
</tr>
<tr>
<td>Cannot be transmitted over long distances.</td>
<td>Can be transmitted over long distances without much loss in energy.</td>
</tr>
<tr>
<td>Source of DC – cell or battery</td>
<td>Source of AC – AC generator</td>
</tr>
</tbody>
</table>

Q.3 State the rule to find the direction of magnetic field produced around a straight current-carrying conductor.
Ans) Right hand thumb rule

Short Answer Type Questions (3 mark)

Q.1 What is the role of fuse, used in series with any electrical appliance?
Ans) A fuse is a safety devise which cuts of electric supply when unduly high current flows through a circuit, this prevents damage to electrical appliances.

Q.2 Why does a magnetic compass needle deflect when a current-carrying loop is brought near it.
Ans) The current carrying loop behaves like a magnet and deflects the needle.

Q.3 Explain the construction, working and principle applied in DC Motor.

Multiple choice questions

1) Commercial electric motors do not use
(a) An electromagnet to rotate the armature
(b) Effectively large number of turns of conducting wire in the current carrying coil
(c) A permanent magnet to rotate the armature
(d) A soft iron core on which the coil is wound

2) The strength of magnetic field inside a long current carrying straight solenoid is
   (a) More at the ends than at the centre
   (b) Minimum in the middle
   (c) Same at all points
   (d) Found to increase from one end to the other

3) The most important safety method used for protecting home appliances from short circuiting or
   overloading is
   (a) Earthing
   (b) Use of fuse
   (c) Use of stabilizers
   (d) Use of electric meter

4) Choose the incorrect statement
   (a) Fleming’s right-hand rule is a simple rule to know the direction of induced current
   (b) The right-hand thumb rule is used to find the direction of magnetic fields due to current
       carrying conductors
   (c) The difference between the direct and alternating currents is that the direct current
       always flows in one direction, whereas the alternating current reverses its direction
       periodically
   (d) In India, the AC changes direction after every 1/50 second

5) To convert an AC generator into DC generator
   (a) split-ring type commutator must be used
   (b) Slip rings and brushes must be used
   (c) A stronger magnetic field has to be used
   (d) A rectangular wire loop has to be used

**Assertion and reasoning**
The following three questions consists of two statements – ASSERTION(A) and REASON(R). answer these questions selecting the appropriate option given below.

a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

6) Assertion (A): No two magnetic field lines will intersect.
   Reason(R): Magnetic field lines do not have a specific direction.

7) Assertion (A): The magnetic field inside a solenoid is uniform
   Reason(R): the magnetic field lines inside a solenoid are parallel.

Ans) 1.c 2.C 3.b 4.d 5.a 6.c 7.a
CHAPTER 14- SOURCES OF ENERGY

1. Our energy requirements increase with our standard of living.

2. Characteristics of good source of energy.
   1. High efficiency/easy to use/easy to store and transport/ economical/easily accessible.
   2. Fossil fuels are non-renewable/exhaustible/causes air pollution, acid rain and global warming.
   3. Biogas is formed by the decomposition of cow dung, agricultural and domestic wastes.

   **Composition of biogas**
   - Methane
   - Hydrogen sulphide
   - Hydrogen
   - Carbon dioxide

   **Advantages of bio gas**: Pollution free/Wealth from wastes/No residue/high efficiency.

6. **Wind energy**: Kinetic energy of the wind is used to do the useful work.
   **Advantages**: Renewable/inexhaustible/pollution free/no residue.
   **Disadvantages**: High cost of installation/minimum wind speed 15km/h/ maintenance cost high/requirement of large area of land.

7. Solar cells are devices which convert light energy into electric energy.
   **Advantages**: inexhaustible/pollution free/used in artificial satellites/can be used in remote areas/ low cost of maintenance.
   **Disadvantages**: Requirement of special grade of silicon/high cost of installation/moderate efficiency.

8. In nuclear power plants, nuclear energy is used for the production of electricity.
Advantage:- Very high efficiency
Disadvantage:- Radioactive emissions/fear of nuclear power plant accidents/disposal of
Radioactive wastes.

CROSSWORD
Find the hidden words related with the chapter sources of energy.
(You can go across and down)

Figure 14.1  Schematic diagram of a biogas plant

Figure 14.2  A solar cooker
**QUESTION BANK**

**Very short answer type questions (1mark)**
1. Expand OTEC.
2. Thermal power plants are set up near coal or oil fields. Give reason

**Short answer type questions. (2 mark)**
1. Hydrogen has been used as a rocket fuel. Would you consider it a cleaner fuel than CNG? Why or why not?
2. Fire wood is our conventional fuel. List any four reasons of replacing it with the alternate sources of energy.
3. List two advantages and disadvantages each for using wind as a source of energy.

**Short answer type questions. (3 mark)**
1. What is solar panel? List two advantages and disadvantages each of using Solar cells for producing electricity.

**Long answer type questions. (5 mark)**
1. Describe the design and function of each part of a solar cooker with the help of a neat labelled diagram.

**Multiple choice questions**

1) In a hydro power plant
   (a) Potential energy possessed by stored water is converted into electricity
   (b) Kinetic energy possessed by stored water is converted into potential energy
   (c) Electricity is extracted from water
   (d) Water is converted into steam to produce electricity
2) Which part of the solar cooker is responsible for greenhouse effect?
   (a) Coating with black colour inside the box
   (b) Mirror
   (c) Glass sheet
   (d) Outer cover of the solar cooker
3) The main constituent of biogas is
   (a) Methane
   (b) Carbon dioxide
   (c) Hydrogen
   (d) Hydrogen sulphide
4) Ocean thermal energy is due to
   (a) Energy stored by waves in the ocean
   (b) Temperature difference at different levels in the ocean
   (c) Pressure difference at different levels in the ocean
   (d) Tides arising out in the ocean
5) The major problem in harnessing nuclear energy is how to
   (a) Split nuclei?
   (b) Sustain the reaction?
   (c) Dispose of spent fuel safely?
   (d) Convert nuclear energy into electrical energy?
**Assertion and reasoning**

The following three questions consist of two statements – ASSERTION(A) and REASON(R), answer these questions selecting the appropriate option given below.

a) Both A and R are true and R is the correct explanation for A  
b) Both A and R are true and R is not the correct explanation for A  
c) A is true but R is false  
d) A is false but R is true.

6) **Assertion (A):** construction of dams leads to global warming.  
   **Reason (R):** The vegetation submerged under the dams’ rots under anaerobic conditions to release methane.

7) **Assertion (A):** The steam trapped in rocks is used to generate geothermal power.  
   **Reason (R):** Geothermal power is not dependent on solar power.

**Ans**) 1.a  2.c  3.a  4.b  5.c  6.a  7.b
CHAPTER 15 - OUR ENVIRONMENT

GIST OF THE LESSON/FLOW CHART

ECOSYSTEM
Interacting Organisms of an area + Non living Constituents.

OUR ENVIRONMENT

TYPES
NATURAL
TERRESTRIAL
Eg. Forest, Grasslands, Aquatic: Pond, Lakes, Oceans

ARTIFICIAL
Eg. Crop field, Garden, Aquarium, Space craft.

COMPONENTS
BIOTIC
Living components: Eg. Plants, Animals and Microbes.

ABIOTIC
Non-living components: Physical factors like temperature, rainfall, wind, soil etc.

REPRESENTATION
of relation between different biotic components.

FOODS CHAIN
A series of organisms feeding on one another taking part at various levels.

FOOD WEB
A network of interconnected food chains.

TROPHIC LEVELS
It is each step or level of the food chain.

I - TROPHIC LEVEL: Producers Eg green plants, Blue green algae (Cyanobacteria), Phytoplankton's (Microscopic free floating aquatic plants)

II - TROPHIC LEVEL: Primary consumers or herbivores

III - TROPHIC LEVEL: Secondary consumers or small carnivore

IV - TROPHIC LEVEL: Tertiary consumers or large carnivore

FLOW OF ENERGY
1 % energy available from the sun to the terrestrial plants is converted into food.

10 % energy in food is transferred to next level of consumer. 90% is lost.

No of steps of food chain is only 3 or 4 as very little energy is available to higher levels.

No of organisms decrease as we move up in a food chain.

Flow of energy in a food chain is unidirectional.

Bio magnification of pollutants: Progressive accumulation of harmful substances like pesticides takes place.

BIODEGRADABLE
Can be broken down by the enzymes of bacteria or fungi
eg. Plant & animal waste, paper, wood.

NON BIODEGRADABLE
Can’t be broken down by the enzymes of bacteria or fungi (Decomposers) Eg. Plastics,

EFFECT OF WASTE
OZONE DEPLETION:
CFC damage ozone layer.

PROBLEM OF WASTE DISPOSAL
POLLUTION
Bio magnification of pollutants: Progressive accumulation of harmful substances like pesticides takes place in a food chain.

WASTE MANAGEMENT
LAND FILLS:
RECYCLING
SEWAGE TREATMENT
INCINERATION
USE OF DISPOSABLE PAPER CUPS

WASTE
Environment: Our surrounding is called environment.

- Ecosystem and its components
- Biotic and abiotic components.
- Food chain and food web
- Energy transfer through trophic levels
- Ozone layer and its concerns.

Ecosystem: This is a system of interdependencies among various living beings and non-living things in a given habitat.

Components of Ecosystem: An ecosystem has two types of components, viz. biotic component and abiotic component.

Abiotic Component: All the non-living things make the abiotic component of an ecosystem. Air, water and soil are the abiotic components.

Biotic Component: All living beings make the biotic component of an ecosystem.

- Green plants play the role of producers; because they prepare the food by photosynthesis.
- Animals and other living beings play the role of consumers; because they take food (directly or indirectly) from plants.
- Bacteria and fungi play the role of decomposers; as they decompose dead remains of plants and animals so that raw materials of organisms can be channelized back to the environment.

Food Chain: food chain is a simple representation of transfer of energy from the sun to different biotic components of an ecosystem. Sun is the ultimate source of energy. Green plants convert solar energy into chemical energy during photosynthesis.

Producer → Primary Consumer → Secondary Consumer

Food Web: In any ecosystem, there can be many food chains which are interlinked at various levels. Thus, many food chains form a network which is called food web.

Transfer of Energy through a food chain: Different levels in the food chain are called trophic level. Out of the energy consumed by an organism at a particular trophic level, 90% is utilized for its own need and rest 10% is left for the organism of the next trophic level.
Balance in the Ecosystem:

There is a delicate balance in an ecosystem; as far as number of organisms at a particular trophic level is concerned. An increase or decrease in population of any organism can disturb this balance. For example in the following food chain:

\[ \text{Plant} \rightarrow \text{Deer} \rightarrow \text{Lion} \]

If all the deer are killed in a jungle, the lions would be left with no food. This would endanger the existence of lions. Once the lions and deer would be finished, it would result in population explosion of green plants. If all the lions die in a jungle, it would create another problem. Since no lion would be left to kill the deer, the population of deer would increase substantially. This will finish off all the green plants and finally even the deer would be left with no food for them.

Biodegradable Substances: Substances which can be decomposed by microorganisms are called biodegradable substances. All the organic substances are biodegradable.

Non-biodegradable: Substances which cannot be decomposed by microorganisms are non-biodegradable. All inorganic substances are non-biodegradable.

Ozone Layer Depletion:
Ozone layer is also known as stratosphere. When ultraviolet radiations act on oxygen, the oxygen gets converted into ozone.

\[
\begin{align*}
\text{O}_2 \rightarrow \text{UV radiation} \rightarrow \text{O + O} \\
\text{O + O}_2 \rightarrow \text{O}_3
\end{align*}
\]

Ozone layer works like a protective shield for living beings.

Effect of CFCs: Use of CFCs (Chlorofluorocarbon) has damaged the ozone layer. It is used in refrigerators and aerosol spray.

Problems of Waste Disposal: Plastic waste is a serious concern because plastic is non-biodegradable. Proper segregation of wastes before disposal helps us to save our environment.
3.1 Food Chain

- **Animals and the food they eat**
  - Tiger eats meat
  - Bird eats fruits/insect
  - Panda eats bamboo shoots

- **Producer**
  - Green plants produced their own food

- **Classify animals into herbivore, carnivore and omnivore.**
  - **Herbivore:** Animals that eat plants only. e.g.: cow, goat, deer
  - **Carnivore:** Animals that eat other animals. e.g.: tiger, lion
  - **Omnivore:** Animals that eat plants and other animals. e.g.: bird, rat

- **Construct food chain**
  - The food relationship among living things can be shown by a food chain.

- **Consumer**
  - Animals that eat plant or other animals are called consumers.

A food chain starts with a plant as producer.

In a food chain the arrow → means 'eaten by'.
FLOW CHART

Habitat (Ecosystem)

Biotic Components
- Plants
- Animals

Abiotic Components
- Soil
- Air
- Sunlight
- Water

Resources (Basis of Origin)

Abiotic Resources
- Things composed of Non-Living things
  - e.g., rocks and metals

Biotic Resources
- Obtained from biosphere and have life.
  - e.g., human beings, flora, fauna, fisheries, livestock etc.

Efficiency of energy transfers between trophic levels:

- 10%
- 15%
- 20%
- 1000 g/m²/year
Figure 15.1  
Food chain in nature (a) in forest, (b) in grassland and (c) in a pond.

Figure 15.2  
Trophic levels

Figure 15.4  Diagram showing flow of energy in an ecosystem
Environment Puzzle

Using the Across and Down clues, write the correct words in the numbered grid below.

ACROSS
2. the act of cutting down or burning trees in an area
4. an area of land where large amounts of waste material are buried under the earth
7. something making land, water or sky dirty
8. to make less rubbish
9. to use something again

DOWN
1. to treat things that have already been used so they can be used again.
3. to keep safe from injury, harm, or destruction
5. a large number of water covering an area that is usually dry
6. to watch and help an animal or the environment

<table>
<thead>
<tr>
<th>LANDFILL</th>
<th>POLLUTION</th>
<th>DEFORESTATION</th>
<th>RECYCLE</th>
<th>FLOOD</th>
<th>PROTECT</th>
<th>REDUCE</th>
<th>PRESERVE</th>
<th>REUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Find the hidden words from the given grid. Words can go across or down

Related to the Environment.
Our Environment--- Question Bank

Q. 1 Using Kulhads as disposable cups to serve tea in trains, proved to be a bad idea. Why?
Ans. Making Kulhads on large scales leads to the loss of top soil.

Q. 2 Why is plastic not degraded by bacteria?
Ans. Plastic is not degraded by bacteria because they do not have enzymes to degrade plastic.

Q. 3 DDT has entered food chain. Which food habit is safer- vegetarian or nonvegetarian?
Ans. Vegetarian habit is safer. Being closer to producers, less DDT will accumulate in our body. Bio magnification leads to higher level of DDT in higher trophic levels.

Q. 4 Aquarium requires regular cleaning whereas lakes normally do not. Why?
Ans. Normally a lake has more diverse forms of life and hence a larger number of food chains. This leads to natural cleaning. Thus, the ecosystem is more stable. The aquarium has a very limited number of food chains and unable to sustain itself. But, sometimes there is excessive growth of algae in lake. Then it also needs to be cleaned.

Q. 5 How will accumulation of bio degradable waste effect our environment?
Ans. Accumulation of bio degradable waste will:
(a) Not let minerals return to mineral pool.
(b) Become site of pest breeding.

Q. 6 Look at the following figures. Choose the correct one and give reason for your answer.

Fig “A”                                     Fig ‘B’

Ans :Fig. “A” is correct. • In an ecosystem, the number of individuals at producer level is maximum. This number reduces at each successive level. Therefore, the shape is a pyramid with broader base and tapering apex. • On an average 10% of the food changes into body mass and is available for the next level of consumers.

Q. 7 It is the responsibility of the government to arrange for the management and disposal of waste. As an individual you have no role to play. Do you agree? Support your answers with two reasons.

Ans. I do not agree. As an individual, I also have the responsibility and can contribute in the following ways:- (i) Cut down waste generation. (ii)Make compost pit for bio degradable waste. (iii) Recycle non biodegradable waste.
1. Which of the following limits the number of trophic levels in a food chain?
(a) Water
(b) Polluted air
(c) Deficient food supply
(d) Decrease in energy at higher trophic levels
ANS- (d)

2. What will happen if deer is missing in the given food chain?
Grass → Deer → Tiger
(a) The population of tiger decreases and the population of grass increases
(b) The population of grass decreases
(c) Tiger will start eating grass
(d) The population of tiger increases
ANS-(a)

3. The percentage of solar radiation absorbed by all the green plants for the Process of photosynthesis is about-
(a) 1%
(b) 8%
(c) 5%
(d) 10%
ANS-(a)

4. Flow of energy in an ecosystem is always-
(a) Unidirectional
(b) Bidirectional
(c) Multidirectional
(d) No specific direction.
ANS-(a)
5. In natural ecosystems, decomposers include-
(a) Only bacteria and fungi
(b) Only microscopic animals
(c) Herbivores and carnivores
(d) Both (b) and (c)
ANS-(a)

**ASSERTION (A) and REASON(R)**

The following two questions consists of two statements-ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below
a) Both A and R are true and R is the correct explanation for A
b) Both A and R are true and R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

6) **ASSERTION (A):** Decomposers act as cleaning agents of environment.
**REASON(R):** The decomposers recycle waste material in hydrosphere.
ANS-(C)

7) **ASSERTION (A):** Garden is an artificial ecosystem.
**REASON(R):** Biotic and abiotic components are manipulated by humans.
ANS-(b)
CHAPTER 16
MANAGEMENT OF NATURAL RESOURCES

Natural resources include total natural environment that support human life and contribute to the production of necessities and comforts to mankind. So natural resources are the components of atmosphere, hydrosphere and lithosphere.

On the basis of abundance and availability, the natural resources are of two types:
(a) Inexhaustible
(b) Exhaustible.

We need to manage our natural resources because of the following reasons:

1. The resources of the earth are limited.
2. The proper management of natural resources to prevent exploitation of natural resources
3. The proper management can ensure equitable distribution of natural resources so that all the people can benefit from the development of these resources.
4. The proper management will take into consideration the damage caused to the environment during the ‘extraction’ or ‘use’ of the natural resources and find ways and means to minimize this damage.

Conservation of Wildlife

It is very important to conserve wild-life to maintain the ecological balance in nature and to preserve the gene pool.

1. Stringent laws to prevent poaching or capturing of animals.
2. Preservation of habitat of wild animals preserved by establishing National Parks and sanctuaries
3. Regular survey by Forest Department to learn about the population of all species of wild animals and plants
4. Special attention should be paid to the conservation of endangered species of wild animals and birds to prevent their extinction altogether.

Conservation of water:

Advantages of Dams:
1. Regular and round the year water supply to fields
2. Continuous water supply to nearby human settlements

Disadvantages of Dams:-

Conservation of Forest:
Effects of Deforestation: - Removal, decrease or deterioration of the forest cover of an area is called deforestation. It is caused by excessive felling of trees, overgrazing, monoculture, fragmentation and clearing of forests.

Deforestation causes.

Chipko Movement:-

Chipko-Movement was born in 1970 in a small hilly village of the upper reaches of Himalayas. Tribal people of Tehri-Garhwal district of U.P realized the importance of the forests and decided against giving its products to the people of other areas. They stood against the ruthless butchery of nature and the axes of greedy contractors

Rainwater Harvesting:-

Water harvesting is capturing, collection and storage of rain water and surface run off for filling either small water bodies or recharging ground water so that water continues to be available in non-rainy seasons.
The given figure shows the total Coliform (bacteria) count level in the river Ganga during year 1993-1994.

(see Fig. 16.1). Coliform is a group of bacteria, found in human intestines, whose presence in water indicates contamination by disease-causing microorganisms.

**Figure 16.1** Total coliform count levels in the Ganga (1993-1994)

MIND MAP

MANAGEMENT OF NATURAL RESOURCES

MINERALS
* Recycling
* Judicial Use
* Alternative Materials

WATER
* Water Harvesting
* pH of water
* Sources of Water Pollution
* Water for All

COAL
* Thermal Power Plant
* Steam Engines

PETROLEUM
* Save for the Future Generations
* Non-renewable

WILDLIFE
* Preserve the Biodiversity we have inherited
* Save Wildlife

FOREST
* Biodiversity
* Role of Chipko Movement

Recycle
Reduce
Reuse
To Save

The Environment
Natural Resources

Across
4 a resource that cannot be replaced
6 inorganic substance that comes from earth
7 items from nature and of use to humankind
10 material put on soil to improve quality of plant growth
11 an example of a renewable resource
13 timber used for building material or paper
14 land that is suitable for producing crops
15 a mineral that was discovered at Sutter's Mill in California in 1849
16 fur-bearing settlers hunted for this

Down
1 a common natural resource we use
2 mineral resources such as _____________ and oil are extensively used by humans
3 __________ oil, and land was an abundant natural resource for Early Settlers
5 can be used over and over again
8 oil, ___________. and natural gas are fossil fuels
9 an example of a non-renewable resource
12 water by artificial means
QUESTION BANK

Very Short Answer Type Question (1 mark)

Q1. What is coliform bacteria?
Q2. What are the two kinds of natural resources?
Q3. What are the 3R’s in sustainable development?

Short Answer Type Questions (2 mark)

Q1. List any two common methods by which solid wastes of urban areas are disposed of?
Q2. State an instance where human intervention saved the forest from destruction.
Q3. Name the stakeholders who have their dependence on forests?

Short Answer Type Questions (3 mark)

Q1. How is our holy river Ganga getting polluted? What are its ill effect? What is being done to prevent its pollution?
Q2. With the help of an example show that reuse strategy is better than recycling.
Q3. Why is sustainable management of natural resources necessary?
Q4. Every one of us can do something to reduce our consumption of various natural resources. List 4 activities based on 3-R approach.

MCQ:

1. Opposition to the construction of large dams is due to:
   a) Social reasons    c) economic reasons
   b) Environmental reasons    d) All of the above
2. Pick the right combination of terms which has no fossil fuel
   a) wood, ocean and coal    c) Kerosene, wind, and tide
   b) wind, wood and sun    d) Petroleum, wood and sun
3. Tehri dam is build over which of the following river?
   a) Kaveri   b) Narmada   c) ganga   d) Mahanadi
4. Khadins, Bundhis, Ahars and Kattas are ancient structures that are examples for:
   a) Grain storage    c) wood storage
   b) Water harvesting    d) soil conservation
5. Expand GAP:
   a) Government Agency for Pollution control
   b) Gross Assimilation by Photosynthesis
   c) Ganga Action Plan
   d) Governmental Agency for Animal Protection

ANS: 1. d) 2. b) 3. b) 4. b) 5. c)
Reasoning and assertion type questions

The following questions consists of two statements- Assertion (A) and Reason(R). Answer these questions selecting appropriate option given below:

a) Both A and R are true and R is correct explanation of A
b) Both A and R are true and R is not correct explanation of A
c) A is true but R is false
d) A is false but R is true

1. Assertion (A) - Natural resources need to be used carefully.
   Reason (R) – Resources are finite in supply and human population is tremendously increasing

2. Assertion (A) – Forest cover balances the temperature level of the area.
   Reason (R) – Forests reduce atmospheric pollution by absorbing carbon dioxide from the atmosphere.

ANS: 3. a) Both A and R are true and R is correct explanation of A
      4. a) Both A and R are true and R is correct explanation of A
EXAMINATION TIPS

1. Set your goals.
2. Prepare a study time table of your own and adhere to it strictly.
3. If you are not performing up to your level in a particular subject, do not postpone studying for this subject at all.
4. Your plan has to be realistic. Do not stuff too many things in a day. Set aside some time in the day for relaxation like playing/watching television/listening to music.
5. Avoid watching too much of television/accessing internet/using mobiles during exams.
6. Practice by Writing
   Practice makes a man perfect. Hence practice writing in all the subjects to score better.
7. Timing of Studying - Choose your study timings.
8. Drawing in Science
   Good drawings fetch you good marks. Practice drawings.
9. Health is Wealth
   Take care of your health. Eat plenty of fruits and vegetables during your exams and drink plenty of water too.
10. Revision – a Must
    Revising your lessons will clarify your doubts and boost your confidence.
11. Prayer/Meditation
    Do devote at least 10 minutes for prayer/meditation as it helps in improving your confidence and concentration.
12. Go for short Walks
    Take a short walk in the evenings to rejuvenate yourself.
13. On the Exam Day
    * Do not cram till the last minute.
    * Be ready to go to school well in advance.
    * Check your compass box, pens, pencils, sharpeners, erasers, scales etc.
    * 30 minutes prior to the commencement of the exam, close all your books and relax.
    * While answering the questions, read the questions carefully and attempt the questions that you know first.
    * Attempt all the questions.
• कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 11 हैं।
• प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नंबर को छात्र उत्तर-पुस्तिका के शृंखलापत्र पर लिखें।
• कृपया जाँच कर लें कि इस प्रश्न-पत्र में 27 प्रश्न हैं।
• कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें।
• इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वावधि में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
• Please check that this question paper contains 11 printed pages.
• Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
• Please check that this question paper contains 27 questions.
• Please write down the Serial Number of the question before attempting it.
• 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

विज्ञान

SCIENCE

निर्धारित समय : 3 घण्टे
Time allowed : 3 hours

अधिकतम अंक : 80
Maximum Marks : 80
General Instructions:

(i) The question paper comprises five Sections, A, B, C, D and E. You are to attempt All the sections.

(ii) All questions are compulsory.

(iii) Internal choice is given in Sections B, C, D and E.

(iv) Questions number 1 and 2 in Section A are one-mark questions. They are to be answered in one word or in one sentence.

(v) Questions number 3 to 5 in Section B are two-marks questions. These are to be answered in about 30 words each.

(vi) Questions number 6 to 15 in Section C are three-marks questions. These are to be answered in about 50 words each.

(vii) Questions number 16 to 21 in Section D are five-marks questions. These are to be answered in about 70 words each.

(viii) Questions number 22 to 27 in Section E are based on practical skills. Each question is a two-marks question. These are to be answered in brief.

SECTION A

1. Name two industries based on forest produce.

2. Why are the heating elements of electric toasters and electric irons made of an alloy rather than a pure metal?
SECTION B

3. Write the molecular formula of ethene and draw its electron dot structure.

4. कारण दीजिए:
   (a) वैलेंटिनम, गोल्ड और सिल्वर का उपयोग आभूषणों को बनाने में किया जाता है।
   (b) सोडियम और पोटेशियम जैसी धातुओं का भण्डारण तेल में डबोकर किया जाता है।

      अथवा
      कान्ह देर तक वायु में खुले रखने पर सिल्वर (चाँदी) की वस्तुएं काली पड़ जाती हैं जबकि कॉपर (बाँसी) के वर्णों को खुले में रखने पर उनके चमकीले भूरे पृष्ठों पर हरी परत जम जाती है। वायु में उपस्थित उन पदार्थों के नाम लिखिए जो इन धातुओं से अभिक्रिया करते हैं तथा बनने वाले उत्पादों के नाम लिखिए।

      दीजिए:
      (a) Platinum, gold and silver are used to make jewellery.
      (b) Metals like sodium and potassium are stored under oil.

      OR

      Silver articles become black when kept in open for some time, whereas copper vessels lose their shiny brown surfaces and gain a green coat when kept in open. Name the substances present in air with which these metals react and write the name of the products formed.

5. रूबी का निर्पेक्ष अपर्वनांक 1.7 है। रूबी में प्रकाश की चाल ज्ञात कीजिए। निर्वात में प्रकाश की चाल 3 x 10^8 m/s है।

      The absolute refractive index of Ruby is 1.7. Find the speed of light in Ruby. The speed of light in vacuum is 3 x 10^8 m/s.

SECTION C

6. क्वतन मली में कॉपर (II) नाइट्रेट के नीले रंग के चूर्ण को गर्म करने पर काला कॉपर ऑक्साइड, O_2 तथा कोई भूरी गैस X बनती है।

      (a) इस अभिक्रिया के प्रकार और गैस X को पहचानिए।
      (b) अभिक्रिया का संतुलित रासायनिक समीकरण लिखिए।
      (c) गैस X के जलीय विलयन का pH परास लिखिए।
On heating blue coloured powder of copper (II) nitrate in a boiling tube, black copper oxide, O₂ and a brown gas X is formed.

(a) Identify the type of reaction and the gas X.
(b) Write balanced chemical equation of the reaction.
(c) Write the pH range of aqueous solution of the gas X.

7. (a) किसी अम्ल को तनुकृत करते समय यह अनुशासन क्यों की जाती है कि अम्ल को जल में मिलाना चाहिए न कि जल को अम्ल में?
(b) शुष्क हाइड्रोजन क्लोराइड गैस शुष्क लिटमस पत्र के रंग में कोई परिवर्तन नहीं करती। क्यों?

अथवा
उद्योगों में सोडियम हाइड्रॉक्साइड किस प्रकार बनाया जाता है? इस प्रक्रिया का नाम लिखिए। इस प्रक्रिया में उपयोग के रूप में कोई गैस X बनती है। यह गैस चूहे के जल से अभिक्रिया करके कोई गैरिक Y बनाती है, जिसका उपयोग रसायन उद्योगों में विरंजन कर्मक के रूप में किया जाता है। X और Y को पहचानिए तथा होने वाली अभिक्रियाओं के रसायनिक समीकरण लिखिए।

(a) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?
(b) Dry hydrogen chloride gas does not change the colour of dry litmus paper. Why?

OR
How is sodium hydroxide manufactured in industries? Name the process. In this process a gas X is formed as by-product. This gas reacts with lime water to give a compound Y, which is used as a bleaching agent in the chemical industry. Identify X and Y and write the chemical equation of the reactions involved.

8. उभयधर्मी ऑक्साइड क्या होते हैं? एक उदाहरण दीजिए। अपने उत्तर की पुष्टि के लिए संतुलित रसायनिक समीकरण लिखिए।
What are amphoteric oxides? Give an example. Write balanced chemical equations to justify your answer.

9. कार्बन यौगिकों की समजातीय श्रेणी क्या होती है? एक उदाहरण दीजिए तथा इसके तीन अभिलक्षणों की सूची बनाइए।
What is a homologous series of carbon compounds? Give an example and list its three characteristics.
10. List in tabular form three distinguishing features between autotrophic nutrition and heterotrophic nutrition.

11. What is transpiration? List its two functions.

OR

(a) What is translocation? Why is it essential for plants?
(b) Where do the substances in plants reach as a result of translocation?

12. What is carpel? Write the function of its various parts.

13. A student holding a mirror in his hand, directed the reflecting surface of the mirror towards the Sun. He then directed the reflected light on to a sheet of paper held close to the mirror.
(a) What should he do to burn the paper?
(b) Which type of mirror does he have?
(c) Will he be able to determine the approximate value of focal length of this mirror from this activity? Give reason and draw ray diagram to justify your answer in this case.

OR

A 10 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 12 cm. The distance of the object from the lens is 18 cm. Find the nature, position and size of the image formed.

15. Write the essential function performed by ozone at the higher levels of the Earth’s atmosphere? How is it produced? Name the synthetic chemicals mainly responsible for the drop of amount of ozone in the atmosphere. How can the use of these chemicals be reduced?

bhāga d

section d

16. (a) List any three observations which posed a challenge to Mendeleev’s Periodic Law.
(b) How does the metallic character of elements vary on moving from (i) left to right in a period, (ii) from top to bottom in a group of the Modern Periodic Table?

or

The electrons in the atoms of four elements A, B, C and D are distributed in three shells having 1, 3, 5 and 7 electrons respectively in their outermost shells. Write the group numbers in which these elements are placed in the Modern Periodic Table. Write the electronic configuration of the atoms of B and D and the molecular formula of the compound formed when B and D combine.
17. (a) Why is the use of iodised salt advisable? Name the disease caused due to deficiency of iodine in our diet and state its one symptom.  
(b) How do nerve impulses travel in the body? Explain.

OR

What is hydrotropism? Design an experiment to demonstrate this phenomenon.

18. (a) What are homologous structures? Give an example.
(b) “The sex of a newborn child is a matter of chance and none of the parents may be considered responsible for it.” Justify this statement with the help of a flow chart showing sex-determination in human beings.

19. When do we consider a person to be myopic or hypermetropic? List two causes of hypermetropia. Explain using ray diagrams how the defect associated with hypermetropic eye can be corrected.

20. (a) Which of the following statements is true? For a given current, the potential difference across a smaller resistance will be greater.

(b) The number of turns of wire in a coil of inductor is doubled. What happens to its magnetic moment?

[Diagram of a simple circuit with resistors and a voltage source]
(a) How will you infer with the help of an experiment that the same current flows through every part of a circuit containing three resistors in series connected to a battery?

(b) Consider the given circuit and find the current flowing in the circuit and potential difference across the 15 Ω resistor when the circuit is closed.

OR

(a) Three resistors $R_1$, $R_2$ and $R_3$ are connected in parallel and the combination is connected to a battery, ammeter, voltmeter and key. Draw suitable circuit diagram and obtain an expression for the equivalent resistance of the combination of the resistors.

(b) Calculate the equivalent resistance of the following network:
21. Draw the pattern of magnetic field lines produced around a current carrying straight conductor passing perpendicularly through a horizontal cardboard. State and apply right-hand thumb rule to mark the direction of the field lines. How will the strength of the magnetic field change when the point where magnetic field is to be determined is moved away from the straight conductor? Give reason to justify your answer.

BHAG Y

SECTION E

22. A teacher provided acetic acid, water, lemon juice, aqueous solution of sodium hydrogen carbonate and sodium hydroxide to students in the school laboratory to determine the pH values of these substances using pH papers. One of the students reported the pH values of the given substances as 3, 12, 4, 8 and 14 respectively. Which one of these values is not correct? Write its correct value stating the reason.

OR

What would a student report nearly after 30 minutes of placing duly cleaned strips of aluminium, copper, iron and zinc in freshly prepared iron sulphate solution taken in four beakers?
23. What is observed when a pinch of sodium hydrogen carbonate is added to 2 mL of acetic acid taken in a test tube? Write chemical equation for the reaction involved in this case.

24. List in proper sequence four steps of obtaining germinating dicot seeds.

OR

After examining a prepared slide under the high power of a compound microscope, a student concludes that the given slide shows the various stages of binary fission in a unicellular organism. Write two observations on the basis of which such a conclusion may be drawn.

25. List four precautions which a student should observe while preparing a temporary mount of a leaf peel to show stomata in his school laboratory.

26. Draw the path of a ray of light when it enters one of the faces of a glass slab at an angle of nearly 45°. Label on it (i) angle of refraction, (ii) angle of emergence and (iii) lateral displacement.

OR
A student traces the path of a ray of light through a glass prism as shown in the diagram, but leaves it incomplete and unlabelled. Redraw and complete the diagram. Also label on it $\angle i$, $\angle e$, $\angle r$ and $\angle D$.

The current flowing through a resistor connected in a circuit and the potential difference developed across its ends are as shown in the diagram by milliammeter and voltmeter readings respectively:

(a) What are the least counts of these meters?

(b) What is the resistance of the resistor?