KENDRIYA VIDYALAYA SANGATHAN

SUPPORT MATERIAL FOR CLASS X
SUBJECT - SCIENCE

[SESSION-2015-2016]

PATNA REGION

KENDRIYA VIDYALAYA
SANGATHAN
Patna Region
PREFACE

Kendriya Vidyalaya is a pioneer organization which caters to the all round development of the students. Time to time various strategies have been adopted to adorn the students with academic excellence. Keeping in view of the implementation of CCE it is desired to prepare study/support material for Class IX to guide the students in the right direction and to equip the students to face the challenges with ease.

This support material is one such effort by Kendriya Vidyalaya Sangathan, an empirical endeavor to help students learn more effectively and efficiently. It is designed to give proper platform to students for better practice and understanding of the chapters. This can suitably be used during revision. Ample opportunity has been provided to students through master cards and question banks to expose them to the CBSE pattern. It is also suggested to students to keep in consideration the time-management aspect as well.

I extend my heartiest gratitude to the Kendriya Vidyalaya Sangathan authorities for providing the support material to the students prepared by various Regions. The same has been reviewed by the Regional Subject Committee of Patna Region who have worked arduously to bring out the best for the students. I also convey my regards to the staff of Regional Office, Patna for their genuine cooperation.

In the end, I earnestly hope that this material will not only improve the academic result of the students but also inculcate learning habit in them.

M.S. Chauhan
Deputy Commissioner
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**Support Material for Class X**

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1. This support material is not the substitute of NCERT Text book.
2. At first go through the text book chapter wise to develop a basic concept of the various topics of the chapter.
3. Study support material topic wise relating it with the text book to develop lateral thinking.
4. Give more attention on the table, charts and diagrams given in the study material.
5. Refresh your concept with mind map given for every chapter.
6. First practice the solve question paper of support material.
7. Try to find solutions of unsolved questions given for practice.
8. Practice the CBSE sample papers to clear your concept more and more to the topic concerned.
9. Make a group of 4 to 5 student to solve HOT questions and Value based questions.
10. In case of any difficulty in understanding the topic take the help of concern subject teacher.

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## COURSE STRUCTURE

### CLASS X

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<tr>
<td>I. Chemical Substances</td>
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<td>II. World of Living</td>
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<td>III. Effects of Current</td>
<td>29</td>
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<td>IV. Natural Resources</td>
<td>07</td>
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<tr>
<td><strong>Total</strong></td>
<td>90</td>
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</tbody>
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### Theme: Materials

#### Unit: Chemical Substances - Nature and Behaviour

**Chemical reactions**: Chemical equation, Balanced chemical equation, implications 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 non metals**: Properties of metals and non-metals, reactivity series, formation and properties of ionic compounds, basic metallurgical processes, corrosion and its prevention.

### Theme: The World of The Living

#### Unit: 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**: Tropic movements in plants; Introduction to plant hormones; control and co-ordination in animals: nervous system; voluntary, involuntary and reflex action, chemical co-ordination: animal hormones.

### Theme: How things work.

#### Unit: Effects of Current

Magnetic effects of current: Magnetic field, field lines, field due to current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's left hand rule. Electromagnetic induction. Induced potential difference, induced current. Fleming's Right Hand Rule. Direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

Theme: Natural Resources (08 periods)

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.

SECOND TERM
CLASS X

<table>
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<th>Second Term</th>
<th>Marks</th>
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<tr>
<td>Units</td>
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<tr>
<td>I. Chemical Substances - Nature and Behaviour</td>
<td>23</td>
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<td>29</td>
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<td>IV. Natural Resources</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

Theme: Materials (25 Periods)

Unit: Chemical Substances - Nature and Behaviour

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, addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

Periodic classification of elements: Need for classification. Modern periodic table, gradation in properties, valency, atomic number, metallic and non-metallic properties.
Theme: The World of The Living (30 Periods)

Unit: World of Living

Reproduction: Reproduction in animal and plants (asexual and sexual) reproductive health—need for and methods of family planning, safe sex vs HIV/AIDS. Child bearing and women’s health.


Theme: Natural Phenomena (23 Periods)

Unit: Reflection of light at curved surfaces, Images formed by spherical mirrors, centre 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: Natural Resources (12 Periods)

Unit: Conservation of natural resources

Management of natural resources. Conservation and judicious use of natural resources. Forest and wild life, coal and petroleum conservation. Examples of People’s participation for conservation of natural resources.

The Regional environment: Big dams: advantages and limitations; alternatives if any. Water harvesting. Sustainability of natural resources.

1) **Chemical reaction** — Chemical changes or chemical reactions are the changes in which one or more new substances are formed.

2) **Chemical Equations** — Representation of a chemical reaction in terms of symbols and formulae of the reactants and products is known as chemical equation.

3) **Balanced Chemical equations** — The chemical equation in which the no. of atoms of different elements is same on both sides of the arrow is called balanced chemical equation. It obeys the law of conservation of mass and helpful in stoichiometric calculation.

4) The chemical reactions can be classified into different types such as—

   a) **Combination reaction** — The reactions in which two or more substances combine to form a new substance are called combination reaction. For example,

   \[ 2\text{Mg(s)} + \text{O}_2 (g) \rightarrow 2\text{MgO (s)} \]

   b) **Decomposition reaction** - The reaction in which a single compound breaks up into two or more simpler substances are called decomposition reactions. For example,

   - The decomposition of a substance by passing electric current through it is known as electrolysis (Electrical Decomposition).
     \[ 2\text{H}_2\text{O} \rightarrow 2\text{H}_2(g) + \text{O}_2(g) \]
   - The decomposition of a substance on heating is known as thermal decomposition.
     \[ 2\text{Pb (NO}_3\text{)}_2 (s) \rightarrow 2\text{PbO (s)} + 4\text{NO}_2 (g) + \text{O}_2 (g) \]
   - The decomposition of a substance by absorbing light energy is called photochemical decomposition.
     \[ 2\text{AgBr(s)} \rightarrow 2\text{Ag (s)} + \text{Br}_2 (g) \]

   c) **Displacement reactions** — The chemical reactions in which a more reactive element displaces a less reactive element from a compound are known as displacement reactions. For example,

   i) \[ \text{Zn (s)} + \text{CuSO}_4 (aq) \rightarrow \text{ZnSO}_4 (aq) + \text{Cu (s)}. \]
        Blue solution colourless solution red ppt.

   ii) \[ \text{Cu (s)} + 2\text{AgNO}_3 (aq) \rightarrow \text{Cu (NO}_3\text{)}_2 (aq) + 2\text{Ag (s)}. \]
        Colourless green solution black ppt.

   d) **Double Displacement Reactions** - The chemical reactions in which compounds react to form two different compounds by mutual exchange of ions are called double displacement reactions. These reactions take place in solution two common types of this reaction are precipitation reactions and neutralization reactions.

   i) **Precipitation reaction:** In this reactions, aqueous solution of two salts are mixed where some salts precipitate due to mutual exchange of ions between the two salts. For example

     \[ \text{AgNO}_3 (aq) + \text{NaCl (aq)} \rightarrow \text{AgCl(s)} + \text{NaNO}_3. \]
     Curdy white ppt

     \[ \text{BaCl}_2 (aq) + \text{Na}_2\text{SO}_4(aq) \rightarrow \text{BaSO}_4(s) + 2\text{NaCl(aq)} \]
     White ppt.

   ii) **Neutralization reaction:** In this type of reaction an acid reacts with a base to form salt and water by exchange of ions.

     \[ \text{NaOH (aq)} + \text{HCl (aq)} \rightarrow \text{NaCl (aq)} + \text{H}_2\text{O}. \]
e) **Redox reaction**: Chemical reaction which shows both oxidation and reduction reaction.

**Oxidation**: Reaction that involves the gain of oxygen or loss of hydrogen.

**Reduction**: Reaction that shows the loss of oxygen or gain of hydrogen.

Both oxidation and reduction take place simultaneously and hence called redox reaction.

\[
\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}
\]

ZnO reduce to Zn ---- reduction

C oxidize to CO ------ oxidation

\[
\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2.
\]

HCl oxidised to Cl₂ whereas MnO₂ is reduced to MnCl₂

f) **Exothermic reaction and endothermic reaction**: On the basis of energy changes during chemical reaction, they can be classified as

i) **Exothermic reaction**: A chemical reaction in which heat energy is produced.

\[
\text{C} + \text{O}_2 \rightarrow \text{CO}_2 (g) + \text{heat}
\]

ii) **Endothermic reaction**: A chemical reaction in which heat energy is absorbed.

\[
\text{CaCO}_3(s) + \text{Heat} \rightarrow \text{CaO}(s) + \text{CO}_2(g)
\]

5 **Corrosion** – The process of slow conversion of metals into their undesirable compounds due to their reaction with oxygen, water, acids, gases etc. present in the atmosphere is called corrosion.

Rusting – Iron when reacts with oxygen and moisture forms red substance called rust. Chemical composition of rust is Fe₂O₃·xH₂O. Its chemical name is Hydrated Iron (III) oxide.

6 **Rancidity** – The taste and odour of food materials containing fat and oil changes when they are left exposed to air for long time. This is called rancidity. It is caused due to oxidation of fat and oil present in food material. It can be prevented by using various methods such as

- by adding antioxidants to the food materials.
- By refrigeration
- Storing food in air tight container and
- by flushing out air with nitrogen.
EXOTHERMIC - Release heat
ENDOTHERMIC - Absorb heat

REDOX REACTION
Shows both Oxidation and Reduction

COMBINATION
Two or more substances combined to give a single product

DECOMPOSITION
A single substance decomposes to give two or more products

TYPE OF CHEMICAL REACTIONS

DECOMPOSITION Reaction

RANCIDITY
Oxidation of fats and oil

CORROSION
Eating away of metals

DOUBLE DISPLACEMENT
Two different elements displace each other

DISPLACEMENT
More reactive element displaces less reactive element

WRITING
BALANCING
Basic Concepts — A Flow Chart

**Chemical reaction**
Process in which one or more substances react to form new substances

**Chemical equation**
Shorthand notation of chemical reaction in terms of symbols, formulae and the ratio of the number of various reactants and products involved

**Combination reaction**
Two or more substances (elements or compounds) combine to form a single substance
- CaO(s) + H₂O(l) → Ca(OH)₂(aq)

**Decomposition reaction**
The breaking down of a single compound into two or more simpler substances
- CuSO₄(aq) + Fe(s) → FeSO₄(aq) + Cu(s)

**Displacement reaction**
One atom or a group of atoms of a compound is replaced by another atom or group of atoms
- 2AgCl(s) → 2Ag(s) + Cl₂(g)

**Thermal decomposition**
A single substance breaks down into two or more simpler substances upon heating
- CaCO₃(s) → CaO(s) + CO₂(g)

**Electric decomposition**
A single substance breaks down into simpler substances upon passage of electric current
- 2H₂O(l) → 2H₂(g) + O₂(g)

**Photo decomposition**
A single substance breaks down into simpler substances in presence of sunlight
- 2AgCl(s) → 2Ag(s) + Cl₂(g)

**Types on the basis of heat transfer**

- **Endothermic reaction**
  - Reactions in which energy is absorbed
  - All decomposition reactions are endothermic reactions
  - CH₄(g) + 2O₂(g) → CO₂(g) + 2H₂O(g) + Heat energy

- **Exothermic reaction**
  - Reactions in which heat is released along with the formation of products
  - 2Al(s) + 3CuO(s) → 2Al₂O₃(s) + 3Cu(l)

**Double displacement reaction**
Two reacting compounds exchange their corresponding ions and form two new compounds
- AgNO₃(aq) + NaCl(aq) → AgCl(s) + NaNO₃(aq)
  - Silver nitrate
  - Sodium chloride
  - Silver chloride (White ppt)
  - A reaction that produces precipitate is called a precipitation reaction

**Oxidation-reduction (redox) reaction**

- **Oxidation**
  - Gain of oxygen atoms
  - Loss of hydrogen atoms
  - Reduction: Copper oxide is being reduced, CuO is the oxidising agent
- **Reduction**
  - Loss of oxygen atoms
  - Gain of hydrogen atoms
- CuO + H₂ → Heat → Cu + H₂O

**Effects in everyday life**

- **Corrosion**
  - Slow conversion of metals into their undesirable compounds (sulphides, carbonates, oxides, etc.)
  - by interaction with atmospheric gases and moisture
  - 2Fe(s) + 1/2O₂(g) + H₂O(l) → Fe₂O₃·H₂O(s)
  - (rust)

- **Rancidity**
  - Oxidation of oils or fats in food resulting in bad taste and smell

**Methods of prevention**

- Painting
- Ciling and greasing
- Plastic coating
- Chromium plating
- Galvanising (zinc plating)
- Alloying
- By adding antioxidants
- Vacuum packing
- Replacing air by nitrogen
- Refrigeration of the foodstuff
CHEMICAL REACTIONS AND EQUATIONS
PRACTICE QUESTIONS FOR FORMATIVE ASSESSMENT I
Q. PAPER

MARKS-30
TIME- 70 MINUTES

Instructions:
• Questions : 1 to 5 – 1 Mark each
• Questions : 6 to 9 – 2 Marks each
• Questions : 10 to 13 – 3 Marks each
• Question 14 – 5 Marks

1. On what chemical law, balancing of chemical equation is based?
2. Identify the compound oxidized in the following reaction:
   \[ 2\text{PbO (s)} + \text{C (s)} \rightarrow \text{Pb(s)} + \text{CO}_2(g) \]
3. Give an example of photochemical reaction.
4. Name the reaction which forms insoluble salts.
5. Name the product obtained and type of reaction given below:
   \[ \text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{_______} + \text{_______} \]
6. Explain the following in terms of gain or loss of oxygen with one example:
   a. Oxidation
   b. Reduction
7. A copper coin is kept in a solution of silver nitrate for some time, what will happen to the coin and the colour of the solution?
8. Why do we apply paint on iron articles?
9. What happens chemically when quicklime is added to water?
10. What is rancidity? Write the common methods to prevent it.
11. What is corrosion? State the conditions necessary for rusting of iron. How rusting is harmful?
12. Name the type of reactions in the following cases:
   a. Garbage producing foul smell
   b. Burning of natural gas.
   c. Carbon dioxide gas passed through lime water.
13. Oil and fat containing food items are flushed with nitrogen. Why?
14.
   a. Why can not a chemical change be normally reversed?
   b. Why is it always essential to balance a chemical equation?
   c. What happens when CO\textsubscript{2} gas is passed through lime water and why does it disappear on passing excess CO\textsubscript{2}?
   d. Can rusting of iron take place in distilled water?

HOTS QUESTIONS (SOLVED)

Q.1. A water insoluble substance ‘X’ on reacting with dilute H\textsubscript{2}SO\textsubscript{4} released a colourless and odourless gas accompanied by brisk effervescence. When the gas was passed through water, the solution obtained turned blue litmus red. On bubbling the gas through lime water, it initially became milky and milkiness disappeared when the gas was passed in excess. Identify the substance ‘X’. Write its
chemical equations of the reactions involved.

Ans. The water insoluble substance 'X' is metal carbonate CaCO₃.

CaCO₃(s) + H₂SO₄(aq) → CaSO₄(aq) + H₂O(l) + CO₂(g)

Ca(OH)₂ + CO₂(g) → CaCO₃(s) + H₂O(l)

(milky)

CaCO₃(s) + CO₂(g) + H₂O(aq) → Ca(HCO₃)₂

(milkiness disappeared)

Q.2. Ahmad took a magnesium ribbon (cleaned) and burned it on a flame. The white powder formed was taken in a test tube and water was added to it. He then tested the solution formed with red and blue litmus paper. What change was seen? Why?

Ans. Red litmus paper turned blue.
Blue litmus paper remained blue.

This is because the magnesium ribbon on burning in air forms the white magnesium oxide. Which dissolved in water, it forms magnesium hydroxide, which is basic in nature.

Q.3. A solution of a substance 'X' is used for white washing.

(a) Name the substance 'X' and write its formula.

(b) Write the reaction of the substance 'X' named on (a) above with water.

Q.4. Marble statues often slowly get corroded when kept in open for a long time. Assign a suitable explanation.

Q.5. Mohan took pure water for the electrolytic decomposition of water but did not see any bubbles near the electrodes. Explain why?

Q.6 A white salt on heating decomposes to give brown fumes and yellow residue is left behind. Name the salt and write the reaction involved.

Q.7 A substance 'X' displaces 'Y' from its solution in water. It is called displacement reaction. What other chemical name can be given to such type of reactions? Explain, giving an example?

Q.8 A grey coloured metal 'Z' (Atomic weight=65) is used in making dry cell. It reacts with dil. HCl to liberate a gas. What is the gas evolved? Calculate the minimum amount of 'Z' required to produce 100 litre of gas?

Q.9 Why respiration is considered an exothermic reaction and photosynthesis is considered an endothermic reaction? Explain

Q.10 Translate the following statement into chemical equation and then balance the equation:

(a) Phosphorous burn in oxygen to give phosphorous pentaoxide
(b) Aluminium metal displace iron from ferric oxide Fe₂O₃ giving aluminium oxide and iron.
(c) Carbon disulphide burn in air to give carbon dioxide and sulphur dioxide.
(d) Barium chloride reacts with zinc sulphate to give zinc chloride and barium sulphate.

Q.11 Why decomposition reactions are called opposite of combination reactions? Write equations for these reactions.
Q. 12 A shiny brown coloured element ‘X’ on heating in air becomes a black coloured compound. Name the element ‘X’& black the coloured compound formed. Also write the equation.

FA II
CHEMICAL REACTION AND EQUATIONS

Oral questions (Conversation type)

1. a) How do you represent chemical changes in chemistry?  
   b) What should you know to write a chemical equation?  
   c) How are reactants and products separated in a chemical equation?
2. a) Is it essential to write balanced chemical equation?  
   b) What will happen if it is not balance?  
   c) How do you know that the equation is not balance?
3. a) What happens when calcium carbonate is heated?  
   b) What is this reaction called?  
   c) Does decomposition take place only on heating?
4. a) What is oxidation?  
   b) Can we call a chemical reaction an oxidation reaction in which hydrogen is removed?  
   c) Give an example of everyday life where redox reaction takes place.
5. a) What is corrosion?  
   b) Give an example.  
   c) What are the requirements for corrosion?

ORAL QUESTIONS

1. What is opposite to combination reaction?
2. To pack food articles, why do manufacturers flush out oxygen with nitrogen?
3. What is spoiling of food called, when kept for a long time?
4. What is the chemical reaction called, in which heat is evolved?
5. Silver articles get black coating. Name the phenomenon.
6. Which gas is evolved when acid is added to lime stone?
7. When a more reactive metal displaces a less reactive metal in solution, what is the reaction called?
8. What sign (+ or -) is given to exothermic reaction?
9. Which of the two is a redox reaction?
   a) Displacement  
   b) Double displacement
10. What is one important similarity between rusting and burning?

QUIZ - WHO AM I

1. I am symbolic representation of a chemical change.
2. I am a metal which go on losing weight when constantly exposed to air and moisture.
3. I conduct electric current and get a green coating when exposed to humid atmosphere for long.
4. My blue colour starts fading when zinc metal is added to my aqueous solution.
5. I get reduced in a redox reaction.
6. I am formed during a chemical change.
7. I separate reactants from products when a chemical reaction is represented by a chemical equation.
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8. I give a name to the reaction between acids and bases.
9. I am a chemical reaction which represents digestion of food in our body/
10. I am a process which is used to prevent rusting of iron objects / articles.

Value based questions:
1. Anjali told her chemistry teacher that bio-fuels should be used instead of fossil fuels. She read in science magazine that researchers have found that one of the most common bacteria E. coli can digest simple sugar from plant waste and turn it into valuable bio-fuel. It can convert a renewable non food plant jatropha to fuel. we need to put it in our food stock, the bacteria converts feed stock into fuel which is oil that you just scrap of f the tap. Bio-fuels made from plants and animal fat, are alternative to petroleum based fuel.
   c) (a) what is bio-fuel?
   d) (b) what are advantage of bio-fuel?
   e) (c)is preparation of bio-fuel a chemical or physical process?
   f) (d) why is bio-fuel better than petroleum products?
   g) (e)what values does are possessed by Anjali who wants to use bio-fuel?

2. Ajay, a student of chemistry was performing chemical reaction between sodium thiosulphate and HCl. He found that time required to appear turbidity increase when concentration of HCl or sodium thiosulphate for both decreases.
   Answer the following questions based on above information:
   (a) Mention the reason for appearance of turbidity.
   (b) Write the chemical reaction involved.
   (c) Mention the value associated with above experiment.
CHAPTER- 2
ACIDS, BASES AND SALTS

GIST OF THE LESSON

1) Acids are sour in taste, turn blue litmus red, and dissolve in water to release H\(^+\) ions e.g. HCl, H\(_2\)SO\(_4\), HNO\(_3\) etc.

2) Bases are bitter in taste, have soapy touch, turn red litmus blue and give hydroxide ions in solution. e.g. NaOH, KOH etc.

3) A salt is a compound which is formed by neutralization reaction between an acid and base. e.g. sodium chloride.

3) Indicators – Indicators are substances which indicate the acidic or basic nature of the solution by their colour change.
The colour of some acid – base indicators in acidic and basic medium are given below

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>INDICATORS</th>
<th>COLOUR IN ACIDIC MEDIUM</th>
<th>COLOUR IN BASIC MEDIUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Litmus solution</td>
<td>Red</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>Methyl Orange</td>
<td>Pink</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>Phenolphthalein</td>
<td>Colourless</td>
<td>Pink</td>
</tr>
<tr>
<td>4</td>
<td>Methyl red</td>
<td>Yellow</td>
<td>Red</td>
</tr>
</tbody>
</table>

5) Chemical properties of acids:
   i) Acids react with active metals to give hydrogen gas.
      \(\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2\)
   ii) Acids react with metal carbonate and metal hydrogen carbonate to give carbon dioxide.
      \(\text{NaHCO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2\)
   iii) Acids react with bases to give salt and water. This reaction is called as neutralization reaction.
      \(\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}\)
   iv) Acids react with metals oxides to give salt and water.
      \(\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}\)

6) Chemical properties of Bases:
   i) Reaction with Metals - Certain reactive metals such as Zinc, Aluminium, and Tin react with alkali solutions on heating and hydrogen gas is evolved.
      \(2\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2\)
   ii) Reaction with acids - Bases react with acids to form salt and water.
      \(\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}\)
   iii) Reaction with Non-metallic oxides – These oxides are generally acidic in nature. They react with bases to form salt and water.
      \(2\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}\)

7) pH Scale: The concentration of hydrogen ion in solution is expressed in terms of pH. The pH of a solution is defined as the negative logarithm of hydrogen ion concentration in moles per liter.
   \[\text{pH} = - \log [\text{H}^+]\]
For water or neutral solutions, pH = 7 ; For acidic solutions, pH < 7; For basic solutions, pH > 7

8) Some Important Chemical Compounds:

a) Common Salt (NaCl)
Sodium chloride is known as common salt. Its main source is sea water. It is also exists in the form of rocks and is called rock salt. Common salt is an important component of our food. It is also used for preparing sodium hydroxide, baking soda, washing soda etc.

b) Sodium Hydroxide or Caustic Soda (NaOH)
It is prepared by passing electricity through an aqueous solution of sodium chloride also known as brine.

\[ 2\text{NaCl (aq)} + 2 \text{H}_2\text{O (l)} \rightarrow 2\text{NaOH (aq)} + \text{Cl}_2 (g) + \text{H}_2 (g) \]

This process is known as chlor-alkali process.

**Properties:**
1. It is white translucent solid.
2. Crystals of sodium hydroxide are deliquescent.
3. It is readily soluble in water and gives strong alkaline solution.

C) Bleaching Powder (CaOCl\(_2\))
Its chemical name is calcium oxychloride. It is prepared by passing chlorine gas through dry slaked lime.

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

**Uses –**
1. For bleaching cotton and linen in textile industry and wood pulp in paper industry
2. For disinfecting drinking water.

d) Baking Soda (NaHCO\(_3\))
Chemical name is Sodium hydrogen carbonate. It is prepared by passing CO\(_2\) gas through brine solution saturated with ammonia.

\[ \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2 + \text{NH}_3 \rightarrow \text{NH}_4\text{Cl} + \text{NaHCO}_3 \]

**Properties:**
1. It is white crystalline solid and sparingly soluble in water at room temperature.
2. On heating it decomposes to give sodium carbonate and carbon dioxide.
3. It reacts with acids to give carbon dioxide gas.
4. It aqueous solution is weak alkaline due to hydrolysis.

**Uses:**
1. It is used in soda – acid fire extinguisher.
2. It acts as mild antiseptic and antacid.
3. It is used as a component of baking powder. In addition to sodium hydrogen carbonate baking soda contains tartaric acid.

e) Washing Soda (Na\(_2\)CO\(_3\).10 H\(_2\)O)
Chemical name is sodium carbonate decahydrate. It is prepared by heating baking soda. Recrystallisation of sodium carbonate gives washing soda.

\[ 2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2 \]
\[ \text{Na}_2\text{CO}_3 + 10 \text{H}_2\text{O} \rightarrow \text{Na}_2\text{CO}_3. 10 \text{H}_2\text{O} \]

**Uses:**
1. It is used for removing permanent hardness of water.
2. It is used in glass, soap and paper industries.
3. It can be used as a cleaning agent for domestic purposes.

f) Plaster of Paris (CaSO\(_4\).1/2H\(_2\)O)
Its chemical name is calcium sulphate hemihydrates. It is obtained by heating Gypsum upto 373K.
CaSO₄·2H₂O → CaSO₄·½H₂O + ½H₂O

On treatment with water it is again converted into gypsum and sets as a hard mass.

CaSO₄·½H₂O + ½H₂O → CaSO₄·2H₂O

Uses:

1. It is used by doctors for setting fractured bones.
2. It is used for making statues, models and other decorative materials.
ACIDS
Corrosive
Blue litmus turns red,

BASES
Soapy to touch,
Red litmus turns blue,

PHYSICAL PROPERTIES

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### Salts

Formed by neutralisation reaction

Acid + Base → Salt + Water

\[
\text{HA} + \text{MOH} \rightarrow \text{MA} + \text{HOH}
\]

\[
\text{NaOH}(aq) + \text{HCl}(aq) \rightarrow \text{NaCl}(aq) + \text{H}_2\text{O}(l)
\]

\[
\text{HNO}_3(l) + \text{KOH}(aq) \rightarrow \text{KNO}_3(aq) + \text{H}_2\text{O}(l)
\]

<table>
<thead>
<tr>
<th>Important Compounds</th>
<th>Chemical name</th>
<th>Chemical formula</th>
<th>Preparation</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Salt</td>
<td>Sodium chloride</td>
<td>NaCl</td>
<td>By combination reaction of sodium hydroxide and hydrochloric acid</td>
<td>(i) As raw material for making many chemicals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[\text{NaOH}(aq) + \text{HCl}(aq)]</td>
<td>(ii) In cooking food</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[\text{NaCl}(aq) + \text{H}_2\text{O}(l)]</td>
<td></td>
</tr>
<tr>
<td>Caustic Soda</td>
<td>Sodium hydroxide</td>
<td>NaOH</td>
<td>By passing electricity through concentrated sodium chloride (brine) solution</td>
<td>(i) In detergents and soaps</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2\text{NaCl}(aq) + 2\text{H}_2\text{O}(l)]</td>
<td>(ii) In paper making</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2\text{NaOH}(aq) + \text{Cl}_2(g) + \text{H}_2(g)]</td>
<td>(iii) In bleach manufacture</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(iv) In bauxite purification to extract aluminium</td>
</tr>
<tr>
<td>Washing Soda</td>
<td>Sodium carbonate</td>
<td>Na$_2$CO$_3$.10H$_2$O</td>
<td>By recrystallisation of sodium carbonate in water</td>
<td>(i) Softening hard water</td>
</tr>
<tr>
<td></td>
<td>decahydrate</td>
<td></td>
<td>[\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O}]</td>
<td>(ii) In washing clothes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[\text{Na}_2\text{CO}_3.10\text{H}_2\text{O}]</td>
<td>(iii) In paper, paint and textile industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(iv) Manufacturing glass, borax and caustic soda extract</td>
</tr>
<tr>
<td>Baking Soda</td>
<td>Sodium hydrogen</td>
<td>NaHCO$_3$</td>
<td>On reacting cold concentrated sodium chloride (brine) solution with ammonia and carbon dioxide</td>
<td>(i) Preparing baking powder</td>
</tr>
<tr>
<td></td>
<td>carbonate</td>
<td></td>
<td>[\text{NaCl} + \text{NH}_3 + \text{CO}_2 + \text{H}_2\text{O}]</td>
<td>(ii) Manufacture of soda water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[\text{NaHCO}_3 + \text{NH}_4\text{Cl}]</td>
<td>(iii) In fire extinguishers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(iv) As an antacid in medicine</td>
</tr>
<tr>
<td>Bleaching Powder</td>
<td>Calcium oxychloride</td>
<td>CaOCl$_2$</td>
<td>By passing chlorine gas over dry slaked lime</td>
<td>(i) For bleaching cotton textile</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[\text{Ca(OH)}_2 + \text{Cl}_2]</td>
<td>(ii) For disinfecting drinking water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[\text{CaOCl}_2 + \text{H}_2\text{O}]</td>
<td>(iii) As an oxidising agent in chemical industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(iv) Manufacturing chloroform</td>
</tr>
<tr>
<td>Plaster of Paris</td>
<td>Calcium sulphate</td>
<td>CaSO$_4$.1/2\text{H}_2\text{O}</td>
<td>By heating gypsum at 373K</td>
<td>(i) For making statues, models, toys, etc</td>
</tr>
<tr>
<td></td>
<td>hemihydrate</td>
<td></td>
<td>[\text{CaSO}_4.2\text{H}_2\text{O}]</td>
<td>(ii) For making fireproof materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[373\text{K}]</td>
<td>(iii) For setting fractured bones</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[\text{CaSO}_4.1/2\text{H}_2\text{O} + 1\frac{1}{2}\text{H}_2\text{O}]</td>
<td></td>
</tr>
</tbody>
</table>
ACID, BASES AND SALTS
PRACTICE QUESTIONS FOR FORMATIVE ASSESSMENT I
Q. PAPER

MARKS-30 TIME- 70 MINUTES

Instructions:

- Questions : 1 to 5 – 1 Mark each
- Questions : 6 to 9 – 2 Marks each
- Questions : 10 to 13 – 3 Marks each
- Question 14 – 5 Marks

1) Name the gas formed when sodium hydroxide reacts with zinc.
2) Write the chemical name of baking soda.
3) What happens when gypsum is heated at 373K?
4) Which has a higher pH value 1M HCl or 1M NaOH solution?
5) Name the acid present in vinegar.
6) What is meant by ‘Water of Crystallisation’ of a substance? Describe an activity to show that.
7) Why does tooth decay start when the pH of mouth is lower than 5.5?
8) What is baking powder? How does it make the cake soft and spongy?
9) Give Arrhenius definition of an acid and a base. Choose strong acid and strong base from the following:
   CH₃COOH, NH₄OH, KOH, HCl
10) What happens when nitric acid is added to egg shell? Give the chemical equation.
11) A student prepared solutions of an acid and a base in two separate beakers. She forgot to label the solutions and litmus paper is not available in the laboratory. Since both the solutions are colourless, how will she distinguish between the two?
12) Identify the compound ‘X’ on the basis of the reactions given below. Write the names and chemical formulae of A, B, C

<table>
<thead>
<tr>
<th>Compound X</th>
<th>+ HCl</th>
<th>+ CH₃COOH</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) H₂(g)</td>
<td>(B) H₂O</td>
<td>(C) H₂O</td>
</tr>
</tbody>
</table>

13) How is plaster of Paris prepared? What is its chemical formula? Write is chemical name.
14) a) Define strong acid and weak acid.
    b) Name the acids present in tomato and tamarind.
    c) A student working in the laboratory added some water to a syrupy liquid taken in tube. The tube immediately cracked and the liquid escaped out, that produced blisters on the skin of the student. Why?

HOTS QUESTIONS

Q.1. In one of the industrial process used for manufacture of sodium hydroxide, a gas ‘X’ is formed as by – product. The gas ‘X’ reacts with lime water to give a compound ‘Y’ which is used as a bleaching agent in chemical industry. Identify ‘X’ and ‘Y’ giving the chemical equation of the reaction.

Ans. In the manufacture of sodium hydroxide, hydrogen gas and chlorine gas (X) are formed as by
products. When chlorine gas (X) reacts with lime water, it forms calcium oxy chloride (bleaching powder) Y.

\[ 2\text{NaCl}_{(aq)} + 2\text{H}_2\text{O}_{(l)} \rightarrow 2\text{NaOH}_{(aq)} + \text{Cl}_2\text{O} \rightarrow 2\text{NaOH}_{(aq)} + \text{Cl}_2 + \text{H}_2\text{O}(G) \]

'X' \rightarrow \text{Cl}_2 \text{gas}

Ca(OH)\text{r}_{2} + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}

Q.2. Dry hydrogen chloride gas does not turn blue litmus, whereas hydrochloric acid does. Why?

Ans. In the dry state, hydrogen chloride (HCl) does not release H\text{+} ions. Therefore, it cannot behave as an acid. When dissolved in water, it forms hydrochloric acid. It dissociates to give H\text{+} ions in solution and behaves as an acid.

Q.3. A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identify X, Y, G and Z.

Q. 4 Name the properties responsible for the following uses of baking powder. (i) Baking industry (ii) As an antacid (iii) As soda-acid fire extinguisher.

Q. 5 A dry pellet of common base B, when kept in open absorbs moisture and turns sticky. The compound is also a by product of chlor alkali process. Identify B. what type of reaction occur when B is treated with an acidic oxide? Write a balanced chemical equation for one such solution.

Q. 6 What effect does an increase in concentration of ‘H’ ions in a solution have on the pH of a solution

Q. 7 Fresh milk has a pH Of 6. When it changes to curd, will its pH value increase or decrease? Why?

Q. 8 How does the flow of acid rain water into a river make the survival of aquatic life in a river difficult?

Q. 9 Arrange in the increasing order of their pH values: NaOH solution, Blood, Lemon juice,

Q. 10 Two solutions A and B have pH values of 5 and 8 respectively. Which solution will be basic in nature?

Q. 11 Why does an aqueous solution of acid conduct electricity?

Q. 12 How is alkali different from a base?

FA II

ACIDS, BASES AND SALTS

ORAL QUESTIONS – (Conversation Type)

1. a) Acids are sour in taste. Is it a way to find whether a substance is an acid or a base?
   b) What is other physical test?
   c) Any test with solid acid?
   d) Can you check the evolution of CO\text{2} chemically?

2. a) What are acids?
   b) Can presence of H\text{+} ion in water be estimated? How?
   c) How is pH related to strength of an acid?
   d) Name one strong acid and one weak acid.

3. a) What are salts?
   b) How many types of salts are formed?
   c) What are neutral salts?
   d) What do you mean by acidic salts?
   e) Define basic salts.
f) Give the corresponding acid and base from which sodium carbonate is formed.

4. a) What is common salt?
   b) Why does common salt become moist in rainy season?
   c) How is it used as a freezing mixture?
   d) Name two important laboratory chemicals prepared from common salt on large scale.

5. a) What is washing soda?
   b) Name the process by which sodium carbonate is manufacture.
   c) What are the raw materials used in the preparation of washing soda?
   d) Sodium carbonate is obtained from another carbonate on heating. Name it.

6. a) Name the substance used for bleaching cotton and wood pulp in textiles.
   b) What is its chemical name?
   c) How is it manufactured?
   d) What is slaked lime?
   e) Why does bleaching powder smell of chlorine?

**ORAL QUESTIONS**

1. Name the acid present in lemon juice.
2. What is the chemical difference between washing soda and baking powder?
3. Name the acid present in ant sting.
4. What is the ideal pH of the soil for the healthy growth of a plant?
5. At what pH the mouth teeth start decaying?
6. How is pH of an acid solution affected when it is diluted?
7. Name the gas responsible for extinguishing fire in a soda–acid fire extinguisher.
8. Out of glucose and acetic acid which one will conduct electricity in water?
9. What is the pH of blood?
10. What is the chemical name of the compound which has the property of hardening when mixed with water?

**QUIZ – WHO AM I**

1. I can roughly measure pH value from 0 – 14.
2. I am called antichlor and am used to remove excess chlorine from clothes when treated with bleaching powder.
3. I am a product of gypsum and am used to making chalks and fire proof materials.
4. I am a compound of calcium and can be used for disinfecting drinking water as well as for decolourisation.
5. I give different smell in acid and base solution.
6. I am an oxide capable of showing properties for both acids and bases.
7. I am a covalent compound and conducts electricity in aqueous medium.
8. I am a salt of potassium hydroxide and nitric acid.
9. I am the term used when a solid becomes liquid when exposed to moist air.
10. I am derived from tomato and turn blue litmus into red.

**Value based questions:**

1. A student accidentally spills concentrated H\textsubscript{2}SO\textsubscript{4} on his hand. Before the teacher get to know his friend washed his hand with water and also with soap but the burning sensation on hand still continued. His friend then rubs solid sodium bicarbonate on his hand and then washed with water, finally the burning sensation is relieved.

Answer the following questions based on above situation.

(I) Mention the values shown by students.

(II) Can you recommend any other substance available in the laboratory which can be used
instead of sodium bicarbonate?

(III) Write the chemical reaction involved in the treatment of acid burn with sodium bicarbonate.

2. Anchal loves to eat chips, burgers and chocolates. Her parents always discourage to eat junk food.

Answer the following questions based on above situation:

(a) why do you think Anchal’s parents do not let her do not eat junk food.
(b) what values are they promoting?
(c) how can children be persuaded to eat healthy food?
CHAPTER – 3

METALS AND NON – METALS

GIST OF THE LESSON

Elements are classified broadly into two categories on the basis of properties:

Metals: Iron, Zinc, Copper, Aluminium etc.

Non – metals: Chlorine, Nitrogen, Hydrogen, Oxygen, Sulphur etc.

Apart from metals and non-metals some elements show properties of both metals and non – metals, e.g. Silicon, Arsenic, Germanium. They are called metalloids

Comparison of physical and chemical properties of metals and non – metals:-

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Property</th>
<th>Metals</th>
<th>Non-Metals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physical State</td>
<td>Metals are solid at room temperature. Except mercury and gallium.</td>
<td>Non-metals generally exist as solids and gases, except Bromine.</td>
</tr>
<tr>
<td>2</td>
<td>Melting and boiling points</td>
<td>Metals generally have high m.pt and b.pt except gallium and cesium.</td>
<td>Non-metals have low m.pt and b.pt except diamond and graphite.</td>
</tr>
<tr>
<td>3</td>
<td>Density</td>
<td>Generally high.</td>
<td>Generally low.</td>
</tr>
<tr>
<td>4</td>
<td>Malleability and Ductility</td>
<td>Malleable and ductile.</td>
<td>Neither malleable nor ductile.</td>
</tr>
<tr>
<td>5</td>
<td>Electrical and thermal conductivity</td>
<td>Good conductors of heat and electricity.</td>
<td>Generally poor conductors of heat and electricity except graphite.</td>
</tr>
<tr>
<td>6</td>
<td>Lustre</td>
<td>Possessing shining or lustre.</td>
<td>Do not have lustre except iodine.</td>
</tr>
<tr>
<td>7</td>
<td>Sonorous sound</td>
<td>Give sonorous sound when struck.</td>
<td>Does not give sonorous sound.</td>
</tr>
<tr>
<td>8</td>
<td>Hardness</td>
<td>Generally hard except Na, K</td>
<td>Solid non-metals are generally soft except diamond.</td>
</tr>
</tbody>
</table>

Comparison of Chemical Properties of Metals and Non-metals:-

<table>
<thead>
<tr>
<th>1</th>
<th>Reaction with Oxygen</th>
<th>Metal + Oxygen → Metal oxide</th>
<th>Non-metal + Oxygen → Non-metal oxide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4Na(s) + O_2(g) → 2Na_2O(s)</td>
<td>C + O_2 → CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4Al(s) + 3O_2(g) → 2Al_2O_3</td>
<td>S + O_2 → SO_2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metals form basic oxides</td>
<td>Non-metals form acidic oxides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zn and Al form amphoteric oxides (they show the properties of both acidic and</td>
<td>CO and H_2O are neutral oxides (they are neither</td>
</tr>
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</tbody>
</table>
| 2 | Reaction with water | Metals react with water to form metal oxides or metal hydroxide and H₂ gas is released.  
   2Na(s) + 2H₂O(l) → 2NaOH + H₂(g) + heat |
|   |   | Non-metals do not react with water, steam to evolve hydrogen gas. Because non-metals cannot give electrons to hydrogen in water so that it can be released as H₂ gas. |
| 3 | Reaction with dilute Acids | Metal + Acid → Metal salt + Hydrogen  
   HCl  
   Mg(s) + 2HCl(aq) → MgCl₂(aq) + H₂(g)  
   H₂SO₄  
   2Na(s) + H₂SO₄ → Na₂SO₄(aq) + H₂(g)  
   HNO₃  
   Metal + HNO₃ → H₂ gas is not displaced.  
   **Reason:** HNO₃ is strong oxidizing agent. |
|   |   | Non-metals do not react with acids to release H₂ gas  
   **Reason:** Non-metals cannot loose electrons and give it to Hydrogen ions of acids so that the gas is released.  
   Mn + 2HNO₃ → Mn(NO₃)₂ + H₂  
   H₂ gas from HNO₃ |
| 4 | Reaction with salt solutions | When metals react with salt solution, more reactive metal will displace a less reactive metal from its salt solution.  
   CuSO₄(aq) + Zn(s) → ZnSO₄(aq) + Cu(s) |
|   |   | When non-metals react with salt solution, more reactive non-metal will displace a less reactive non-metal from its salt solution.  
   2NaBr(aq) + Cl₂(g) → 2NaCl(aq) + Br₂(aq) |
| 5 | Reaction with Chlorine | Metal + Chlorine → Metal Chloride  
   Ionic bond is formed. Therefore Ionic compound is obtained.  
   2Na + Cl₂ → 2NaCl |
|   |   | Non-metal + Chlorine → Non-metal Chloride  
   Covalent bond is formed. Therefore covalent compound is obtained.  
   H₂(g) + Cl₂ → 2HCl |
| 6 | Reaction with Hydrogen | Metals react with hydrogen to form metal hydride  
   This reaction takes place only for most reactive metals.  
   2Na(s) + H₂(g) → 2NaH(s) |
|   |   | Non-metals react with hydrogen to form hydrides  
   H₂(g) + S(l) → H₂S(g) |
Properties of ionic compounds

1. **Physical nature**: solid and hard due to strong force of attraction. (generally brittle)
2. **Melting point and boiling point**: have high M.P and B.P, as large amount of heat energy is required to break strong ionic attraction.
3. **Solubility**: soluble in water and insoluble in kerosene and petrol.
4. **Conduction of electricity**: ionic compounds in solid state does not conduct electricity.
   - **Reason**—Ions cannot move due to rigid solid structure. Ionic compounds conduct electricity in molten state or aqueous solutions.
   - **Reason**—Ions can move freely since the electrostatic forces of attraction between the oppositely charged ions are overcome due to heat.

Occurrence of metals.

It occurs in Earth's crust, sea-water

- Minerals
- Ores

Elements or compounds, occurring naturally in the earth's crust

Minerals that contain very high percentage of a particular metal and these metals can be extracted economically on a large scale.

- e.g. Bauxite ore → Aluminium
- Haematite → Iron
Extraction of Metals based on their reactivity. The various steps involved are as follows.

1. **Concentration/Enrichment of Ore**
   - Ore + impurities (gangue)
   - Separation depends on difference in the physical or chemical properties of ore and the gangue.

2. **Metals of high reactivity (Na, K, Mg, Al)**
   - Electrolysis of Molten Ore.
   - Pure Metal

3. **Metals of Medium Reactivity (Zn, Fe, Pb)**
   - Carbonate Ore \((ZnCO_3)\)
     - Calcination (heat in absence of air)
     - Oxides of Metal
     - Reduction to Metal using carbon.
     - Purification of Metal (electrolytic method)

4. **Metals of low Reactivity (Cu, Ag)**
   - Sulphide Ores \((CuFeS, CuS, AgS)\)
     - Roasting (done for sulphide ores only)
     - Metal Oxide
     - Reduction by C
     - Metal (impurities)
     - Refining to get Pure metal

<table>
<thead>
<tr>
<th><strong>Calcination</strong></th>
<th><strong>Roasting</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>It is done for carbonate ores. Heating of ores in absence of oxygen. (ZnCO_3(s) \rightarrow_{heat} ZnO(s) + CO_2(g)).</td>
<td>It is done for sulphide ores. Heating of S. ore in presence of oxygen. (2ZnS(s) + 3O_2(g) \rightarrow_{heat} 3ZnO(s) + SO_3(g)).</td>
</tr>
</tbody>
</table>

**Refining of Metals**
To obtain pure metal electrolytic refining of metals is done.
MIND MAP

PHYSICAL PROPERTIES
- Solid
- High M.P & B.P
- High density
- Malleable & ductile
- Good conductor of heat and electricity

CHEMICAL PROPERTIES
- Metal + O₂ → metal oxide
- Metal + H₂O → metal hydroxide/Oxide
- Metal + dil. Acid → salt + H₂
- Metal + Cl₂ → metal chloride
- Metal + H₂ → metal hydride

PHYSICAL PROPERTIES
- Solid, liquid and gas
- Not malleable & ductile
- Low M.P & B.P
- Poor conductor of heat electricity

CHEMICAL PROPERTIES
- Non-metal + O₂ → Non-metal oxide
- Non-metal + steam → H₂
- Non-metal + acid → no reaction
- Non-metal + chlorine → non-metal chloride
- Non-metal + hydrogen → non-metal hydride
Reactivity Series (or Activity Series) of Metals

<table>
<thead>
<tr>
<th>Metal</th>
<th>Symbol</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium</td>
<td>K</td>
<td>Most reactive metal</td>
</tr>
<tr>
<td>Sodium</td>
<td>Na</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>Ca</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>Mg</td>
<td></td>
</tr>
<tr>
<td>Aluminium</td>
<td>Al</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>Zn</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>Fe</td>
<td></td>
</tr>
<tr>
<td>Tin</td>
<td>Sn</td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>Pb</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>Cu</td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td>Hg</td>
<td></td>
</tr>
<tr>
<td>Silver</td>
<td>Ag</td>
<td></td>
</tr>
<tr>
<td>Gold</td>
<td>Au</td>
<td>Least reactive metal</td>
</tr>
</tbody>
</table>

These metals are more reactive than hydrogen.

These metals are less reactive than hydrogen.

Decreasing chemical reactivity.
METALS AND NON – METALS

PRACTICE QUESTIONS FORMATIVE ASSESSMENT I
Q. PAPER

MARKS-30 TIME- 70 MINUTES

Instructions:
• Questions : 1 to 5 – 1 Mark each
• Questions : 6 to 9 – 2 Marks each
• Questions : 10 to 13 – 3 Marks each
• Question 14 – 5 Marks

1) Which metal other than mercury is liquid at room temperature?
2) Why the item made of silver turns black when exposed to air?
3) Which non – metal is lustrous?
4) What is an amalgam?
5) What is the nature of oxides of metal?
6) Give reasons for the following:
   a) Na, K and Ca metals form hydrides by combination with hydrogen gas, but most other metals do not.
   b) Metals conduct electricity.
7) Write the equations for the reactions of:
   a) Iron with steam.
   b) Calcium and potassium with water.
8) What is activity series? How does it help us in predicting the relative reactivities of various metals?
9) (a) What is the difference between sodium atom and sodium ion?
    (b) Why are ionic compounds usually hard?
10) a) Write electron dot structure for sodium and oxygen.
    b) Show the formation of Na₂O by electron transfer.
    c) What are the ions present in these compounds?
11) Write three properties of ionic compounds.
12) Explain how a metal low in the activity series can be extracted. Write suitable example.
13) Give reasons:
    a) Platinum, gold and silver are used to make jewellery.
    b) Sodium, potassium and lithium are stored under oil.
    c) Aluminium is a highly reactive metal; still it is used to make utensils for cooking.
14) Name the following:
    a) A non – metal that is a good conductor of electricity.
    b) A metallic oxide which cannot be reduced by coke.
    c) A metallic oxide which is amphoteric in nature.
    d) A non – metallic oxide which is neutral.
    e) Principal ore of aluminium.
HOTS QUESTIONS (SOLVED / UNSOLVED)

Q.1 a) What are amphoteric oxides? Choose the amphoteric oxides from amongst the following:
    Na₂O, ZnO, Al₂O₃, CO₂, H₂O
    b) Why is it that non metals do not displace hydrogen from dilute acid?
    Ans.
    a) The oxides which are acidic as well as basic in nature are called amphoteric oxides. ZnO and Al₂O₃ are amphoteric oxides.
    b) Non metals can not loose electrons so that H⁺ ions become hydrogen gas.

Q.2 What is anodizing? What is its use?
   Ans. The process of forming thick oxide layer of aluminium oxide that makes it resistant to further corrosion.

Q.3 What is Aqua regia? What is its use?
   Ans. It is a mixture of concentrated HCl and concentrated HNO₃ in the ratio 3:1. It can dissolve gold and platinum.

Q.4 Give reason: Aluminium is highly reactive metal, but it is used to make utensils for cooking.

Q.5 Explain why (a) Iron articles are frequently painted. (b) Iron sheets are coated with Zinc layer.

Q.6 On adding dilute HCl acid to copper oxide powder, the solution formed is blue – green. Predict the new compound formed which imparts a blue – green colour to the solution? Write its equation.

Q.7 Name the property of metal used in the following cases- (i) Aluminium foil (ii) Metal jewellery (iii) Cable wires (iv) Bells

Q.8 How can you prove that Zinc is more reactive than Copper?

Q.9 Draw and explain the electrolytic refining of impure Copper.

Q.10 Why is Aluminium extracted from Alumina by electrolytic reduction and not by reducing it with Carbon?

Q.11 Write 3 points of difference between Calcination & Roasting?

Q.12 Write 5 points of difference between Ionic compound and covalent compound.

Q.13 What is thermit reaction? Give its one use.

Q.14 ‘M’ is an element which is out of Cu, Fe, Al, Na. it shows following properties:
    (a) One of its ore is rich in M₂O₃.
    (b) M₂O₃ is not affected by water.
    (c) It corrodes easily.
    (d) It forms two chloride MCl₂ and MCl₃. Identify ’M’

Q.15 Magnesium when reacts with hot water, starts floating. Why?

Q.16 Carbon can reduce copper oxide to copper but not CaO to Ca. Why?

FA II

METALS AND NON – METALS

ORAL QUESTIONS

1. Name the metal which is a liquid.
2. Name the non – metal which shows lustre.
3. Name the lightest metal.
4. Name the metal with highest density.
5. Name the property of the metals by virtue of which these can be beaten into sheets
6. Name the property of the metals by virtue of which these can be drawn into wires.
7. Name the element which is kept in water.
8. Name the metal used for galvanisation of iron.
9. Mercury is liquid and a good conductor of heat. How is this property utilized?

**QUIZ – WHO AM I**

1. I am a property of metals which appears at lower temperatures.
2. I am noble conductor of heat and electricity.
3. Though I get corroded in atmosphere but still find wide applications for making kitchen utensils.
4. I am a metal but very soft and cannot be kept in the open.
5. I am called a series and play a significant role when a metal reacts with solutions of other metal salts.
6. Scientists / Industrialists use me to extract metals profitably and economically.
7. I am a process to refine metals of high reactivity.
8. I am a process associated with wasting away of metals by the action of atmospheric gases and moisture.
9. I am homogenous and not a compound though my formation least to altering the properties of metals involved.
10. We belong to the same category of elements but still combine to form molecules / compounds.

**Value based questions:**
1. Shivam helps his friend Rohan in studies. Shivam is topper in the class. Rohan also improved his performance. They like each other and they are good friends.
   (a) What values are proposed by Shivam?
   (b) What type of bond exist between Rohan and Shivam?
   (c) Why are ionic bonds strong?
2. Mrs. Sharma has gone to the jewellers to buy jewellery. She asked the jeweller if the jewellery is made up of pure gold. The jeweller assured her that it is 100% gold and nothing has been mixed in it. Mrs Sharma is happy and buys the necklace.
   Answer the following question based on the above information:
   (a) Was the jeweller right in saying that the necklace is made up of 100% gold?
   (b) What values are promoted by jeweller?
   (c) What precaution you take while purchasing the gold jewellery?
   (d) Why does govt. insist on purchasing hallmarked jewellery?
CHAPTER 6 - LIFE PROCESSES

KEY CONCEPTS & GIST OF THE LESSON

- Life processes – The processes that are necessary for an organism to stay alive. Eg. Nutrition, respiration, etc.
- Criteria of life- (i) Growth  (ii) Movement
- Nutrition- The process in which an organism takes in food, utilizes it to get energy, for growth, repair and maintenance, etc. and excretes the waste materials from the body.
- Types of nutrition
  1. **Autotrophic nutrition** (Auto =self: trophos = nourishment) E.g. Plants, Algae, blue green algae (Cyanobacteria).
     - Process – Photosynthesis (Photo=light; Synthesis= to combine)
     - Raw materials- (i) Carbon dioxide (ii) Water
     - Equation- sunlight
     - $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
     - Chlorophyll (Glucose)
     - Energy conversion- Light/Solar energy to Chemical energy
     - Role off Chlorophyll- To trap the sun’s energy for photosynthesis
     - Factors- (i) Carbon dioxide (ii) Water(iii) Light (iv) Temperature
     - Events/ Steps of photosynthesis–
       (i) Absorption of light energy by chlorophyll
       (ii) Conversion of light energy to chemical energy & Splitting of water molecule into Hydrogen & oxygen
       (iii) Reduction of Carbon dioxide to Carbohydrate
     - Gaseous exchange- (i) Gas used- Carbon dioxide
       (ii) By product - Oxygen
     - Source of raw materials-
       (i) Carbon dioxide –Land plants- Air, Aquatic plants- Water
       (ii) Water & Minerals - Soil

  2. **Heterotrophic nutrition** (Hetero =others: trophos = nourishment) Eg. Animals, plants lacking chlorophyll like fungi.
     (a) **Saprophytic nutrition**: Organisms feeds on dead decaying plants or animals material. E.g. Fungi, Bacteria
     (b) **Parasitic nutrition**: Organisms obtain food from the body of another living (host)
       - Endoparasite: Parasite lives inside the body of the host e.g. tapeworm, roundworm.
       - Exoparasite: Parasite lives on the body of the host. E.g. lice, leech.
     - Note- The parasite benefits while the host is usually harmed e.g. Cuscuta-plant parasite (amarbel), plasmodium (malarial parasite).
     (c) **Holozoic nutrition**: Organism (mostly animals) take in whole food and then digest it into smaller particles with enzyme. Eg.Amoeba, Paramoecium. Animals, human beings.
       - Steps in Holozoic nutrition
         (i) Ingestion: taking in of food.
         (ii) Digestion: breaking down of complex food into simpler, absorbable form.
         (iii) Absorption : absorption of digested food nutrients like amino acids, glucose, fatty acid and glycerol.
         (iv) Assimilation: Utilization of digested food from the body.
         (v) Egestion: Removing undigested food from the body.
Nutrition in human beings

- **Alimentary canal**
  - Mouth → Oesophagus → Stomach → Small intestine → Large intestine
- **Important gland/juices**

(Refer to figure 6.6 page no.97 of N.C.E.R.T Text book)

<table>
<thead>
<tr>
<th>Organ</th>
<th>Gland</th>
<th>Enzyme/Juice</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouth</td>
<td>Salivary glands</td>
<td>Salivary Amylase</td>
<td>Converts starch into sugar</td>
</tr>
<tr>
<td>Stomach</td>
<td>Gastric glands</td>
<td>Gastric juice-</td>
<td>(a) Kills harmful bacteria that enters with the food.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(i) Hydrochloric acid →</td>
<td>(b) Makes the medium acidic for activation of pepsin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) Pepsin →</td>
<td>(c) Regulate the cardiac sphincter of stomach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) Mucus →</td>
<td>Digests proteins</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Protects the inner lining of the stomach from the corrosive action of Hydrochloric acid.</td>
</tr>
<tr>
<td>Small intestine</td>
<td>1) Liver</td>
<td>(i) Bile juice →</td>
<td>(a) Makes the medium alkaline for the activation of trypsin.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) Breaks down large fat molecules into smaller globules so that enzymes can act upon them(emulsification)</td>
</tr>
<tr>
<td></td>
<td>2) Pancreas</td>
<td>(ii) Pancreatic Juice</td>
<td>Converts Carbohydrates to glucose</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Converts Proteins to Amino acids</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Converts Fats into Fatty acids &amp; Glycerol</td>
</tr>
</tbody>
</table>

- **Peristaltic movements** - Rhythmic contraction of muscles of the lining of Alimentary canal to push the food forward.
- **Sphincter muscle** - Helps in the exit of food from the stomach.

- **Villi** - Small finger like projections on the walls of-
  - (vi) Small intestine - To increase the surface area for the absorption of food.
  - (vii) Large intestine - For absorption of water.

- **Respiration** - The process by which digested food is broken down with the help of Oxygen to release energy (oxidation of food)
  - Types of respiration - (i) Aerobic respiration (ii) Anaerobic respiration
### Aerobic respiration

1. Takes place in presence of Oxygen.
2. End products- Carbon dioxide & Water
3. More energy is released.
4. Takes place in Cytoplasm & Mitochondria
5. Complete oxidation of glucose takes place.
6. It occurs in most organisms.
7. Equation:
   \[
   \text{Glucose} \rightarrow \text{Pyruvate} \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{Energy (38 ATP)}
   \]

### Anaerobic respiration

1. Takes place in absence of Oxygen.
2. End products- Ethanol & Carbon dioxide or Lactic acid.
3. Less energy is released.
4. Takes place in only in Cytoplasm.
5. Incomplete oxidation of glucose takes place.
6. It occurs in certain bacteria, yeast & certain tissues of higher organisms. E.g. In humans during vigorous exercise, when the demand for Oxygen is more than the supply, muscle cells respire anaerobically for some time.
7. Equation:
   - In Yeast-(Alcoholic fermentation)
   \[
   \text{Glucose} \rightarrow \text{Pyruvate} \rightarrow \text{Ethanol} + \text{CO}_2 + \text{Energy}
   \]
   - In muscle cells – (lactic acid fermentation)
   \[
   \text{Glucose} \rightarrow \text{Pyruvate (3 Carbon molecule)} \rightarrow \text{Lactic acid} + \text{Energy}
   \]

- Some common features of Respiratory organs-
  (i) Large surface area- for greater rate of diffusion of respiratory gases.
  (ii) Thin permeable walls – to ensure easy diffusion & exchange of gases.
  (iii) Extensive blood supply-

- Respiratory organs are richly supplied with blood vessels for quick transport of gases.

- Gaseous exchange in plants-
  - Process – Diffusion
  - Direction of diffusion depends on-
    (i) Environmental conditions
    (ii) Requirement of the plant.
  - Day time- Carbon dioxide given out during respiration is used for photosynthesis. Therefore only Oxygen is released, which is a major activity during the day.
  - Night time – Only respiration takes place. Therefore only Carbon dioxide is released, which is a major activity during the night.

- Gaseous exchange in animals-
  - Terrestrial animals- take Oxygen from the atmosphere.
  - Aquatic animals- take Oxygen dissolved in water. (Oxygen content is low in water, therefore they breathe faster.

- Human Respiratory system-
  - External nostrils →
  - Nasal cavity → Trachea → Bronchi → Bronchioles → Alveoli
  - Rings of cartilage present in the throat ensure that the trachea (air passage) does not collapse when there is less air in it.
  - Lungs – (i) Present in the thoracic cavity.
(ii) They are spongy, elastic bags consisting of Bronchi, Bronchioles and Alveoli
Refer to figure 6.9 page no. 104 of N.C.E.R.T Text book)

- Respiration occurs in two phases-
- (i) External - Breathing, which is a mechanical process. (ii) Internal -
  Cellular respiration
- Mechanism of breathing – It includes : (i)Inhalation (ii) Exhalation
- Exchange of gases-
  - Unicellular organisms- By Diffusion
  - Animals- (i) As the body size is large, diffusion alone is not enough.
    (ii) Respiratory pigments also required.
    (iii) Respiratory pigment in human beings is Haemoglobin,
      which is present in red blood corpuscles.
    (iv) It has very high affinity for Oxygen.
    (iv) Carbon dioxide is more soluble in water than Oxygen, so it
      Gets dissolves in blood and is thus transported.

Transportation
- Transportation in human beings-
  - Blood- (i) It is a fluid connective tissue.
    (ii) Components- (1) Fluid medium- Plasma
      (2) Red blood corpuscles
      (3) White blood corpuscles
      (4) Platelets suspended in plasma
    (iii) Plasma transports food, Oxygen, Carbon dioxide,
      Nitrogenous wastes, etc.
  - Functions of blood- (i) Transport of respiratory gases.
    (ii) Transport of nutrients.
    (iii) Transport of waste products.
    (iv) Defence against infection
  - Blood vessels- (i) Arteries (ii) Veins (iii) Capillaries

<table>
<thead>
<tr>
<th>Arteries</th>
<th>Veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thick walled.</td>
<td>1. Thin walled.</td>
</tr>
<tr>
<td>3. Carry blood away from the heart.</td>
<td>3. Carry blood to the heart.</td>
</tr>
<tr>
<td>5. Valves absent.</td>
<td>5. Valves present</td>
</tr>
<tr>
<td>Circulatory system</td>
<td>Heart</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
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<td></td>
<td></td>
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</tbody>
</table>

- Heart- (Refer to figure 6.10 page no. 106 of N.C.E.R.T Text book)
  (i) It is a muscular organ, which works as a pump in the circulatory system.
  (ii) It is the size of our fist.
  (iii) It has two sides, which are separated by a partition so that the oxygenated and deoxygenated blood do not get mixed up.
  (iv) It has four chambers-
    - Two upper chambers called Atria.
    - Two lower chambers called Ventricles.

- Working of heart-
  **Left side-** (i) Left atrium relaxes & the Oxygenated blood enters it from the lungs through the pulmonary vein.
  (ii) Left atrium contracts & the blood enters the left ventricle through the valve (Bicuspid or mitral valve)
  (iii) Left Ventricle contracts and the blood is pumped into the largest artery ‘Aorta’ and is carried to all parts of the body.

  **Right side-** (i) Right atrium relaxes & the deoxygenated blood from the body enters it through superior and inferior Vena cava.
  (ii) Right atrium contracts & the blood enters the right Ventricle through the valve (Tricuspid Valve)
  (iii) Right Ventricle contracts and the blood is pumped into the Pulmonary artery and is carried to lungs.

- Valves- Unidirectional to prevent the backward flow of blood.
- Pulmonary vein is the only vein that carries Oxygenated blood (from lungs to left side of the heart).
- Pulmonary artery is the only artery that carries Deoxygenated blood (from right side of the heart to lungs).
- Double circulation in man - because the blood passes through the heart twice in one complete cycle of the circulation.
- Capillaries - (i) Form the connection between arteries & veins.  
  (ii) Walls are one cell thick only for easy exchange of blood.
- Platelets - Plug the leaks of arteries and veins by clotting the blood.
- Lymph - Extracellular fluid similar to plasma but colourless with lesser protein.
- Function of lymph - (i) Transportation of digested & absorbed fats from the small intestine.  
  (ii) Drains excess fluid from the intercellular spaces back in the blood.
- Higher animals - E.g., birds, mammals.  
  (i) Oxygenated blood & Deoxygenated blood are completely separate for efficient Oxygen supply.  
  (ii) This is to fulfill higher energy needs and to maintain body temperature (warm blooded animals).
- Amphibians & reptiles - have 3 chambered heart where little mixing of Oxygenated blood & Deoxygenated blood takes place. Therefore their body temperature varies with the temperature of the environment. (cold blooded animals)
- Transportation in plants -
  - Plants need less energy needs - because they do not move and therefore have a slow transport system.
  - Transport of water -  
    (i) Takes place by xylem tissue present in roots, stem, leaves and is therefore interconnected.  
    (ii) Root cells take up ions from the soil, which creates a concentration difference between root and soil. Column of water therefore rises upwards.
  - In very tall plants - transpiration creates a suction pressure, which pulls the water upwards.
  - Importance of transpiration -  
    (i) Helps in upward movement of water in plants.  
    (ii) It regulates the temperature in plants.

- Transport of food -  
  (i) Takes place by phloem tissue.  
  (ii) Movement of prepared food in plants is called translocation.

- Excretion - The biological process of removal of harmful metabolic wastes in living organisms.
- Excretion in human beings -  
  (Refer to figure 6.13 page no. 110 of N.C.E.R.T Text book)  
  - Organs of excretory system - (i) Kidneys  
    (ii) Ureters  
    (iii) Urinary bladder  
    (iv) Urethra
  - Kidneys -  
    (i) Two in number  
    (ii) Bean shaped
(iii) Present in abdomen on either side of the backbone
(iv) Basic unit is nephron.
   a. Glomerulus- Group of capillaries (cluster) present in Bowman’s capsule to receive blood from renal artery and filters it.
   b. Bowman’s capsule- Cup shaped structure, which contains glomerulus.
   c. Convoluted tubule-is long and reabsorbs vital nutrients like glucose, amino acids, salts, urea and water.

Note-Vital functions of kidneys- (a) Filtration & removal of Nitrogenous wastes (Urea, Uric acid)
   (b) Reabsorption of vital nutrients
      ▪ Ureters- Transport the urine formed in the kidneys to the urinary bladder.
      ▪ Urinary bladder- Muscular bag like structure to store urine.
      ▪ Urethra- Helps in removal of urine when the Urinary bladder is full.
      ▪ Artificial kidney- Principle: Dialysis

❖ Excretion in plants-
   ▪ Gaseous wastes- CO₂ in respiration & O₂ in photosynthesis are removed by the process of diffusion.
   ▪ Excess water- is removed by transpiration.
   ▪ Other wastes- (i) Stored in cellular vacuoles or in leaves, which fall off or as gums, resins, etc. in old xylem.
     (ii) Excreted in soil.

❖ Important diagrams-
  1. Open & close stomata
  2. Steps of nutrition in Amoeba
  3. Alimentary canal of human beings/ Digestive system of human beings
  4. Respiratory system of human beings
  5. Structure of heart.
  6. Excretory system of human beings
  7. Structure of nephron

❖ Important activities-
  1. To prove that chlorophyll is necessary for photosynthesis.
  2. To prove that Carbon dioxide is necessary for photosynthesis.
  3. To prove that light is necessary for photosynthesis.
  4. To prove that product of fermentation is Carbon dioxide.
  5. To prove that leaves lose water by transpiration.
  6. To study the action of salivary amylase on starch.
  7. To demonstrate that Carbon dioxide is present in exhaled air.
  8. To demonstrate the process of transpiration in plants.
Instructions:
• Questions : 1 to 5 – 1 Mark each
• Questions : 6 to 9 – 2 Marks each
• Questions : 10 to 13 – 3 Marks each
• Question 14 – 5 Marks

1. Name the site of photosynthesis.
2. What is osmoregulation?
3. Name the excretory unit of kidney.
4. What is neuron?
5. Name the term for transport of food from leaf to other parts of the plant.
6. Draw the diagram of cross – section of a leaf and label the following in it:
   a. Chloroplast
   b. Guard cell
   c. Lower epidermis
   d. Upper epidermis
7. What do you mean by double circulation of blood?
8. Explain why Bile juice does not contain any digestive enzymes, yet it is essential for digestion.
9. How would non – secretion of hydrochloric acid in our stomach affect food digestion? Explain.
10. How does nutrition takes place in Amoeba?
11. Draw a diagram of cross section of human heart. Show the path of flow of blood with the help of arrows.
12. How water is transported upwards in plants?
13. Describe the functioning of nephrons.
   b. Label the following – oesophagus, liver, gall bladder, and duodenum.
   c. What is the function of liver in human body?

HOTS QUESTIONS (SOLVED / UNSOLVED)

Q1. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?
Ans. The mammals and birds are warm-blooded animals which have high energy needs because they constantly require energy to maintain their body temperature. It is necessary to separate oxygenated blood and deoxygenated blood in mammals and birds because such a separation allows a highly efficient supply of oxygen to the body cells which is required for producing a lot of energy needed by them.

Q2. How is small intestine designed to absorb digested food?
Ans. The inner surface of small intestine has millions of tiny, finger like projections called Villi. The presence of villi gives the inner walls of the small intestine a very large surface area. The large inner surface area of small intestine helps in the rapid absorption of the digested food.
LIFE PROCESSES
ORAL QUESTIONS

1. Do plants also need oxygen?
2. How does food passes through alimentary canal?
3. What regulate the exit of food from the stomach into small intestine?
4. In which part of the alimentary canal food is completely digested absorbed?
5. In which cell organelle breakdown of pyruvate takes place using oxygen?
6. Which structures stop backward flow of blood in atria and ventricles?
7. The filtered urine is collected in which part of nephron?
8. Which part of the plant excretes some waste substances into the soil?
9. Name the process used to remove urea from the blood.
10. The process by which evaporation of water from the plants mainly through the stomata.

QUIZ

1. Digestion of starch in humans takes from which organ?
2. Absorption of energy takes place in sunlight by the pigment.
3. Is chloroplast is non – lining structure?
4. What is the function of amylase?
5. Name the organ responsible for respiration in fish.
6. Which is more harmful urea or ammonia?
7. Which contains less nitrogenous wastes, the renal vein or renal artery?
8. Draw the diagram of respiratory system or human digestive system.

VALUE BASED QUESTIONS
1. you were standing on the road side, when you saw a family travelling in acar. An ambulance carrying a patient for dialysis was travelling behind the car. The driver of the car brought his car to one side of the road and allowed the ambulance to overtake.
   (a) what value was shown by the driver?
   (b) what is dialysis?
   (c)what are the vehicles whom we should give pass while driving?
2. an organ donation camp was organised by govt. in your locality to encourage people for organ donation but the camp was not very successful. The camp hardly received any response.
   (a) what values are possessed by people who wish to donate their organs.
   (b) will organ donation agreement affect the donar?
   (c) why did the organ donation camp failed?
CHAPTER 7 – CONTROL & COORDINATION

KEY CONCEPTS & GIST OF THE LESSON

- Coordination-The working together of various organs of the body of an organism in a proper manner to produce appropriate reaction to a stimulus is called coordination.

- Stimulus- The changes in the environment to which an organism responds and reacts is called Stimulus

- Control & coordination in animals- takes place by (i) Nervous system & (ii) Endocrine system

- Nervous system
  
  Stimulus → Receptor organ → Sensory nerve → Brain/Spinal cord
  
  Response ← Effector organ ← Motor nerve

- Endocrine system
  
  Stimulus → Endocrine organ → Secrete hormone → Hormone in blood
  
  Response ← Target organ

- Parts of the Nervous system – (i) Brain (ii) Spinal cord (iii) Nerves (Neurons)

- A Neuron is the structural & functional unit of Nervous system

- Parts of a neuron- (i) Dendrites (ii) Cell body (iii) Axon (iv) Nerve ending

- Synapse- Space/junction between two adjacent nerves is called Synapse.

- Passing of information takes place –(i) By Electric impulse (inside the neuron) and (ii) In the form of chemicals (At synapse)

- Reflex action- Spontaneous, involuntary and automatic response to a stimulus to protect us from harmful situations. Eg. On touching a hot object unknowingly we instantly withdraw our hand.

- Reflex arc- The pathway of the reflex action is called Reflex arc.
  
  Stimulus → Receptor organ → Sensory nerve → Spinal cord → Effector organ → Response
  
  Refer to figure 7.2 page no. 117 of N.C.E.R.T Text book

- Nervous system-
  
  (1) Central Nervous system (CNS)
  
  (i) Brain (ii) Spinal Cord

  (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 Text book

<table>
<thead>
<tr>
<th>Fore brain</th>
<th>Mid brain</th>
<th>Hind brain</th>
</tr>
</thead>
</table>

44
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. Controls reflex of eyes & ears

Hind brain- Connects the Fore brain & Hind brain
Cerebellum – Controls & coordinates muscular movements, maintaining body posture and equilibrium.
Pons - Acts as a bridge between brain & spinal cord
Medulla oblongata- Controls involuntary actions like blood pressure, salivation, vomiting, etc.

Spinal cord- Cylindrical or tubular structure extending downwards from the Medulla oblongata.

Protection of the brain & the spinal cord-
(i) Bony outer covering: skull for the brain & vertebral column for the spinal cord.
(ii) Cerebrospinal fluid present in between the three membranes.

Action caused by Nervous tissue
Nervous tissue → Brain Muscles → Causes action

Path or action-
Nerve impulse → Muscle cell → Changes shape due to special proteins
↓
Action caused ← Shorter form of muscles ← Change shape & arrangement of cell

Chemical communication by hormones- (advantages)
(i) Electrical impulses have their limitations because they reach only those cells connected to the nervous tissue.
(ii) Also the nerve cells cannot generate & transmit impulses continuously.
(iii) Electrical communication is slower.

Hormones- (i) are chemical messengers 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.

Hormones are secreted by- Endocrine glands

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Endocrine glands</th>
<th>Exocrine glands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ducts absent</td>
<td>Ducts present</td>
</tr>
<tr>
<td>2.</td>
<td>Secrete hormones</td>
<td>Secrete enzymes</td>
</tr>
<tr>
<td>3.</td>
<td>Secreted in blood</td>
<td>Secreted in duchs of glands</td>
</tr>
</tbody>
</table>
4. Situated away from the site of action  
Situated near the site of action

- Some glands which act as both endocrine & exocrine

<table>
<thead>
<tr>
<th>Gland</th>
<th>Endocrine function</th>
<th>Exocrine function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td>Produces insulin &amp; Glucagon hormone.</td>
<td>Produces digestive enzyme. (pancreatic amylase, lipase, trypsin)</td>
</tr>
<tr>
<td>Testes</td>
<td>Produces hormone Testosterone</td>
<td>Produces male gametes (reproductive cells)</td>
</tr>
<tr>
<td>Ovaries</td>
<td>Produces hormone Oestrogen</td>
<td>Produces female gametes (reproductive cells)</td>
</tr>
</tbody>
</table>

- 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>Endocrine gland</th>
<th>Hormone</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pituitary gland</td>
<td>Growth hormone</td>
<td>Body growth, development of bones &amp; muscles (If excess- Gigantism)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(If less- Dwarfism)</td>
</tr>
<tr>
<td>Thyroid gland</td>
<td>Thyroxine</td>
<td>Regulates carbohydrate, protein &amp; fat metabolism (If less- Goitre)</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Produces insulin &amp; Glucagon hormone</td>
<td>Regulates blood sugar levels (if less diabetes is caused)</td>
</tr>
<tr>
<td>Testes in males</td>
<td>Produces hormone Testosterone</td>
<td>Development of secondary male characters like deep voice, beard, etc.</td>
</tr>
<tr>
<td>Ovaries in females</td>
<td>Produces hormone Oestrogen</td>
<td>Development of secondary female characters like mammary glands, menstrual cycle, maintenance of pregnancy.</td>
</tr>
</tbody>
</table>

- 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
- Nastic movements -The movements of plants independent of stimuli are called nastic movements. E.g.- Touch me not plant leaves close when touched(Mimosa pudica)
- Plant hormones (Phytohormones)
  2. Gibberellins- Help in vegetative growth
  3. Cytokinins- Promote cell division
  4. Abscissic acid - Inhibits growth & causes wilting (falling) of leaves
- Important diagrams- 
- Important activities- 
  1. To compare taste of sugar and food with open & blocked nostrils.
  2. To demonstrate the response of a plant to the direction of light.
  3. To demonstrate hydrotropism.
MIND MAP

CONTROL AND CO-ORDINATION

ANIMALS

NERVOUS SYSTEM

REFLEX ACTION

REFlex arc

CNS

Brain, spinal cord

PNS

Neuron

Sensory

Motor

ENDOCRINE SYSTEM

Hormone secreted by endocrine glands

PLANTS

Plant movement

Tropic

Direction of stimulus

Nastic

Independent of stimulus

Phytohormones

Growth promoting

Auxins, Gibberellins, Cytokinins

Growth inhibiting

Aba
CONTROL AND CO-ORDINATION
FORMATIVE ASSESSMENT I
Q. PAPER

MARKS-30
TIME- 70 MINUTES

Instructions:
- Questions : 1 to 5 – 1 Mark each
- Questions : 6 to 9 – 2 Marks each
- Questions : 10 to 13 – 3 Marks each
- Question 14 – 5 Marks
1. Which endocrine gland is unpaired?
2. Which part of the brain controlled posture and balance of the body?
3. Where in a neuron, conversions of electrical signal to a chemical signal occur?
4. Which gland secretes digestive enzyme as well as hormones?
5. We suddenly withdraw our hand when a pin pricks. Name the type of response involved in this action.
6. What is a tropic movement? Explain with an example.
7. What will happen if intake of iodine in our diet is low?
8. Draw the structure of neuron and label the following on it:
   a. Nucleus
   b. Dendrite
   c. Cell body
   d. Axon
9. Why are some patients of diabetes treated by giving injections of insulin?
10. Why is the flow of signals in a synapse from axonal end of one neuron but not the reverse?
11. What are reflex actions? Explain reflex arc.
12. What are the major parts of the brains? Mention the functions of each.
13. How does chemical co-ordination take place in animals?
14. 
   a. Name the various plant hormones.
   b. Give physiological effects of hormones on plant growth and development.

HOTS QUESTIONS (SOLVED / UNSOLVED)

Q1. Which hormone:
1. prepares the body for action?
2. controls the amount of sugar (glucose) in blood?
3. brings about changes in boys at puberty?
4. brings about changes in girls at puberty?
Ans. a) Adrenaline  b) Insulin
   c) Testosterone  d) Oestrogen
Q2. i) Name the hormone produced by thyroid gland.
   ii) Which mineral is necessary for the synthesis of the above hormone?
iii Name the disease suffer from the deficiency of this mineral.
iv Write the function of the above hormones?

Q3. What is chemotropism? Give one example of chemotropism.

**ORAL QUESTIONS**

1. What is the basic unit of nervous system?
2. How do neuron conduct message from brain to other parts?
3. What do you mean by CNS?
4. What are its main parts?
5. Which part controls reflex action?
6. What are endocrine glands?
7. What is the secretion of endocrine gland called?
8. Name a gland of human body which secretes both enzymes and hormone.
9. Which plant hormone helps in cell division?
10. Which hormones help on stem elongation?

**QUIZ**

1. Which system of our body is made of organised network for conducting information in the body?
2. Which part of the neuron receives information?
3. What is the name of the neuron which remains between the sensory neuron and the motor neuron? Where is it located?
4. Which part of the brain helps us to do activities like riding a cycle and walking in a straight line?
5. What are two major types of muscles we have?
6. What causes change in leave of ‘touch me not’ plant?
7. Which hormone helps us to prepare to combat adverse condition?
8. Name a female sex organ which produces gametes as well as female hormone.

**VALUE BASED QUESTIONS**

Q1. Mr. Bora has a habit to iron his shirt every morning before going to office. One morning he forgot to keep the hot iron in proper place and left for office. His two years old daughter touched the iron and her hand got burnt. Mrs. Bora immediately put the hand of her daughter under a running tap as a first aid.
   (a) What value was shown by Mrs. Bora?
   (b) How do we react when we touch a hot object?
   (c) What other materials commonly cause burn injury?

Q2. Few children in your village have complain of swelling neck. More and more children complained about swollen necks every month. A villager Hari Singh in superstitious and he thinks that the village is cursed by a ‘devil’. Shyam is an another villager who thinks it is a disease which needs consultation with the doctor.
   (a) do you agree with Hari Singh?
   (b) what can be the reason behind the swollen necks of the young children? how can the problem be overcome?
   (c) what social change is required in the village to make it free from blind faith
   (d) what values are shown by Shyam?
**ELECTRICITY**

**GIST OF THE LESSON**

1. **Positive and negative charges:** The charge acquired by a glass rod when rubbed with silk is called positive charge and the charge acquired by an ebonite rod when rubbed with wool is called negative charge.

2. **Coulomb:** It is the S.I. unit of charge. One coulomb is defined as that amount of charge which repels an equal and similar charge with a force of $9 \times 10^9$ N when placed in vacuum at a distance of 1 meter from it. Charge on an electron $= 1.6 \times 10^{-19}$ coulomb.

3. **Static and current electricities:** Static electricity deals with the electric charges at rest while the current electricity deals with the electric charges in motion.

4. **Conductor:** A substance which allows passage of electric charges through it easily is called a ‘conductor’. A conductor offers very low resistance to the flow of current. For example copper, silver, aluminium etc.

5. **Insulator:** A substance that has infinitely high resistance and does not allow electric current to flow through it is called an ‘insulator’. For example rubber, glass, plastic, ebonite etc.

6. **Electric current:** The flow of electric charges across a cross-section of a conductor constitutes an electric current. It is defined as the rate of flow of the electric charge through any section of a conductor.
   
   \[
   \text{Electric current} = \frac{\text{Charge}}{\text{Time}} \\
   \text{or} \quad I = \frac{Q}{t}
   \]

   Electric current is a scalar quantity.

7. **Ampere:** It is the S.I. unit of current. If one coulomb of charge flows through any section of a conductor in one second, then current through it is said to be one ampere.

   
   \[
   1 \text{ ampere} = 1 \text{ coulomb}/1 \text{ second} \quad \text{or} \quad 1 \text{ A} = 1\text{C}/1\text{s} = 1\text{Cs}^{-1}
   
   1 \text{ milliampere} = 1 \text{ mA} = 10^{-3} \text{ A}
   
   1 \text{ microampere} = 1\mu\text{A} = 10^{-6} \text{ A}
   
8. **Electric circuit:** The closed path along which electric current flows is called an ‘electric circuit’.

9. **Conventional current:** Conventionally, the direction of motion of positive charges is taken as the direction of current. The direction of conventional current is opposite to that of the negatively charged electrons.

10. **Electric field:** It is the region around a charged body within which its influence can be experienced.

11. **Electrostatic potential:** Electrostatic potential at any point in an electric field is defined as the amount of work done in bringing a unit positive charge from infinity to that point. Its unit is volt. Positive charges move from higher to lower potential regions. Electrons, being negatively charged, move from lower to higher potential regions.

12. **Potential difference between two points:** The Potential difference between two points in an electric field is the amount of work done in bringing a unit positive charge from one point to another.

   \[
   \text{Potential difference} = \frac{\text{Work done}}{\text{Charge}} \quad \text{or} \quad V = \frac{W}{Q}
   
   \text{Volt is the S. I. Unit of P.D.}
   
13. **One volt potential difference:** The Potential difference between two points in an electric field is said to one volt if one joule of work has to be done in bringing a positive charge of one coulomb from one point to another. \[ 1 \text{ volt} = 1 \text{ joule}/1 \text{ coulomb} \quad \text{or} \quad 1 \text{ V} = 1\text{J}/1\text{C} \]

14. **Galvanometer:** It is device to detect current in an electric circuit.

15. **Ammeter:** It is device to measure current in a circuit. It is always connected in series in a circuit.

16. **Voltmeter:** It is a device to measure potential difference. It is always connected in parallel to the component across which the potential difference is to be measured.

17. **Ohm’s law:** This law states that the current passing through a conductor is directly proportional to the potential difference across its ends, provided the physical conditions like temperature, density etc.
remains unchanged. 

\[ V \alpha I \text{ or } V = RI \]

The proportionality constant \( R \) is called resistance of conductor.

18. **Resistance**: It is a property of a conductor by virtue of which it opposes the flow of current through it. It is equal to the ratio of the potential difference applied across its ends and the current flowing through it.

\[ \text{Resistance} = \frac{\text{Potential difference}}{\text{Current}} \text{ or } R = \frac{V}{I} \]

19. **Ohm**: It is the S.I. unit of resistance. A conductor has a resistance of one ohm if a current of one ampere flows through it on applying a potential difference of one volt across its ends.

\[ 1 \text{ ohm} = 1 \text{ volt/1 ampere} \text{ or } 1\Omega = 1\text{V}/1\text{A} \]

20. **Factors on which resistance of a conductor depends**: The resistance \( R \) of a conductor depends
   i) Directly on its length \( L \) i.e. \( R \alpha L \).
   ii) Inversely on its area of cross-section \( A \) i.e. \( R \alpha \frac{1}{A} \)
   iii) On the nature of material of the conductor.
   On combining the above factors, we get
   \[ R \alpha \frac{L}{A} \]
   \[ R = \rho \frac{L}{A} \]
   The proportionality constant \( \rho \) is called resistivity of conductor.

21. **Resistivity**: It is defined as the resistance offered by a cube of a material of side 1 m when current flows perpendicular to its opposite faces. Its S.I. unit is ohm-meter \((\Omega m)\).

\[ \text{Resistivity, } \rho = \frac{RA}{L} \]

22. **Equivalent resistance**: If a single resistance can replace the combination of resistances in such a manner that the current in the circuit remains unchanged, then that single resistance is called the equivalent resistance.

23. **Laws of resistances in series**:  
   i) Current through each resistance is same.  
   ii) Total voltage across the combination = Sum of the voltage drops.  
   \[ V = V_1 + V_2 + V_3 \]
   iii) Voltage drops across any resistor is proportional to its resistance.  
   \[ V_1 = IR_1, V_2 = IR_2, V_3 = IR_3 \]
   iv) Equivalent resistance = Sum of the individual resistances.  
   \[ R_s = R_1 + R_2 + R_3 \]
   v) Equivalent resistance is larger than the largest individual resistance.

24. **Laws of resistances in parallel**:  
   i) Voltage across each resistance is same and is equal to the applied voltage.  
   ii) Total current = Sum of the currents through the individual resistances.  
   \[ I = I_1 + I_2 + I_3 \]
   iii) Currents through various resistances are inversely proportional to the individual resistances.  
   \[ I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}, I_3 = \frac{V}{R_3} \]
   iv) Reciprocal of equivalent resistance = Sum of reciprocals of individual resistances.  
   \[ \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \]
   v) Equivalent resistance is less than the smallest individual resistance.

25. **Joule’s law of heating**: It states that the heat produced in a conductor is directly proportional to (i) the square of the current \( I \) through it (ii) proportional to its resistances \( R \) and (iii) the time \( t \) for which current is passed. Mathematically, it can be expressed as

\[ H = I^2Rt \] joule = \( I^2Rt/4.18 \) cal

OR

\[ H = VIt \] joule = \( VIt/4.18 \) cal

**Applications**: Electric toaster, Electric heater, Fuse wire etc.

26. **Electric energy**: It is the total work done in maintaining an electric current in an electric circuit for given time.
Electric energy, \( W = Vlt = I^2Rt \) joule

27. **Electrical power:** Electrical power is the rate at which electric energy is consumed by an appliance.

\[
P = \frac{W}{t} = VI = I^2R = \frac{Q}{t} \quad \text{watt}
\]

28. **Watt:** It is the S.I. unit of power. The power of an appliance is 1 watt if one ampere of current flows through it on applying a potential differences of 1 volt across its ends.

1 watt = 1 joule/1 second = 1 volt x 1 ampere

or 1 W = 1 Js\(^{-1}\) = 1 VA

1 kilowatt = 1000 W

1KVA=1000 W

29. **Kilowatt hour:** It is the commercial unit of electrical energy. One kilowatt hour is the electric energy consumed by an appliance of 1000 watts when used for one hour.

1 kilowatt hour (kWh) = 3.6 \times 10^6 J
MIND MAP

ELECTRIC POWER

\[ P = \frac{w}{t} \]
Unit - Watt (W)

\[ P = \frac{V I}{t} \]
\[ P = \frac{V^2}{R} \]

ELECTRIC ENERGY

Work = \( V IT = I^2RT \)
Unit of E E = Watt-Hr

JOULE'S LAW

\[ H = I^2RT \]
Or \( H = VIT \)

OHM'S LAW

\[ V = IR \]

RESISTANCE (R) = \( \frac{V}{I} \)
Unit of R = Ohm (Ω)

RESISTIVITY = \( \frac{RA}{L} \)
Unit of Resistivity = Ohm.metre (Ωm)

\[ I = \frac{Q}{t} \]
Unit of I is Ampere (A)

RESISTANCE IN SERIES

\( R_s = R_1 + R_2 + R_3 \ldots \)

RESISTANCE IN PARALLEL

\( 1/R_p = 1/R_1 + 1/R_2 + 1/R_3 \ldots \)
ELECTRICITY
QUESTION PAPER FOR FORMATIVE ASSESSMENT
MARKS-30
TIME- 70 MINUTES
Instructions:
• Questions : 1 to 5 – 1 Mark each
• Questions : 6 to 9 – 2 Marks each
• Questions : 10 to 13 – 3 Marks each
• Question 14 – 5 Marks
1. Define resistivity of material.
2. What is the power of torch bulb rated at 2.5V and 500mA?
3. Why series arrangement not used for connecting domestic electrical appliances in a circuit?
4. How is ammeter connected in the circuit to measure electric current?
5. What is the direction of flow of conventional current?
6. Why is it not advisable to handle electrical appliances with wet hands?
7. Two electric bulbs marked 100W 220V and 200W 200V have tungsten filament of same length.
Which of the two bulbs will have thicker filament?
8. How does the resistance of a wire vary with its area of cross section?
9. Draw the symbols of following components used in circuit diagram.
   ii) Battery
   iii) Switch closed
   iv) Resistor of resistance R
   v) Voltmeter
10. A geyser is rated 1500W, 250V. This geyser is connected to 250V mains. Calculate –
   i) The current drawn
   ii) The energy consumed in 50hrs.
   iii) The cost of energy consumed at Rs. 2.20 per kWh.
11. What is the function of an electric fuse? Name the material used for making fuse. In household
circuit where is fuse connected?
12. What is meant by electric resistance of a conductor? A wire of length “l” and resistance R is
stretched to its twice length. How will its (i) resistance and (ii) resistivity change?
13. a) Draw diagram showing three resistors R₁, R₂ and R₃ in series.
b) Two resistors of resistance 4Ω and 12Ω
   i) In parallel
   ii) In series
   Calculate the values of equivalent resistance in each case.

HOTS QUESTIONS (SOLVED )
Q.1. Why is the tungsten metal more coiled in the bulb and not installed in straight parallel wire form?
Ans. The coiled wire of tungsten increases the surface area of the wire in very less space so as to emit
more light and helps in glowing with more intensity.
Q.2. Why are fairy decorative lights always connected in parallel?
Ans. When the fairy lights are connected in series the resistance offered will be greater and brightness of
the bulbs will be affected. But in parallel connection all the bulbs will glow with same intensity and if
any one bulb gets fused the other bulbs will continue to glow.
Q.3. What will happen when -
a) Voltmeter is connected in series?
b) Ammeter is connected in parallel?
   Ans: When voltmeter is connected in series no current flows through the circuit as ideal voltmeter infinite resistance. When Ammeter is connected in parallel, high current flows through the ammeter and it gets spoiled.

Q.4 Two metallic wires A and B of same material are connected in parallel. Wire A has length l and radius r and wire B has length 2l and radius 2r. Compute the ratio of total resistance of parallel combination and the resistance of wire A.

   Ans. Resistance of wire A, \( R_1 = \frac{\rho l}{A} = \frac{\rho l}{\pi r^2} \).
   Resistance of wire B, \( R_2 = \frac{\rho 2l}{2\pi (2r)^2} \).
   \( \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{\pi r^2}{\rho l} + \frac{\pi r^2}{\rho 2l} = 3 \frac{\pi r^2}{\rho l} \).
   \( R = \frac{\rho l}{3 \pi r^2} \).
   \( \frac{R}{R_1} = \frac{1}{3} \).

VALUE BASED QUESTION:
   (1) Electricity plays an important role in the development of a country. Ram, a student of class X was studying in the library. After school hours when he came from the library, he found that electric fans and tubelights of all rooms were ON. He immediately switched OFF all fans and lights and reported the matter to the Principal.
   (i) Comment on the attitude of Ram.
   (ii) Why Ram reported the matter to the Principal?
   Ans. (i) Ram knows the importance of electricity. He is against the misuse of national resources.
   (ii) He reported the matter to prevent the misuse of national resources.
CHAPTER-13
MAGNETIC EFFECTS OF ELECTRIC CURRENT
KEY CONCEPTS & GIST OF THE LESSON

❖ Magnet: (i) is an object that attracts objects made of iron, cobalt & nickel. (ii) Comes to rest in North-South direction, when suspended freely. (iii) Like poles repel each other while unlike poles attract.

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

❖ Magnetic field: The space around a magnet or a current carrying wire within which a magnetic force is experienced by another magnet is called magnetic field.

❖ Magnetic field lines: Magnetic field is represented by a series of curves around a magnet. They are called field lines. They are lines drawn in a Magnetic field along which an imaginary north magnetic pole moves. 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.
   (iii) Inside the magnet, the direction of field lines is from South Pole to North Pole. Therefore magnetic field lines are closed curves.
   (iv) Closeness of field lines indicates stronger magnetic field.
   (v) In weak magnetic field, they are widely spaced.

❖ 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 line due to a current through a circular loop becomes straight line at the centre of the 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 centre of the circular 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 field strength at the centre decreases.
   (ii) The number of turns in the coil: As the number of turns in the coil increase, the magnetic strength at the centre increases, because the current in each circular turn is having the same direction, thus the field due to each turn
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)
  1. A coil of many turns of insulated copper wire wrapped in the shape of a cylinder is called a Solenoid.
  2. Magnetic field produced by a Solenoid is similar to a bar magnet.
  3. The strength of magnetic field is proportional to the number of turns & magnitude of current.
  4. The strength of magnetic field inside a solenoid is uniform.

- **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 central finger in the direction of current, then the thumb gives the direction of force acting on the conductor.

- **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**: The phenomenon of production of induced current in a closed circuit or coil due to change in magnetic field is called Electromagnetic induction.

- **Fleming’s Right hand rule**: gives the direction of induced current.
  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 is in the direction of motion of the conductor then the middle finger will give the direction of induced current.

- **Electric generator**: A device that converts mechanical energy to electric energy.
  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 three wires in domestic electric circuit are as follows-
  1. **Live wire**- (Red insulated, Positive)
  2. **Neutral wire**- (Black insulated, Negative)
  3. **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 wires and neutral wire
- Fuse: It is a protective device used for protecting the circuits from short circuiting and over loading

**Important diagrams**
1. Magnetic field lines around a bar magnet.
2. Right hand thumb rule
3. Magnetic field lines through and around a current carrying solenoid.
4. An electromagnet.
5. A simple electric motor
6. Electric generator

**Important activities**
1. Magnetic field lines around a bar magnet
2. Direction of electric current in a simple electric circuit.
3. Direction of Magnetic field lines depends on the direction of electric current.
MIND MAP

MAGNETIC EFFECT OF ELECTRIC CURRENT

Safety measure
- Fuse
- Earthing

Magnet and its properties

Magnetic field lines & properties.
- Right hand thumb rule

Solenoid

Fleming's right hand rule.
- Fleming's left hand rule
- Electric motor

Domestic electric circuits

Electromagnetic induction.

Electromagnet
Q. PAPER FOR FORMATIVE ASSESSMENT

MARKS-30 TIME- 70 MINUTES

Instructions:
- Questions : 1 to 5 – 1 Mark each
- Questions : 6 to 9 – 2 Marks each
- Questions : 10 to 13 – 3 Marks each
- Question 14 – 5 Marks

1. State two uses of electromagnet.
2. An electron is moving along X – axis in a magnetic field directed along Y – axis. In which direction will the electron deflected.
3. State Fleming’s left hand rule.
4. What is the importance of earth wire?
5. Should a copper wire be used as a fuse wire? If not, why?
6. Give two points of difference between electromagnet and permanent magnet.
7. Draw the magnetic field lines indicating direction of the magnetic field through and around
   i) A circular loop of wire carrying electric current.
   ii) A solenoid carrying electric current.
8. What is magnetic field? State right hand thumb to know the direction of magnetic field at a point.
9. Give four features of domestic electric wiring.
10. Draw a schematic diagram of domestic wiring system and write its main features.
11. Match the following:
    
    A  
    i) Right hand thumb rule  
    ii) Fleming’s left hand rule    
    iii) Fleming’s right hand rule 
    
    B  
    a) Force on a conductor in a magnetic field 
    b) Direction of magnetic field of straight conductor 
    c) Direction of induced current in conductor 
    d) Polarity of any end of a solenoid.
12. a) Draw a labelled diagram to show how electromagnet is made.
    b) What is the purpose of soft iron core in making electromagnet?
13. Write two differences between AC and DC current and draw diagram of them also.
14. a) Write principle of electric generator.
    b) Explain construction and working of generator.
    c) Draw labelled diagram of electric generator.

HOTS QUESTIONS (SOLVED)

1. On what effect of an electric current does an electromagnet work?
   A. Magnetic effect of electric current
2. What is the frequency of AC (Alternating Current) in India?
   A. 50Hz
3. On what effect of an electric current does a fuse work?
   A. Heating effect of electric current.
HOTS QUESTIONS (UNSOLVED)
1. Name the sources of direct current.
2. Why do two magnetic field lines never intersect each other?
3. What is the role of split ring in an electric motor?
4. What is an earth wire?
5. What modifications in commercial electric motor enhance the power of the motor?

ORAL QUESTIONS
1. a) What are magnets?
   b) What are natural magnets?
   c) What is the meaning of the word lodestone?
   d) What is the origin of the word magnetism?
2. a) What is the sure test of magnetism?
   b) What happens if we break a magnet into two pieces?
   c) Is it possible to obtain isolated north and south poles?
3. a) What is magnetic field line?
   b) Can two magnetic field lines intersect? If not, why?
   c) Magnetic field lines are closed. Why?
   d) How do the field lines of the regions of strong field differ from those of weak field?
4. a) What is a solenoid?
   b) Is the magnetic field of a solenoid similar to that of a bar magnet?
   c) State the two factors by which the strength of magnetic field inside a solenoid can be increased.
   d) How will you determine the direction of the magnetic field due to a current carrying solenoid?
5. a) What is an electromagnet?
   b) What is the effect of placing an iron core inside a solenoid?
   c) What type of core should be used inside a solenoid to make an electromagnet?
   d) Give two advantages of electromagnets.

ORAL QUESTIONS
1. What important observation did Oersted make in his experiments with current carrying conductors?
2. How can you locate a current – carrying wire concealed in a wall?
3. A freely suspended magnet always points along north – south direction. Why?
4. What type of core should be used inside a solenoid to make an electromagnet?
5. What is the principle of an electric motor?
6. A generator converts energy from one form to another. Name these two forms of energy.
7. Which wire (live, neutral or earth) goes through the switch?
8. Are different appliances connected in series or parallel in a house?
9. What is the colour convention for live, neutral and earth wires?
VALUE BASED QUESTION:
1. ASHOK used a fuse rated as 5 A in a circuit in which an electric heater of 2 KW was connected with the supply of 220V. The heater was not working as the fuse wire melted. Ashok discussed the problem with his friend Ram. Ram suggested him to use a fuse rated 10 A in the circuit. The problem was solved.
   (i) What values are shown by Ram?
   (ii) How much current was flowing in the circuit with the fuse 10A?
Ans; (i) Helpful; High degree of awareness.
   (ii) $I = \frac{P}{V} = \frac{2000}{220} = 9.09 \text{ A}$
CHAPTER-15
SOURCES OF ENERGY
KEY CONCEPTS & GIST OF THE LESSON

✧ Characteristics of a good fuel:
   (v) High calorific value
   (vi) Less smoke
   (vii) Less residue after burning
   (viii) Easy availability
   (ix) Inexpensive
   (x) Easy to store and transport

✧ Fossil fuels: were formed millions of years ago, when plants and animal remains got buried under the earth and were subjected to high temperature and pressure conditions. E.g.: Coal, Petroleum, etc. These fossil fuels are non-renewable sources of energy and cause environmental problems due to pollution.

✧ Thermal power plants:
   (i) Use coal, petroleum and natural gas to produce thermal electricity.
   (ii) Electricity transmission is very efficient.
   (iii) The steam produced by burning the fossil fuels runs the turbine to produce electricity

✧ Hydro power plant:
   (Refer to figure 14.3, page no. 246 of N.C.E.R.T Text book)
   (i) It is the most conventional renewable energy source obtained from water falling from a great height.
   (ii) It is clean & non-polluting source of energy.
   (iii) Dams are constructed to collect water flowing in high altitude rivers. The stored water has a lot of potential energy.
   (iv) When water is allowed to fall from a height, potential energy changes to kinetic energy, which rotates the turbines to produce electricity through EMI (Electromagnetic Induction)

✧ Disadvantages of Hydro power plant:
   (i) Highly expensive to construct.
   (ii) Dams cannot be constructed on all river sites.
   (iii) Large areas of human habitation and agricultural fields get submerged.
   (iv) People face social and environmental problems.

✧ Non-conventional sources:
   (1) Bio-mass:
      o It is the source of the conventionally used fuels that are used in our country. E.g.: Cow dung cakes, fire-wood, coal, charcoal
      o Bio gas: It is a mixture of gases produced during decomposition of bio mass in the absence of Oxygen. (Anaerobic Respiration). Methane is the major component of bio gas.
Bio gas plants: Animal dung, sewage, crop residues, vegetable wastes, poultry droppings, etc. are used to produce Bio gas in Bio gas plants.

Uses: Bio gas is used for cooking and lighting.

(Refer to figure 14.4, page no. 247 of N.C.E.R.T Text book)

(2) Wind energy:
- It can be converted into mechanical and electrical energy.
- Kinetic energy of the wind is used in running of wind mills, which are used to lift water, grind grains, etc.
- Advantages: (i) Eco friendly (ii) Renewable
- Disadvantages: (i) Wind speed not uniform always.
  (ii) Needs a large area to erect series of wind mills.
  (iii) Big amount of investment is needed.
- (iv) Output is less as compared to investment

(3) Solar energy:
- Solar radiations can be converted into electricity through solar cells (photovoltaic cells).
- Photovoltaic cells convert solar radiations directly into electricity through silicon solar cells.
- Solar cells arrange on a large flat sheets form a solar panel.
- Solar cookers are painted black from outside and a large glass plate to trap solar radiations by greenhouse effect.
- (Refer to figure 14.6, page no. 249 of N.C.E.R.T Text book)
- Advantages of Solar cookers:
  (i) Eco friendly
  (ii) Renewable
  (iii) Used in rural areas.
  (iv) Retains all the nutrients in food due to slow cooking.
- Disadvantages of solar cooker:
  (i) Solar radiations are not uniform over earth’s surface.
  (ii) Cannot be used at night or on cloudy days.
  (iii) Cannot be used to make chapattis for frying as these require a temperature of 140⁰C or more.
  (Maximum temperature of 100⁰C only can be achieved in a solar cooker)
- Other solar devices- Solar water heater, Solar furnace

(4) Geo thermal energy:
(i) Energy harnessed from the heat of the sun is called Geo thermal energy.
(ii) Magma is formed when this heat melts the rocks. The molten rocks and hot gases are called magma
(iii) The magma gets collected at some depths below the earth’s surfaces. These places are called ‘Hot spots”
(iv) When underground water comes in contact these hot spots, it changes into steam, which can be used to generate electricity.
- Advantages of Geo thermal energy:
  (i) Renewable
  (ii) Inexpensive
- Disadvantages of Geo thermal energy:

64
(i) Only few sites available for harnessing energy.
(ii) Expensive

(5) Nuclear energy:
(i) Energy released when some changes take place in the nucleus of the atom of a substance, is called Nuclear energy.
(ii) It is used for heat generation, fuel for marine vessels.
   o Advantages of Nuclear energy:
     (i) Alternative source of energy due to depletion of fossil fuels.
     (ii) From a small amount of fuel, a large amount of energy is released.
   o Disadvantages of Nuclear energy:
     (i) Risk of nuclear waste leakage
     (ii) High cost of setting up of nuclear plant
     (iii) Pollution of environment.

(6) Energy from the sea-
(A) Tidal energy: Locations in India – Gulf of Kutch, Gujrat& W. Bengal
(i) Depends upon harnessing the rise and fall of sea level due to tidal action.
(ii) Dams are constructed across a narrow part of sea and turbine converts tidal energy into electrical energy.
Disadvantages: Uniform tidal action is not seen
(B) Wave energy:
(i) Kinetic energy of the waves of sea are used to rotate turbines..
(ii) These turbines generate electrical energy

❖ Important diagrams-
1. Hydro power plant
2. Bio gas plant
3. A wind mill
4. A solar cooker
MIND MAP

Characteristics of good fuel

Fuel

Sources of energy

Non renewable

Fossils fuels

Renewable

Thermal power plant

Coal

Petroleum

Natural Gas

Geothermal

Nuclear power plant

Solar cooker

Biogas plant

Hydro power plant

Wind mill

Hot Spots

Electricity

Nuclear

Solar

Biomass

Water

Wind

Wind mill
FORMATIVE ASSESSMENT I

Q.PAPER

MARKS-30

TIME- 70 MINUTES

Instructions:
• Questions : 1 to 5 – 1 Mark each
• Questions : 6 to 9 – 2 Marks each
• Questions : 10 to 13 – 3 Marks each
• Question 14 – 5 Marks

1. Name the component of sunlight, exposure to which may cause skin cancer.
2. Flowing water possess which type of energy.
3. Name one place in India where wind energy power station is installed.
4. What is a solar panel?
5. What type of energy transformation takes place during winding of spring of a clock?
6. Write two differences between renewable and non – renewable sources of energy.
7. What is the principle of solar cooker? Name two types of solar cooker.
8. Name any two types of harmful nuclear radiations emitted during nuclear fission.
9. What is thermal power plant? Where it is preferably situated?
10. What is the principle of solar cooker? Give two limitations and two advantages of solar cooker.
11. Name the fuel for hydro power plant. Mention two advantages and disadvantages of producing electricity at the hydro power plant.
12. Explain why:
   a) It is difficult to burn a piece of fresh wood from a tree.
   b) Pouring dry sand over the fire extinguishes it.
   c) It is difficult to use hydrogen as source of energy.
13. What are the different types of energies obtained from sea? Explain.
14. a) What is a principle of Biogas?
   b) Explain it working in brief.
   c) Draw a labelled diagram of biogas plant.

HOTS QUESTIONS (SOLVED)

1. Name the materials used for making solar cells.
   A. Silicon, Germanium and Selenium
2. What fraction of solar energy reaches the earth’s surface?
   A. 47%
3. Name the process that produces a large amount of energy in the sun.
   A. Nuclear fusion
4. Why is biogas called a clean fuel?
   A. Because it- (i) leaves no ash (ii) does not cause pollution (iii) does not produce any poisonous gas.

HOTS QUESTIONS (UNSOLVED)

1. What is the use of black painted surface in solar heating devises?
2. Why are bio gas plants considered to be boon to the farmers? Give reason.
3. Hydroelectricity generated at a dam may be considered another form of solar energy. Why?
4. How is the slurry left over after the generation of biogas in biogas plant used?
5. Why is charcoal considered to be a better fuel than wood?
6. Why a solar cooker cannot be used for frying or making chapattis?
7. In parabolic reflector type coolers, even temperature up to 180°C- 200°C can be attained. How?
8. Modern chulahs are more efficient than traditional chulahs. Why?
9. How is hydro energy converted into electrical energy?
10. Explain, why only a part of the solar energy that strikes the upper regions of atmosphere reaches the surface of the earth?

ENERGY

ORAL QUESTIONS (CONVERSATION TYPE)

1. a) What is a good source of energy?
   b) Name one good source of energy.
   c) It is a renewable source of energy?
   d) Is it conventional or non – conventional source of energy?
   e) What other name is given to it?
   f) What is a fossil fuel?
   g) Name any other two fossil fuels.
2. a) Which is the ultimate source of all forms of energy?
   b) Can you explain?
   c) Name some renewable source of energy arising due to sun.
   d) Name some non – renewable source of energy arising due to sun.
   e) Why is the energy contained in fossil fuels considered due to sun’s energy?
   f) Name any source of energy not influenced by sun’s energy.
3. a) What is the principle of nuclear energy?
   b) What are the kinds of nuclear reaction?
   c) Which of these can be used for destructive purposes?
   d) Which of these can be used to produce energy for common use?
   e) What is nuclear fission?
   f) Name two substances which are easily fissionable.
   g) What are these substances called?
   h) What is this phenomenon of breaking up of radioactive isotopes called?
   i) Name the rays emitted.

ORAL QUESTIONS

1. Which component of solar radiations produces heat?
2. Name a form of energy that can be harnessed from the oceans.
3. Name the main component of biogas.
4. Name a fuel which is considered cleaner than CNG.
5. What is common between an atom bomb and a nuclear reactor?
6. What is the main transformation of energy during working of a windmill?
7. What are the conditions to achieve nuclear fusion?

QUIZ

1. I am a force that cannot be created but my form may be changed.
2. I am an important part of the system that transforms that transforms K.E. / P.E. into electrical
energy.

3. I have been used to produce energy for a long time and my origin is in the remains of plants and animals.

4. I used to thrown as a waste material for centuries. But I am given an honourable name and a useful work to perform.

5. I have a huge body capable of eating water from any source with a decorative head called Hydroelectric power station.

6. I resemble a fossil fuel but find use as self sustained source of energy especially in rural areas.

7. I produce a chain of reactions each step capable of producing tremendous amount of energy.

8. I am associated with nuclear reactions but deliver heat in critical conditions.

9. I am the lightest fuel with a large potential as a source of energy.

10. I deliver hot springs with taking any energy from man – made sources or sun.

**VALUE BASED QUESTIONS**

1. In an IT firm there are 60 professionals, most of them come by their personal vehicle and from same locality.
   (a) will this practice of commuting help the nature? Justify it.
   (b) if not what can they do to help the nature?
   (c) what associated values will the learner get from the idea develop to help the nature?

2. A school organised the study tour for its students to observe, how do people in a village use energy resources for their living? They observed that in one of the village people use wood and cow dung as a fuel while in the nearby village they saw modern technology was used by the villagers for better sanitation and management of their bio-waste and sewage materials by establishing biogas plant.
   (a) if you compare the sanitation of both the villages which practice would you prefer to be the best and why?
   (b) state the associated values which you get from this excursion tour.
TERM II
(Second Term)

Contents:

Nos:

1. Carbon and its compounds 89
2. Periodic classification of elements 97
3. How do organisms Reproduce 102
4. Heredity and evolution 105
5. Light-Reflection and refraction 110
6. The human eye and the colourful world 115
7. Management of natural resources 119
8. Our Environment 123

******
**Topic 1: Carbon and its compounds**

**Important terms and conditions**

*Versatility of carbon:* Carbon is known metal and occurs in free as well as combined state in nature.

*Free state:* Diamond, graphite and coal.

*Combined state:*

1. Solid state: All animals and plants products.
2. Liquid state: Petroleum and vegetable oil.
3. Gaseous state: In air has CO<sub>3</sub>.

Carbon has 4 valance electrons carbon can form an anion C<sup>4-</sup> by gain of electrons. It can also form of cations C<sup>4+</sup> by loss of electron. It can share its valance electrons with other carbon atoms or atoms of non-metal and forms covalent bonding.

Compounds of carbon: Simplest compounds of carbon are hydro carbon and simplest hydro carbon is methane.

Classification of hydro carbon:

**Saturated hydro carbon:**

\( \text{(C}_n\text{H}_{2n+2}) \)

**Unsaturated hydro carbon:**

**Compounds having single bond compounds having double and triple bonds.**

<table>
<thead>
<tr>
<th>ALKANES</th>
<th>ALKENES</th>
<th>ALKYNES</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{C}<em>n\text{H}</em>{2n+2} )</td>
<td>( \text{C}<em>n\text{H}</em>{2n} )</td>
<td>( \text{C}<em>n\text{H}</em>{2n-2} )</td>
</tr>
<tr>
<td>ethane ( \text{(C}_2\text{H}_6) )</td>
<td>Ethene ( \text{C}_2\text{H}_4 )</td>
<td>Ethyne ( \text{C}_2\text{H}_2 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Hydro carbons</th>
<th>Definitions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Straight chain</td>
<td>All carbons are in form of straight</td>
<td>Butane</td>
</tr>
</tbody>
</table>
2. **Branched Chain**
   - One or more carbon atoms are attached to main straight line
   - Isobutane.

3. **Ring or cyclic hydrocarbon**
   - Saturated
     - Carbon atoms are bonded by single covalent bond.
     - Ethane
   - Unsaturated
     - Carbon atoms are bonded by doubled or triple covalent bond.
     - Ethene and Ethyne

**Isomerism**: The phenomenon of existence of compounds in two or more forms with same molecular formula but different structure.

**Functional group**: An atom or groups of atoms which makes a carbon compounds reactive and decide its properties.

<table>
<thead>
<tr>
<th>Sr.no.</th>
<th>Hetero atoms</th>
<th>Functional groups</th>
<th>Formula of functional group</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cl/Br</td>
<td>Halo-chloro/bromo</td>
<td>-Cl, -Br</td>
<td>Chloromethane(CH₃Cl)</td>
</tr>
<tr>
<td>2.</td>
<td>oxygen</td>
<td>1. Alohols</td>
<td>-OH</td>
<td>Ethanol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Aldehydes</td>
<td>-CHO</td>
<td>C₂H₅OH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Ketones</td>
<td>&gt;C=O</td>
<td>Methanal</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>HCHO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Propanone</td>
</tr>
<tr>
<td>4. Carboxylic acid</td>
<td>-COOH</td>
<td>( \text{CH}_3\text{COCH}_3 )</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Ethanoic acid</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>( \text{CH}_3\text{COOH} )</td>
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</tbody>
</table>

HOMOLOGOUS SERIES: A series of compounds in which the same functional group substitute for hydrogen in a carbon chain, such that successive compounds differ by \( \text{CH}_2 \) groups e.g \( \text{CH}_4, \text{C}_2\text{H}_6, \text{C}_3\text{H}_8 \) etc.

**NOMENCLATURE OF CARBON COMPOUNDS:**

Prefix word root + suffix + Functional group.

CARBON COMPOUNDS:

ETHANOL – \( \text{C}_2\text{H}_5\text{OH} \) common name ethyl alcohol

ETHANOIC ACID – \( \text{CH}_3\text{COOH} \) common name acetic acid.

ESTERIFICATION REACTION: The reaction between carboxylic acid and an alcohol in the presence of conc. Sulphuric acid to form a sweet smelling substance ester. e.g

\[
\text{Conc.} \text{H}_2\text{SO}_4 \\
\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}
\]

Saponification reaction: Alkaline hydrolysis of ester produces soaps.

Heat

\[
\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}
\]

Reaction with carbonates and hydrogen carbonates: Reaction of ethanoic acid with carbonates or bi carbonate evolves carbon dioxide gas.

\[
2\text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}
\]
SOAP AND DETERGENT: Soap is sodium and potassium salt of long chain of carboxylic acid. They form lather with soft water only.

Detergent are ammonium or sulphonate salts of long chain carboxylic acid. They even remain effective in hard water and foam lather.

**Cleansing action of soap**

![Diagram of soap micelle](image)

(a) Soap micelle  
(b) Soap micelle entraps the dirt particle
Summative Assessment 2
Carbon and its compounds
F.A-III
PAPER PEN TEST

TIME: 40 Min
Max marks:40.

1. Name the compound form heating ethanol at 443 K with excess of conc.\( \text{H}_2\text{SO}_4 \). 1
2. What happened when a small piece of sodium is dropped into ethanol? 1
3. Write the chemical equation for the decarboxylation of ethanoic acid? 1
4. Give an example of esterification reaction. 1
5. Name the product obtained when ethanol is oxidized by acidified potassium dichromate or alkaline potassium permanganate. 1
6. Why is conversion of ethanol to ethanoic acid is an oxidation reaction. 1
7. Name the 2 elements which are present both in CNG and Petroleum 2
8. Draw the electronic dot structure of ethane molecule (\( \text{C}_2\text{H}_6 \)) 2
9. Write the IUPAC name of the next homologous of \( \text{CH}_3\text{OHCH}_2\text{CH}_3 \). 2
10. Define homologous series of organic compounds series of organic compounds ,Mention any two characteristics of homologous series. 2
11. Describe a chemical test to distinguish between ethanol and ethanoic acid. 2
12. Give the name of functional groups (i)-CHO (ii) \( >\text{C}=0 \) 2
13. Why does carbon form compounds mainly by covalent bonding? 2
14. What are the two properties of carbon which lead to huge number of carbon compounds we see around us? 2
15. Allotropy is a property shown by which class: substances elements compounds or mixtures? Give one examples of allotropy. 2
16. How may be the following be obtained from ethanol? Express giving chemical equations. 2
   (i) Ethyl ethanoate (ii) Sodium ethoxide.
17. Describe with chemical equation how ethanoic acid may be obtained from. 2
   (i) Ethanol (ii) Methanol
18. Explain the cleansing action of soap 3
19. Distinguish between esterification and saponification reactions of organic compounds 3
20. Explain the structure of graphite in term of bonding and give one property based on this structure. 3
21. Name the organic acid present in vinegar .Write a chemical equation which represents the commercial method for the preparation of this acid from methanol. 3

HIGH ORDER THINKING SKILLS (HOTS) QUESTIONS:

1. Why the colour of potassium permanganate disappears, if it is added to warm solution of ethanol.
2. An organic compound with molecular formula \( \text{C}_2\text{H}_4\text{O}_2 \) 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.

3. a. What are the various possible structure formulae of a compound having molecular formula 
   C$_3$H$_6$O.
   b. Also give the IUPAC names of the above possible compounds.
   c. What is the similarity in these compounds?

4. A mixture of oxygen and ethyne is burnt for welding, can you tell why a mixture of ethyne and air is not used.

5. Two carbon compound A and B have molecular formula C$_3$H$_8$ and C$_3$H$_6$ respectively. Which one of the two is most likely to show addition. Justify your answer. Explain with the help of a chemical equation, how an addition reaction is used in vegetable ghee industry.

6. 1ml glacial acetic acid and 1ml of ethanol are mixed together in a test tube. Few drops of concentrated sulphuric acid is added in the mixture are warmed in a water bath for 5 min.
   a. Name the resultant compound formed.
   b. Represent the above change by a chemical equation.
   c. What term is given to such a reaction.
   d. What are the special characteristics of the compound formed.

7. An organic compound ‘X’ with a molecular formula C$_3$H$_6$O undergoes oxidation in the presence of alkaline KMnO$_4$ and forms the compound ‘Y’.
   a. Identify ‘X’ and ‘Y’
   b. Write your observation when the compound ‘X’ is made to react with compound ‘Y’ which is used as a preservative for pickles.

8. What is formalin?

**Topic 1: Carbon and its compounds**

F.A-IV

**QUIZ:**
1. Name the simplest hydrocarbon.
2. What is the general formula of alkynes?
3. Name the carboxylic acid used as preservation
4. Name the product other than water formed on burning of ethanol in air.
5. Give the IUPAC name of the following compounds.
   i) An aldehyde derived from ethane.
   ii) A ketone derived from butane.
   iii) A chloride derived from propane.
   iv) An alcohol derived from pentane.

**Multiple choice questions**

1. Dilute acetic acid was added to the four test tubes containing the following chemical.
   i) KOH   ii) NaHCO$_3$   iii) K$_2$CO$_3$   iv) NaCl
   Brisk effervescence was observed in test tubes
2. Which of the following solution of acetic acid in water can be used as vinegar used in pickles?
   a) 5-10% b. 10-15% c.20-130% d.100%
3. The suffix used for naming an aldehyde is
   a. ol b.al c. one d.ene
4. When acetic acid reacts with ethyl alcohol, we add cons. H\textsubscript{2}SO\textsubscript{4}, its acts as...........and the process is called..................
   a) Oxidizing agent, saponification. b) Dehydrating agent, esterification c) reducing agent,esterification.
   d). Acid & esterification.
5. 2ml of ethanoic acid was taken in each of the three test tubes. A, B and C and 2ml, 4ml and 8ml water was added to them, respectively. A clear solution is obtained in:
   a. Test tube A only.
   b. Test tubes A & B only.
   c. Test tubes B and C only.
   d. All the test tubes.
6. 2 ml of acetic acid was added in drops to 5ml of water it was noticed that:
   a. The acid formed a separate layer on the top of water.
   b. Water formed a separate layer on the top of the acid.
   c. A clear and homogenous solution was formed.
   d. A pink and clear solution was formed.
7. A few drops of ethanoic acid was added to solid sodium carbonate. The observation made was that
   a. A hissing sound was evolved
   b. Brown fumes evolved.
   c. A brisk effervescence occurred.
   d. A pungent smelling gas evolved.
8. Acetic acid, when dissolved in water, it dissociates into ions reversibly because it is a:
   a) Weak acid b) strong acid c) weak base. d) strong base.
9. Which of the following hydrocarbon can show isomerism?
   a. C\textsubscript{2}H\textsubscript{4} b. C\textsubscript{2}H\textsubscript{6} c. C\textsubscript{3}H\textsubscript{8} d. C\textsubscript{4}H\textsubscript{10}
10. Combustion of hydrocarbon is generally accompanied by evolution of

**ACTIVITY:**
1. To Study the saponification reaction for the preparation of soap in the laboratory using any vegetable oils.
2. Prepare soaps of different colours and fragrances.

**CARBON AND ITS COMPOUNDS**
3. Testing the hardness of water.
4. Collect information about artificial ripening of fruits by ethylene.

**PROJECTS:**
To prepare models of methane, ethane, ethyne and benzene molecules using thermocols, ball and match sticks.

**TOPICS FOR DEBATE:**
1. Role of esters in everyday life.
2. Condemning the use of alcohol as a social practice.
3. Use of biodegradable synthetic for cleansing purpose.

Value based questions:
TOPIC 2: PERIODIC CLASSIFICATION OF ELEMENTS

Gist of the lesson:
Classification of elements: the arrangement of element in such manner that element with similar properties are grouped together while elements with dissimilar properties are separated.

Early attempt to classify elements:

DOBEREINER'S TRIADS:
He arranged the elements with similar properties in a group of three known as triad in such a manner that the atomic mass of the middle element was approximately the average of the other two elements

LIMITATIONS:
Only three triads were identified from the element known at that time .hence this classification was not useful.

NEWLAND'S LAW OF OCTAVES:
He arranged the element in the order of increasing atomic masses starting with hydrogen (least atomic mass) and ended with thorium having atomic mass 56. According to him, the properties of every eighth element are similar to the first element. It was compared to music notation sa, re, ga, ma, pa, da, ni, so and thus the name Newlands law of octaves (notes of music).

LIMITATIONS:
1. It was applicable only for lighter element having atomic mass upto 40 amu, i.e. up to calcium.
2. He believed that only 56 elements existed in nature but later on more element were discovered whose properties did not fit into Newland law of octaves.
3. Some elements having different properties were grouped together like cobalt and nickel have been placed with halogens.
Due to above limitations, Newland law of octave was rejected.

MANDELEEV'S PERIODIC TABLE:
He arranged the elements in order of increasing atomic masses, similarity in physical and chemical properties of element. Properties of hydrides and oxides of different element were studied and elements with similar properties were grouped together.
He classified the elements in table consisted of vertical columns called groups and horizontal rows called periods. There were 8 groups in table and group is subdivided into subgroups A and B except group VIII which has three sets of elements in 4th, 5th, 6th period.

LIMITATIONS OF MENDELEEV, PERIODIC TABLE:
1. Position of hydrogen was not assigned correctly.
2. No separate position has been given to isotopes of an element.
3. Some element having higher atomic mass are placed before the elements with lower atomic mass.

MODERN PERIODIC TABLE:
Mosely modified the Mandelleve’s periodic table by taking atomic number as the fundamental property instead of atomic mass.
Modern periodic table consists of 18 vertical columns known as group, and 7 horizontal rows known as periods.
GROUPS:
Elements in group one are called alkali metals.
Elements in group 2 are called alkaline earth metals.
Elements in group 17 are called halogens.
Group 18 elements are called inert gases or noble gases.
Significance of group in the periodic table is that an element in a group has same number of valance electron, valency and thus identical chemical properties.

PERIODS

1ST PERIOD – 2 elements and is called very short period.
2nd PERIOD– 8 elements and are called short period.
3rd PERIOD – 8 elements and are called short period.
4th PERIOD – 18 elements and are called long period.
5th PERIOD – 18 elements and are called long period.
6th PERIOD – 32 elements and are called very long period.
7th PERIOD - incomplete period.

The number of shell present in the element indicates the period to which it belongs.

VALENCY:
It is defined as the combing capacity of an atom of an element to acquire noble gas configuration. It is equal to the number of electron lost, gained or shared during the formation of chemical compound.

ATOMIC SIZE / ATOMIC RADII:
It is defined as the distance from the centre of the nucleus to the outer most cell of atom. It is generally expressed in pico meter (pm).

On moving down the group the atomic radii increases. Because on moving down the group a new energy shell is added which increases the distance between the outermost electron and the nucleus. All though the nucleus charge also increases, but it is compensated by the additional shell being added thus, increasing the size of the atom. Across the period the atomic radii decrease. Due to the increase nuclear charge, the pull on the electron increases and hence, they are pulled closer to the nucleus thus, decreasing the atomic size. Oxides and its nature. Metal reacts with oxygen to form oxides by loss of electrons. These oxides on dissolution in water from bases.

REACTIVITY OF ELEMENTS:
Down the group reactivity of metal increases as the tendency to lose electron increases due to the increased atomic size.
Reactivity of non metals decreases down the group because of the increased atomic size and the tendency to gain electron decreases.
On moving across the period the reactivity first increases due to the decreased in the metallic character and increase in non-metallic character.
MIND MAP

PERIODIC CLASSIFICATION OF ELEMENTS

PERIODS (Horizontal Rows)

NON-METALLIC
- Electronegative
- Taking electrons

METALLIC
- Electropositive
- Giving electrons

Properties of elements are periodic function of their Atomic Number

GROUPS (Vertical Columns)

METALS
- Atomic Size Increases

NON-METALS
- Atomic Size Decreases Slightly

Early Attempts At the Classification Of Elements

Deberery's Triads
Li Be Li C Be C
Na Si Na P
K Rb K I

Mendeleev's Periodic Table

Mendeleev's Periodic Table
Properties of elements are periodic function of their Atomic Mass

Newland's Octave

Groups

Every 8th element

Element in properties
The image contains a modern periodic table of the elements in long form. The table is organized into periods and groups, with elements categorized into metals, nonmetals, and metalloids. Each cell contains the element's symbol, atomic number, and atomic weight. The table also includes information on electron configurations, oxidation states, and other properties. The layout is colorful, with different colors assigned to various groups, making it visually engaging. The periodic table is a fundamental tool in chemistry, used to organize and understand the properties and relationships between elements.
PRACTICE QUESTIONS FOR FORMATIVE ASSESSMENT III

TIME: 1 HRS
M.M: 30

Q.1 What is the position of hydrogen in the modern periodic table? (1)
Q.2 Where are the isotopes of the same elements having different atomic masses placed in the periodic table? (1)
Q.3 An element M is the third group of the periodic table. Write the formula of its oxide? (1)
Q.4 What is the valency of magnesium with atomic no. 12 and chlorine with atomic no. 17? (1)
Q.5 What is the difference in number of shell in magnesium and sulphur? (1)
Q.6 On the basis of electronic configuration, how will you select
i) the terminating member in a period.
ii) the chemically similar elements.
Q.7 Give reason as to why the atomic radii of elements increase in a group while moving from top to bottom? (2)
Q.8 Elements in a group of periodic table have similar chemical properties why? (2)
Q.9 Explain why atomic number is more important than atomic weight in determining chemical properties? (2)
Q.10 Where in periodic table do we find:
i) elements classified as non metal.
ii) elements forming negative ions.
iii) elements with high melting points.
iv) elements forming positive ions. (1)
Q.11 In a group reactivity of metals increases while those of non metals decreases. Explain. (2)
Q.12 Elements in a group of periodic table have similar chemical properties why. (2)
Q.13 Elements of group 18 are called zero group. Why? (2)
Q.14 Write the electronic configuration of atoms of
a) potassium (K) b) argon (Ar) c) lithium (Li) d) fluorine (F) e) chlorine (Cl) (5)
Q.15 i) Why is potassium more reactive than lithium?
ii) Why is fluorine more reactive than chlorine?
iii) Which is smaller in size Cl or Ar?
iv) Which is smaller in size Li or F?
v) Which is more electronegative F or Cl?
Q.16 The atomic no. of an element is 17.
i) What is its valency?
ii) Whether it is a metal or non-metal?
iii) Whether it is bigger or smaller in size then an element of atomic no. 18?
iv) What type of bonds it will form with elements of group 18?
v) How would its oxide behave with litmus solution? (5)

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**HOTS QUESTIONS**

Q.1 An element has two electrons in its M shell:
   i) Identify the element.
   ii) What type of ion will it form?
   iii) What will be the formula of its chloride?
   iv) Predict the solubility of its chloride?

Q.2 Which among the following elements whose atomic number are given below belong to the same period? Give the reason.
   17, 10, 20, 12, 19, 15

Q.3 Element X with atomic number 12 and element Y with atomic number 17 reacts with hydrogen to form hydrides. Which of them is expected to have high melting points?

Q.4 Why is position of hydrogen not justified in modern periodic table?

Q.5 Give two limitations of Mendeleev’s periodic table.

Q.6 Name two elements for which Mendeleev left space in his periodic table.

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**FORMATIVE ASSESSMENT IV**

**QUIZ**

Q.1 Name the element with atomic number 12.

Q.2 Name a metal in making cans and a member of group 14.

Q.3 Name the most electronegative element in the periodic table.

Q.4 Name the horizontal rows in the periodic table.

Q.5 On moving across the period, atomic size of the element increase or decrease.

Q.6 Who gave the classification on the basis of the musical note.

Q.7 Name two elements belonging to group one which can be cut with the help of knife.

Q.8 What name is given to the elements belonging to group 2 of the periodic table and why?

Q.9 Name the lustrous non-metal having 7 valence electron.

Q.10 Name the highly reactive metal that gives violet colour to flame.

Q.11 Name the gas used in coloured advertising lights having 2 valence electron.

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**DEBATE AND DISCUSSION**

A) Drawbacks of Mendeleev’s and modern periodic table.

B) Achievements of Mendeleev’s and modern periodic table.

C) Advantages of modern periodic table in understanding chemistry.

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**PROJECTS**

1. Power point Presentation on the following topics:
   1. Modern Periodic Table based on the similarity of properties of elements
   2. Contribution by various Scientists towards the development of Periodic Table.
   3. PERIODIC CLASSIFICATION
      a) Making flash cards to study atomic numbers, electronic configuration and other properties of elements.
      b) Make an outline sketch of the Modern Periodic Table.

Value based questions:

1. Shivam helps his friend Rohan in studies. Shivam is topper in the class. Rohan also improved his performance. They like each other and they are good friends.
   (a) What values are proposed by Shivam?
   (b) What type of bond exist between Rohan and Shivam?
   (c) Why are ionic bonds strong?
HOW DO ORGANISMS REPRODUCE?

**GIST OF THE LESSON**

1) Reproduction: process by which living organism produce new individual of their own kind.
2) Creation of DNA copy: when the cell divides into two, each new cell gets a copy of each DNA or chromosomes.
3) Importance of variation: variations are created by DNA copying mechanism during sexual reproduction.
4) Asexual modes of reproduction:
   a) Fission—binary & multiple fission
   b) Fragmentation
   c) Regeneration
   d) Budding
   e) Vegetative propagation
   f) Spore formation
5) Sexual reproduction—
   a) In flowering plant
   b) In human beings
6) Parts of flowers
7) Pollination: self and cross pollination
8) Fertilization: male and female germ cell fuses to form zygote.
9) Puberty: The age, when reproductive organs become functional,(in female 10-12 years, in male 13-14 years).
10) Male reproductive system in human beings.
11) Female reproductive system in human beings.
12) Reproductive health—
   a) To have awareness about STDs, (sexually transmitted disease).
   b) Some common STDs are gonorrhea, syphilis & HIV-AIDS.
13) Contractive methods: to avoid pregnancy—
   a) barrier method   b) chemical methods   c) surgical methods
MIND MAP

**How Do Organisms Reproduce**

- Spore Formation: Mucor
- Fission: Binary, Multiple
- Regeneration: Planaria
- Fragmentation: Sponge
- Budding: Hydra, Yeast
- Vegetative Propagation: leaf - Bryophyllum, stem - rose, root - carrot

**DNA Copying**
- Mechanism creates variation for survival of species

**Reproduction**
- Creating new individuals that look very much like the parent

**Asexual (Single parent)**

**Sexual (Male-Female)**

- Plants
  - Anther
  - Stamen
  - Pollen
  - Stigma
  - Style

- Human Beings
  - Male Gamete
  - Female Gamete
  - Fertilization
  - Zygote

**Contraceptives to avoid pregnancy and population explosion**
- Condom for avoiding pregnancy and STDs

**Reproductive Health**
FORMATIVE ASSESSMENT-III

Very short answer type questions:
Note: each question carries 1 mark.
1) What is reproduction?
2) Have you seen seeds of rose or potato? Name some plants whose seeds you may have seen.
3) Can an amoeba and hydra reproduce like human beings?
4) What changes are observed in the uterus if fertilization occurs?
5) Define fertilization?

Short answer type questions
Note: each question carries two marks:
1) In the human body, what is the role of (a) seminal vesicles (b) prostate gland?
2) State the difference between menarche and menopause?
3) What is variation? Mention the importance of DNA copying in reproduction.

HIGHER ORDER THINKING SKILLS(HOTS) QUESTIONS

1) Give two reasons for the appearance or variation among the progeny formed by sexual reproduction.
2) Colonies of yeast fail to multiply in water but multiply in sugar solution. Give one reason.
3) Malaria parasite divides into many daughter individual simultaneously through multiple fission. State an advantage the parasite gets because of this type of reproduction.
4) What is the importance of DNA copying in reproduction?
5) How does reproduction help in providing stability to population of species?
6) Why is vegetative propagation practised for growing some types of plants?
7) Why would be the reason for adopting contraceptive methods?
8) Name those parts of flower, which serve the same function as the following do in the animals a) testies b) Eggs, c) Ovary, d) Sperms.

*Activity* - to grow rhizopus & prepare its temporary slide.
Aim: to show asexual reproduction in an organism.
App: slice of bread, water, box, slide, cover slip.
Procedure: children grow rhizopus on slice of bread and make a temporary slide.

*Project: 1.a* To study manner of vegetative reproduction in some commercially useful plants.
2) To study the seeds during sprouting period.

1. Separating the various parts of any 5 flowers displaying and comparing them.
2. Growing some plants by vegetative propagation.

*Seminars:* reproductive health and sexually transmitted disease: children form groups and discus
*Symposium*: gender related problems: female infanticide.

*Group discussion*: if there was no sexual reproduction.....

*Debate*: is it necessary to learn about reproductive health from class VII?
TOPIC 4: HEREDITY AND EVOLUTION

POINTS TO REMEMBER:

1. HEREDITY: Transmission of features or characters from one generation to another or from parents to offspring through their genes.

2. VARIATION: It occurs due to sexual reproduction, inaccuracies during DNA replication (mutation) and due to environmental factors.

3. GENETICS: Branch of biology dealing with the study of heredity and variations.

4. ALLELES: There is one pair of alleles which can express itself whether present in homozygous state or heterozygous state. Eg – T (tallness in pea plant), R (round seeds in pea plant).

5. GREGOR JOHANN MENDEL: (1822-1884): He is known as the father of ‘genetics’. He worked on Sweet pea plant (pisumsativum).


7. PHENOTYPE: Visible traits of an individual. Eg – Tallness or Dwarfness.

8. EVOLUTION: Gradual changes in traits of organisms from pre-existing organisms is called evolution.

9. SPECIATION: It may take place when variation is combined with geographical isolation. (Formation of new species)
MIND MAP

HEREDITY AND EVOLUTION

Gregor Johann Mendel
(Father of Genetics)
Worked on
"Pisum sativum"

Evolution Evidences

Speciation

Sex Determination

Genetics

Genotype Phenotype

Heredity & Variation

Homologous Organs

Analogous Organs

Feet

Wings of Bird

Remnants of

Wings of Bird

Analogy

Vertebral Column

Wrist bone in Humans

Tail bone in Animals

Hands of Man

Forelimbs of Horse
FORMATIVE ASSESSMENT –III

TICK THE CORRECT OPTION:

1. The number of chromosomes in human ovum is
   a. 21    b. 22    c. 23    d. 24
2. An example of homologous organs is
   a. our arm and a dog’s foreleg  b. our teeth and an elephant’s tusk
   c. potato and runners of grass.  d. all of these.
3. The hereditary units are:
4. The science dealing with biotechnology is called.
   a. Heredity and variation  b. paleontology  c. genetics  d. Genetic engineering

HOTS

1. If a trait exists in 10% of a population of an asexually reproducing species and a trait B in 60% of the same population which trait is likely to have arisen earlier?
2. Which of the following is not the example of artificial selection?
3. Explain how advantages variations like long neck help an organism like Giraffe to survive better?
4. Which of the following is the clearly acquired trait in human beings?
5. Why are human beings, who look different from each other size and colour belongs to the same species?
6. Acquired characters are not inherited. Give reasons.
7. All the human races like Africans, Asians, Europeans and others might have from common ancestors provide few evidence in support of the view.
8. How is genetic drift different from natural selection? From the diagram given below which case shows natural selection?
   Refer to diagram 9.7 , page 147 of textbook.
Observe the diagram properly, mention the ratio of round, yellow seeds and wrinkled, green seeds.
Refer to diagram 9.5, page 145 of text book.

9. From the figures given below, make a pair of homologous and analogous organs. Also justify the answer.
Refer to page 132, diagram 9.8, of text book.

**FORMATIVE ASSESSMENT – IV**

**QUIZ**

A. Decomposers are also called _________
B. Producers prepare their ______________
C. Ozone layer is destroyed by ___________
D. Ecology is the study of the interaction of_________ with each other and their surroundings.

**SEMINAR**

A. Mendel’s work
B. Sex determination in organisms
C. Role play
D. Student in act as Aristotle, Darwin, Lemark and Mendel and present the work done by these great people.
GROUP DISCUSSION

If Mendel had met!

Projects: 1. Save Tiger….. Children collect information about the Tigers from various national Parks and Wild life sanctuaries. Perform the stage shows to develop the awareness about the forests and wild life.
3. To collect information on artificial selection carried out in some crops and animals. Visit to Veterinarycollege.
4. Visit to an agricultural research Institute to understand the various techniques involved in Hybridisation.
5. Conducting a survey on
   A. Evolution of wisdom teeth in parents.
   B. Free and attached earlobes.
   C. Rolling of tongue.
   D. Finger prints.

Debate: Use of Biotechnology in Human Welfare.

Activity: To study vestigial organs in Human beings. Students define vestigial organs and discuss the use of every part of the body. Then come to the conclusion.
CHAPTER 5 REFLECTION AND REFRACTION

Key concepts and terms:
1) **Light**: light is a form of energy. It brings the sensation of sight. It is a form of electromagnetic radiation. It also provides us means of communication (Fiber-optics).

2) **Light wave**: light wave travels with a speed of $3 \times 10^8$ m/s in free space. Its speed depends on the medium.

3) **Ray and beam**: the straight line indicating the path of the light (arrow- direction is called a ray. A bundle of rays originating from the same source of light in a particular direction is called a beam of light.

4) **Reflection**: when light falls on a surface and gets back the same medium, it is called reflection.

5) **Image**: the point of convergence or the point form where the light appears to diverge after reflection or refraction is called image.

6) **Angle of incidence**: the angle between the incident ray and the normal at the point of incidence is called angle of incidence.

7) **Angle of reflection**: the angle between the reflected ray and the normal at the point of reflection is called angle of reflection.

8) **Laws of reflection**: 1) the incidence ray the reflected ray and the normal at the point of incidence, all lie in the same plane.

9) **Aperture**: the width of the reflecting surface is called aperture.

10) **Focus**: the point on the principle axis where all parallel rays meet after reflection is called principle focus.

11) **Focal length**: the length or separation between the pole and the focus is called focal length ($PF = f$)

12) In order to draw ray diagram, two rules are used:

   1) The rays of light passing parallel to the principle axis will coverage at the focus after reflection.

   2) The rays of light passing through the focus will emerge parallel to the principle axis after reflection.

   3) The rays of light passing through the center of curvature will all retrace their both after reflection,(as it is normal at the point of incidence)

   4) The rays of light falling at the pole get reflected at the same angle on the other side of principle axis. (Laws of reflection)

13) **Relation between radius of curvature and focal length** It is two times the focal length i.e. $R=2f$.

14) **Mirror formula**: $1/f = 1/v + 1/u$ where $f$, $v$ and $u$ are the focal length, image distance and object distance.

15) **Lens formula**: if $u$, $v$ and $f$ are the object distance, image distance and focal length respectively then $1/f=1/v-1/u$

16) **Magnification of a lens**: $m= \frac{\text{size of image} (h_1)}{\text{size of object} (h_0)}$ also $m= \frac{(h_1)}{(h_0)} = \frac{v}{u}$.

17. **Magnification of a mirror** : $m = \frac{\text{size of image} (h_1)}{\text{size of object} (h_0)}$

18. Power of the lens is defined as the reciprocal of its focal length. $P=1/f$, Unit-Dioptre(D);

1D is the power of the lens whose focal length is 1 metre.

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MIND MAP

Reflection of Light

1. Types of mirrors
   - Convex
   - Concave

2. Laws
   - $\frac{1}{f} + \frac{1}{v} = \frac{1}{u}$
   - $\theta_i = \theta_r$
   - Same plane, normal, reflected ray

3. Image
   - Real
     - Can be formed on screen
   - Virtual
     - Cannot be formed on screen

4. Pole of mirror
   - $O$

5. Terms
   - Center of curvature $C$
   - Focus $F$
   - Radius of curvature $R$
   - Focal length $f$
   - $CP = 2FP$

6. Uses
   - Headlights
   - Shaving mirrors

Chapter 3: Diagrams
FORMATIVE ASSESSMENT –III
(Pen Paper Test)

1) If the speed of light in a medium is \(2 \times 10^8\) m/s, then its refractive index is:
   a) 1  b) 10 cm  c) 1.5  d) 0.5

2) The power of sunglasses is
   a) 20 D  b) 10 cm  c) 25 cm  d) zero

3) The refractive index of diamond is 2.42. What is the meaning of this statement in relation to the speed of light?

4) Draw a ray diagram and show the image formed by a concave mirror when the object is kept at focus.

5) An object is placed at a distance of 10 cm in front of convex mirror of focal length 15 cm. Find the nature and position of image.

6) 1) Two thin lenses of power +3.5 D and -2.5 D are placed in contact. Find the power & focal length of lens combination?
   1) Define 1) Snell’s law of refraction of light. 2) Pole of a concave mirror.

7) An object of size 4 cm is kept at a distance of 20 cm from the optical center of a converging lens of a focal length 10 cm. Calculate the distance of image from the lens and the size of the image.

8) a) Define magnification. Write the sign convention used for expressing it.
   b) Using lens formulae, find the position of image, its nature and magnification formed by a concave lens of focal length 20 cm and the object is at 15 cm.

FORMATIVE ASSESSMENT –IV

1) QUIZ:
   1) Name the place where image is formed in the eye?
   2) Name the muscular diaphragm that controls the size of the pupil?
   3) What is the cause of dispersion of light?
   4) Which color has got more wave length?
   5) How many colors evolve when white light disperses?
   6) What is the reason for the different deviation?
   7) Who discovered that white light consists of seven colours?
   8) What makes bees respond the ultraviolet light?

Oral questions:

1) What is a ray?
2) A Lemon placed in water appears larger in size due to ________________
3) What does the negative sign of magnification of a mirror indicate?
4) What is the relation between focal length and radius of curvature of a spherical mirror?
5) What is the range of vision of normal human eye?
6) What do you mean by lateral displacement?
7) Magnification produced by convex mirror for object of size 5 cm is \(\frac{1}{2}\) what is the size of image?
8) What is the real image?
9) A ray of light strikes at 45 degree on a mirror. what is a angle of incidence and reflection?
10) What is power of accommodation?

**Home assignment:**
1. What do you mean by Power of the lens?
2. What is the lens formula? Write the sign convention for various mirror and lens.
3. Name the lens/mirror in the following situations;
   i) Rear View mirror ii) magnifying Glass iii) Mirror with Dentist iv) Correction of Myopia.
4. The power of the lens is -2D. What is the focal length and nature of the lens?

**Project Work:**
1. To find the focal length of the given concave mirror using candle light.
2. Study the phenomena of refraction of light in different medium (Glass slab, Plastic, etc)
**MIND MAP**

**Refraction** occurs as the speed of light is different in different medium.

**Snell’s law of refraction.**

Ref. index = speed of light in Vacuum/speed of light in medium. \( n = \frac{c}{v} \)

**REFRACTION**; Deviation in the path of light when light travels from one medium to the other.

- **i** - Angle of incidence
- **r** - Angle of refraction

Lesser the refractive index; the medium is optically rarer

Greater the refractive index; the medium is denser.

Optical density is the ability of the lens to bend light either towards or away from the normal.

Convex lens forms real and virtual image. The real image is diminished, same size and enlarged depending on the distance \( u (u > 2f; u = 2f; u < 2f) \)

The virtual image is formed.

Concave lens always forms virtual image and diminished image.

**Len’s Formula:** \( \frac{1}{v} - \frac{1}{u} = \frac{1}{f} \)

Power of a lens = \( \frac{1}{f} \) where \( f \) is in metre.

Unit of Power = Dioptre.
THE HUMAN EYE AND THE COLOURFUL WORLD

Key concepts and terms:
1. Eye: The natural optical device using which man can see objects around him. It forms an inverted, real image on a light-sensitive surface called the retina.

Refer to NCERT figure 11.1 page no. 187
2. Power of accommodation: The maximum variation in power of the lens so that the far-off and near-by objects are viewed is called power of accommodation.
3. Near point of eye: The minimum distance between the object and the eye so that a clear image is formed on the retina. This distance is 25 cm.
4. Far point of eye: The farthest point up to which the eye can see objects clearly is called the far point of the eye. It is infinity for normal eye.
5. Persistence of vision: The time for which the impression or sensation continues in the eye is called the persistence of vision. It is about 1/16th of a second.
6. Myopia or short sightedness: Inability of the eye in viewing long distance objects. It is caused due to: i) excessive curvature in the eye lens ii) elongation of eye ball. It is corrected by using concave lens.
7. Hypermetropia or long-sightedness: The inability of the eye in viewing the nearby objects. It is caused due to: i) greater focal length of the lens ii) eyeball becoming smaller. It is corrected by using convex lens.
8. Presbyopia: In human eye, with age, the near point recedes and the far point get reduced. The eye becomes both myopic and hypermetnic. This is caused due to: i) weakening of ciliary muscles and ii) reducing ability of the lens to change the curvature. It can be corrected by using bifocal lens.

9. Dispersion: The process of splitting of white light into its seven constituting colours is called dispersion. The band of seven colours is called spectrum of visible light.
   - Rainbow is a natural spectrum which is caused by dispersion of sunlight by tiny water droplets, present in the atmosphere.
10. Atmospheric refraction: The optical density of our atmosphere decreases with altitude. Thus a ray of light entering any layer of the atmosphere suffers refraction as it travels through the other layers. This is called atmospheric refraction. Natural phenomena which occur due to atmospheric refraction are: a) twinkling of stars b) Advance sunrise and delayed sunset.
11. Scattering of light: The earth’s atmosphere consists of gases and many kinds of particles. When light falls on such particles it get scattered in all directions. Smaller particles scatter blue light to a larger extent than the red light. Natural phenomena which occur due to scattering of light are: i) blue colour of sky b) Reddening of the sun at sunrise and sunset.
The Human Eye and The Colourful World.

Human eye

- The human eye is one of the most valuable and sensitive sense organs.

Parts of eye
1. Cornea
2. The Irid
3. Pupil
4. Eyelens
5. Retina
6. Rod
7. Cone

1) Far point - Infinity
2) Near point - 25 cm

Defects of vision
- Myopia
- Hypermetropia
- Presbyopia

Causes:
- 1) Focal length is too great or eye ball becomes short
- 2) Due to elongation in the focal length

Correction:
- Concave lens of suitable focal length

Causes:
- The power of accommodation of the eye decreases with ageing due to weakening of ciliary muscle

Correction:
- The defect can be corrected by using two focal lenses of suitable focal length, such persons may suffer from myopia and Hypermetropia.
FORMATIVE ASSESSMENT – III

Give reason for the following:

1) Red light is used for danger signal

2) Cause of Colour blindness.

3) Sky appears black in Moon.

4) Rainbow is seen on a rainy day in the presence of sunlight.

4) A person with a myopia eye cannot see objects beyond a distance of 1.5m. What would be the power of corrective lens? Which type of lens is used?

5) What do you understand by myopia? Write two causes of it?

6) What do you mean by far point and near point of eye?

7) What is presbyopia? State the cause of it and how is it corrected?

8) Explain:  
1) why does sky look blue on a clear day
2) Twinkling of stars.

9) What is hypermetropia? State two causes of hypermetropia with help of ray diagrams.

HOTS

1. Why does it takes sometimes to see in a dim room when you enter the room from bright sunlight outside?
   ANS: In the bright iris causes the pupil to become smaller so that only a small portion of light enter the eye and rods of the retina are also adjusted in the same way. but when a person enter in to dim light each iris takes sometimes to increase the diameter of the pupil so that more amount of light can enter the eyes to see the objects clearly and rods of the retina also takes some time to adjust themselves to get the picture of the object in the dim light.

2. Can we see a rainbow on the moon?
   ANS: No, since there is no atmosphere on the moon.

3. Does a beam of light give a spectrum on passing through a hollow prism?
   ANS: No, this is because dispersion of light cannot occur through a hollow prism containing air.

FORMATIVE ASSESSMENT – IV

QUIZ: A

1. Name the place where image is formed in the eye?
2. Name the muscular diaphragm that controls the size of the pupil.
3. What is the cause of dispersion of light?
4. Give the cause of cataract of eye.
5. Which color has got more wavelength?
6. What makes bees respond to ultraviolet light?

Quiz:B

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1) What is the focal length of a plane mirror?
2) Which of the two has a great power, a lens of shot focal length or a lens of large length?
3) What does m= +1 stand for?
4) What is the power of a lens if its focal length is 50cm?
5) What is the nature of image at retina?
6) Name the point inside the lens through which a ray of light goes deviated?
7) What is the S.I. unit of power of a lens?

**Home Assignment**

1. Name the photographic film equivalent to our eye .
2. Why does a glass slab not disperse white light?
3. Why do we not perceive the depth of a lake?
4. Name two causes of Myopia, Hypermetropia and presbiopia.
5. Name the liquids that keep our eye soft.
6. What causes rainbow formation?
7. What is Mirage?

**Project work:**

1. To understand the dispersion of light with help of activity?
   (Hint: materials, an irregularly shaped glass, white screen).
2. List, observe, reason and explain three cases of nature where dispersion happens.
   (hint: 1) Sun rise and sun set  2.Formation of rainbow.3.Twinkling of stars)
3. Draw a labeled diagram of human eye and explain the function of retina, cornea, pupil, rods, and cones?

**seminar:** (students will be divided into groups 7 they will present papers on the topic)

*Topic* - PROBLEMS OF VISION:

2) Means to overcome and Corrective measure
GIST

1) **Natural resources:** it is stock of the nature such as air, water, soil, minerals, coal, petroleum, forest and wildlife that are useful to mankind in many ways.

2) **Pollution:** it is defined as the undesirable change in physical, chemical or biological characteristics of our soil, air or water, which harmfully affect human lives or the lives of other species.

3) **pH of water:** pH stands for ‘potential of hydrogen’. The acidic and basic character of aqueous solutions can be described in terms of hydrogen ion and hydroxyl ion concentration. A pH below 7 indicates an acid solution and above 7 indicates an alkaline solution.

4) **Three R’s to save the Environment:** We can reduce pressure on the environment by applying the maxim to ‘Reduce, Recycle and Reuse’ in our lives.

5) **Sustainable Development:** It is the development which can be maintained for a long time without undue damage to the environment.

6) **Need to manage our Resources:** Our natural resources are limited. With the rapid increase in human population, due to improvement in health care, the demand for all resources is also increasing.

7) **Biodiversity:** It is the existence of a wide variety of species of plants, animals and microorganisms in a natural habitats with in a particular environment or of genetic variation with a species.

8) **Wildlife:** It means all those naturally occurring animals, plants and their species which are not cultivated, domesticated and tamed.

9) **Water harvesting:** It means capturing rainwater where it falls or capturing the run off in a local area and taking measures to keep the water clean by not allowing polluting activities to take place.

10) **Fossil Fuels:** These fuels are obtained from the remains of plants and animals, which got buried beneath the earth millions of years ago, changed into coal, petroleum and natural gas due to excessive heat and high pressure inside the earth.

11) **Coal:** It contains chiefly carbon and its compounds mainly nitrogen, oxygen, sulphur and hydrogen. It also contains inorganic matter.

12) **Non-renewable Energy Sources:** These are energy sources which cannot be replaced easily when they get exhausted and are also called conventional sources of energy. E.g.: Fossil fuels.

13) **Uses of Fossil Fuels:**
- Coal: Thermal power plants and steam engines
- Petroleum: Petroleum products like petrol and diesel are used as means of transport.

14) **Management of Fossil fuels:** The natural gas is a good alternative to fossil fuels like coal and petroleum. The use of alternative source of non-conventional source of energy such as solar energy, wind energy, biomass energy etc. Should be promoted to save the reserves of fossil fuels. Biogas can also be used for various purposes.

**MIND MAP**
FORMATIVE ASSESSMENT –III
(paper pen test)

Q 1. i) Which one of the following started chipko movement  
ii. From the list given pick the item that is not a natural resource?  
a. soil b. water c. air d. Electricity  
iii. The pH range most conductive for life of fresh water plants and animals is  
a. 6.5-7.5 b. 2.0-3.5 c. 3.5-5.0 d. 9.0-10.5  

Q 2. What are renewable resources? How are they different from non-renewable resources?  
Q 3. What would be the advantages of exploring resources and long term aim?  
Q 4. Why should there be equitable distribution of resources?  
Q 5. Why are coal and petroleum known as fossil fuels? Why do we need to conserve them?  
Q 6. Name the three “Rs” to save the environment? Explain how each of them is beneficial for mankind?  
Q 7. Who are the stakeholders in forest? Why do we think so?  

HOTS  
1. What do you mean by Bio-Reserves? What are their objectives?  
2. Explain the main points of difference between Agro Forestry and Urban Forestry Programme.  
3. Beautiful Landscapes are of great value to Human Beings. Explain.
FORMATIVE ASSESSMENT –IV

QUIZ

1. Chipko Andolan originated in
   a. Kerala  
   b. Rajasthan 
   c. Uttarakhand  
   d. Karnataka
2. Kulhs are irrigation Canals of
   a. Rajasthan 
   b. Karnataka 
   c. Himachal Pradesh  
   d. Assam
3. Which of the following is greenhouse gas?
   a. Sulphurdioxide  
   b. Carbon monoxide 
   c. Carbondioxide  
   d. Nitrogen dioxide
4. Which of the following bacteria is found in Gangawater?
   a. Coliform bacteria 
   b. Streptococcus bacteria 
   c. Staphylococcus bacteria  
   d. Diplococcus bacteria
5. Stake holders of forest resources in India are
   a. Local people and industries 
   b. NGO 
   c. Forest enthusiasts  
   d. All of these
6. Arabari forest of Bengal is dominated by
   a. Teak 
   b. Sal 
   c. Bamboo  
   d. Mangrove
7. Which of the following are to be managed for sustainable developments?
   a. Industries 
   b. Forest 
   c. Crops  
   d. Resources
8. Red data book provides a list of:
   a. Protect animals  
   b. Rear animals for milk 
   c. Entrap animal 
   d. Both a & b
9. Sardarsarover dam is situated on river
   a. Gangab. Narmada  
   c. Yamuna  
   d. Godavari
10. Pynes System of irrigation is common in:
    a. Bihar 
    b. Madhya Pradesh 
    c. Rajasthan  
    d. Himachal Pradesh

Debate:
Topic “Money spent on protection of wild life should actually be spent for the welfare of poor people”

Seminar:
Reading papers by the students on the following topics:
 i. River water pollution –source and solution
 ii. Sustainable development

Symposium
 i. Global warming and melting Himalaya –a controversy”
 ii. Save the tiger.

Home Assignment
1. Making a model to show Rainwater Harvesting.
2. Carry out a survey in your locality where Rainwater is being harvested.
3. Record the mode of transport used by your classmates.
4. Find out the amount of diesel/petrol used by families of your classmates.
5. Checking the PH of water from various sources.
**Topic 8  OUR ENVIRONMENT**

**GIST**

1. **ECOLOGY** – The study of the interaction of living organisms with each other and their surrounding is called ecology.
2. **ENVIRONMENT** – Everything that surrounds organisms and influences its life.
   a) Biotic components of environment – The living organisms e.g. Plants and animals.
   b) Abiotic components of environment – the nonliving components like air, light, etc.
3. **ECOSYSTEM** – All interacting organism in area =together with the nonliving constituents of environment. (Functional unit of an environment)
4. **PRODUCERS** – They make the energy from sunlight available to the rest of the ecosystem.
5. **CONSUMERS** – Living beings which depend on other sources for food are called consumers.
6. **BIODEGRADABLE** – Substances that are broken down by the action of bacteria or saprophytes e.g. Paper.
7. **NONBIODEGRADABLE** – Substances that are not broken down by the action of bacteria or saprophytes e.g. Plastic.
8. **FOOD CHAIN** – The process of transfer of energy from one organism to the other organism by the process of eating and being eaten.
   
   Grass → Grasshopper → Frog → Snake
9. **FOODWEB** – It is a network of food links between populations in a community.
10. **10% LAW OF ENERGY FLOW** – The energy available at any trophic level in a food chain is 10% of the previous one. It was given by Scientist Lindmann.
11. **BIOLOGICAL MAGNIFICATION** – Progressive accumulation of non-biodegradable waste at various trophic levels of food chain.
MIND MAP

Our Environment

Ecosystem

Biota
- Plants
- Animals
- Microbes

Abiota
- Temperature
- Oxygen
- Humidity
- Water

Energy Flow in Ecosystem

Trophic Levels

Food Chain
- Organisms taking part at various trophic levels form a food chain.
- Grass → Insect → Frog → Snake → Eagle

Food Web
- Interlinking of food chains forms a food web.
- Grass → Insect → Bird → Owl
- Plant → Insect → Rat → Cat
- Plant → Rabbit

Some solar radiation is reflected by the Earth & the atmosphere.
Infrared radiation is emitted from the Earth's surfaces.
HIGHER ORDER THINKING SKILLS (HOTS) QUESTIONS

1. Write any two ways of energy flow through an ecosystem.
2. Differentiate between biodegradable and non biodegradable with respect to the effect of biological processes on them and the way they affect our environment.
3. Which level shows the maximum biological magnification? Why?

[Diagram of Upright Pyramid of biomass in a terrestrial ecosystem]

4. Why is pond self-sustaining unit while an aquarium may not be? Justify the answer.
5. Arrange grasshopper, frog, grass, eagle and snake in the form of food chain.
6. If 1000 KJ energy is available at producer level, how much energy will be available at first carnivore level?
7. Why do most food chains have 3-5 steps only?
8. Select the biodegradable items from the list given below:
   - Polythene bags, old clothes, wilted flowers, pencil shavings, glass bangles, bronze statue, vegetable peels.
9. What will be impact on ecosystem if bacteria and fungi are removed from the Environment?
10. Express your feelings on the picture given down below. What will happen if all Carnivores are eliminated from the environment? What measures will you take to save Tiger?
FORMATIVE ASSESSMENT - III

Very short answer questions:
NOTE: Each question carries one mark.

TICK THE CORRECT OPTIONS:

1. Ozone layer is destroyed by
   a) SO₂    b) Smog    c) CFCs    d) CO₂
2. Which of the following is biodegradable?
   a) Cow dung    b) Plastic    c) DDT    d) Radioactive wastes
3. Vegetables peels, waste paper, wood carvings and egg shells can be used to make
   a) Bricks    b) Compost    c) Urea    d) None of these
4. Which of the following is constituent of food chain?
   a) Grass, wheat and mango    b) Grass, goat and human
   c) Goat, cow and elephant    d) Grass, fish and goat
5. Acid rain is caused by precipitation of
   a) Oxides of sulphur    b) CFCs    c) Ozone    d) CO₂

SHORT ANSWER QUESTIONS:
EACH QUESTION CARRIES TWO MARKS:
1) Classify the followings as decomposers and producers Green plants, bacteria, fungi, algae, blue green algae.
2) Distinguish between producers and consumers.
3) Name two environment friendly practices.

ANSWER THE FOLLOWING QUESTIONS:
EACH QUESTION CARRIES THREE MARKS
1. How is ozone depletion caused? Name the compounds causing it.
2. What is meant by biodegradable waste? Which of the following are biodegradable?
   Agriculture residue, plastic, insecticides, sewage.
3. What is being done to avoid ozone depletion? (Three steps)
4. What is meant by a trophic level? Why do we have a greater number of organisms at lower levels?
   **Long answer (5 marks)**
5. Describe any five modes of disposal of wastes.

**FORMATIVE ASSESSMENT – IV**

**Quiz:**
1. Ozone layer is destroyed by ________________.
2. Ecology is the study of the interaction of _______ with each other and their surroundings.
3. Decomposers are also called ________________.
4. Water, air, light and temperature are the examples of _______ components.
5. Consumers _______ manufacture their own food and depend on plants and other animals for their feed.

- **Seminar:** Children discuss ways and means to reduce the problems given below: 
  a) Ozone depletion  
  b) Garbage disposal
- **Symposium:**
  Environment problems: Groups mention the problems they are facing in day today life.
- **Group discussion**
  Role of students in bringing awareness among community members on ill effects of polythene bags.
- **Activities:**
  a) To study the ill effects of using some chemical like CFCs, nitrogenous fertilizers, DDT etc.
  b) Field trips: Visit to a botanical garden.
    1. Role play of food chain and food web by class students.
    2. Skit/Action Song on Banning of plastics.
    3. Write a passage on ‘Autobiography of plastics.’

**VALUE BASED QUESTIONS**
1. Plastic production is increasing day by day inspite of the fact that plastic is harmful for the environment. Based on the above statement answer the following:
   (a) what are the harmful effects of plastic usage?
   (b) what are the alternatives that we can use instead of plastics?
   (c) what value will you get from this passage?
2. My sister is in habit of keeping the tap open while brushing her teeth. She loves to bath under shower. My neighbour uses hose pipe attached to drinking water supply pipe for washing his scooter and car. According to me their way of handling the most precious resource water in absolutely wrong. On the basis of the above information answer the following question:
   (a) do you agree with me or not?
   (b) what changes in the above situation can be done to conserve water.
   (c) what values are promoted by me?
References:

Science - Textbook for class IX - NCERT Publication

Science - Textbook for class X - NCERT Publication

Assessment of Practical Skills in Science - Class IX - CBSE Publication

Assessment of Practical Skills in Science - Class X - CBSE Publication

Laboratory Manual Science - Class X, NCERT Publication
SUMMATIVE ASSESSMENT – I
SCIENCE (Theory)
Class – X

Time allowed: 3 hours
Maximum Marks: 90

General Instructions:
a) All questions are compulsory.
b) The question paper comprises of two sections, A and B. You are to attempt both the sections.
c) Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
d) Questions 4 to 6 in section A are two marks questions. These are to be answered in about 30 words each.
e) Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
f) Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
g) Questions 25 to 27 in section B are 2 marks questions and Questions 28 to 36 are multiple choice questions based on practical skills. Each question of multiple choice questions is a one mark question. You are to select one most appropriate response out of the four provided to you.

Section A

1. Define Electrolysis.
2. What is breathing?
3. A wire of resistance 10Ω is bent in the form of a closed circle. What is the effective resistance between the two points at the ends of any diameter of the circle?
4. A calcium compound which is a yellowish white powder is used as a disinfectant and also in textile industry. Name the compound. Which gas is released when this compound is left exposed to air?
5. Name the ovarian hormones and give the function of any one of them.
6. What is the difference between direct and alternating currents? Write one important advantage of using alternating current.
7. Balance the chemical equation:
   (a) HNO₃ + Ca(OH)₂ → Ca(NO₃)₂ + H₂O
   (b) NaOH + H₂SO₄ → Na₂SO₄ + H₂O
   (c) NaCl + AgNO₃ → AgCl + NaNO₃
   (d) BaCl₂ + H₂SO₄ → BaSO₄ + HCl
8. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.
9. (i) Differentiate between ‘strong’ and ‘weak’ electrolyte.
   (ii) Select the strong electrolytes from amongst the following:
        Molten NaCl, glacial acetic acid, strong ammonium solution, dil. HCl
10. Give reasons:
    (a) Germanium is called a metalloid.
    (b) Zirconium is known as a strategic metal.
    (c) Nitrogen in used to preserve food.
11. (a) What are strategic metals? Give one example also.
    (b) State the reason for the following behaviour of Zinc metal: On placing a piece of Zinc metal in a solution of mercuric chloride, it acquires a shining silvery surface but when it is placed in a solution of magnesium sulphate no change is observed.
12. What is the function of epiglottis in man? Draw a labelled diagram showing the human respiratory system.
13. Draw a diagram of the front view of human heart and label any six parts including at least two, that are concerned with arterial blood supply to the heart muscles.
14. Draw the diagram of a neuron.
15. In a household 5 tubelights of 40 W each are used for 5 hours and an electric press of 500 W for 4 hours everyday. Calculate the total electrical energy consumed by the tubelights and press in a month of 30 days.
16. Aslam is a welder by profession who was working at Mohan’s house. After making a ‘railing’ by using electric welding with naked eyes, Aslam was using a grinder on it to smoothen the welding joints. Just then some particles fell into Aslam’s eye. He started crying with pain. Mohan hired an auto and took him to an eye hospital, doctor used a device connected to two electric wires to remove the particles from Aslam’s eye. Aslam asked Mohan what had fallen into his eye and what device was used by the doctor to remove that particle from the eye. Being a science student of class X, Mohan explained everything to Aslam and asked him to be careful in future.

Read the above passage and answer the following questions:
(a) What could be the particle fell into Aslam’s eye?
(b) What device was used by the doctor to remove the particle and how it worked?
(c) What values are shown by Mohan during this episode?

17. Explain the difference between nuclear fission and nuclear fusion reaction with examples. Give reason why the energy due to fusion is not being used to meet our day to day energy needs?

18. With the help of a labelled diagram, describe the working of a solar water heater.

19. With the help of an activity, explain that hydrogen and oxygen are released when electric current is passed through water.

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Explain the following:
(i) Why is the tungsten used almost exclusively for filament of an electric lamp?
(ii) Why are the elements of electric heating devices, such as bread-toaster and electric irons, made of an alloy rather than a pure metal?
(iii) Why is the series arrangement of appliances not used for domestic circuits?
(iv) How does the resistance of a wire vary with its area of cross-section?
(v) Why are copper and aluminium wires usually employed for electric energy transmission?

23. What is electromagnetic induction? Give two methods of inducing electric current in a coil. Explain each method with the help of diagram.

Or

Draw a labelled diagram of domestic circuit. What is the importance of earthing in a circuit?

24. State the principle on which an electromagnet works. Describe an activity to make an electromagnet. Give two uses of electromagnet.

Or

Describe an activity to draw magnetic lines of force around a current carrying (a) straight conductor, (b) circular loop.

Section B

25. Which of the following gas turn limewater milky:
(a) CO₂ (b) SO₂ (c) Both CO₂ and SO₂ (d) Neither CO₂ nor SO₂
Write chemical reactions involved.

26. A student wanted to decolourise a leaf. In which solvent, he should boil the leaf? Justify your answer.

27. The current flowing through a resistor connected in an electrical circuit and the potential difference developed across its ends is shown in figure. Calculate the value of resistance of the resistor in ohms.
28. Given below are the observations reported by four students I, II, III and IV for the changes observed with dilute HCl or dilute NaOH and different materials.

<table>
<thead>
<tr>
<th>Material</th>
<th>Dil HCl</th>
<th>Dil. NaOH</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Moist litmus paper</td>
<td>Blue to red</td>
<td>Red to blue</td>
</tr>
<tr>
<td>II. Zinc metal</td>
<td>React at room temperature</td>
<td>Does not react at room temperature</td>
</tr>
<tr>
<td>III. Zinc metal on heating</td>
<td>Liquid becomes milky</td>
<td>Remains clear and transparent</td>
</tr>
<tr>
<td>IV. Solid sodium bicarbonate</td>
<td>No reaction</td>
<td>Brisk effervescence</td>
</tr>
</tbody>
</table>

The incorrectly reported observation is:
(a) I (b) II (c) III (d) IV

29. Dil. H₂SO₄ cannot be used in preparation of SO₂ because:
(a) It is not a good oxidizing agent.
(b) It is a good reducing agent.
(c) It is bleaching agent.
(d) It is dehydrating agent.

30. A student asked to demonstrate the following two properties of sulphur dioxide gas:

I. It is heavier than air and
II. It is highly soluble in water.

Which two of the following four arrangements would the student use to demonstrate these properties:
(a) I and II (b) II and III (c) I and III (d) II and IV

31. Medulla Oblongata is originated from:
(a) Mesoderm (b) Ectoderm (c) Endoderm (d) Ectomesoderm

32. The innermost layer of the human eye is:
(a) sciera (b) cornea (c) retina (d) lens

33. In the experiment on studying the dependence of current (I) on potential difference (V), four student set up their circuits as shown below:
The best set up is that of:
(a) student I (b) student II (c) student III (d) student IV

34. The following circuit diagram shows the experimental set-up for the study of dependence of current on potential difference. Which two circuit components are connected in series:

(a) Battery and Voltmeter (b) Ammeter and Voltmeter
(c) Ammeter and Rheostat (d) Resistor and Voltmeter

35. For a current in a long straight solenoid N and S-poles are created at the two ends. Among the following statements, the incorrect statement is:
(a) The field lines inside the solenoid are in the form of straight lines which indicate that the magnetic field is the same at all the points inside the solenoid.
(b) The strong magnetic field produced inside the solenoid can be used to magnetize a piece of magnetic material like soft iron, when placed inside the coil.
(c) The pattern of magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.
(d) The N and S-poles exchange position when the direction of current through the solenoid is reversed.

36. Which is the ultimate source of energy:
(a) Water (b) Sun (c) Uranium (d) Fossil fuels
SUMMATIVE ASSESSMENT –II
SCIENCE (Theory)
Class – X

Time allowed: 3 hours

Maximum Marks: 90

General Instructions:
a) All questions are compulsory.
b) The question paper comprises of two sections, A and B. You are to attempt both the sections.
c) Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
d) Questions 4 to 6 in section A are two marks questions. These are to be answered in about 30 words each.
e) Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
f) Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
g) Questions 25 to 27 in section B are 2 marks questions and Questions 28 to 36 are multiple choice questions based on practical skills. Each question of multiple choice questions is a one mark question. You are to select one most appropriate response out of the four provided to you.

Section A

1. Complete the following reaction:
   \[ \text{CH}_3 \text{CH}_2 \text{OH} + \text{Na} \rightarrow \]

2. A mirror is turned through 150°. By what angle will the reflected ray turn?

3. Name the chemicals that cause depletion of ozone layer.

4. For each of the following pairs, state which one is larger in size:
   (a) Na, Na⁺ (b) Be, Mg (c) Br, I (d) Cl, Br

5. Name the scientific terms used to represent the following:
   (a) The branch of biology which studies heredity and variation.
   (b) The transmission of traits from parents to offsprings.
   (c) Differences in a trait in human beings.
   (d) A recognizable feature of an organism.

6. Light coming from the bottom of a water tank does not come out of the water. What should be the minimum angle of incident for the same?

7. Electronic configuration of elements X, Y and Z is given below:
   \[ \begin{align*}
   X &= 2, 7 \\
   Y &= 2, 8, 5 \\
   Z &= 2, 8, 8
   \end{align*} \]
   Write the position of elements in the periodic table.

8. On the basis of electronic structure, how will you select:
   (a) The first element in a period.
   (b) The terminating number in a period.
   (c) The chemically similar elements.


10. Explain various steps of budding in yeast.

11. On the basis of possibilities of combination of these sex chromosomes, what percentage probability does a couple have having of son or a daughter? Show the same by making a cross.

12. It is a well known fact that pregnant woman’s health is a backbone of every family and society. Using the above information, answer the following questions:
   (a) Which tissue is responsible for providing nutrition from mother to growing embryo?
   (b) What according to you can be the likely measures to maintain a woman’s health during pregnancy?
   (c) What value will the learners infer from this passage?
   [Value Base Question]

13. Monochromatic light of wavelength 589 nm is incident from air on a water surface. What are the wavelength, frequency and speed of:
   (a) reflected light (b) refracted light?
   (μ of water = 1.33)

14. A girl in the mirror laughing house finds her face appearing highly magnified, lower portion of her body of the same size but laterally inverted and middle portion of the body highly diminished in size. Can you guess the design of the mirror?
15. Find the position of an object which when placed in front of a convex mirror produces a virtual image, which is half of the size of object.

16. What is dispersion? Which colour deviates the most in a prism? Why does it take place?

17. What are the problems caused by the non-biodegradable wastes that we generate?

18. Write a note on conservation of coal and petroleum.

19. (a) How can we use alcohol as a fuel? What are its advantages?
   (b) How will you prepare soap? Explain the cleansing action of soap.
   (c) Give one use of acetic acid.

   Or

   (a) Name two elements of group 13.
   (b) Name most electronegative element in periodic table. Write its atomic number.
   (c) Give limitations of Dobereiner’s law of triads.
   (d) Why do ionic compounds not conduct electricity in solid state?
   (e) Name the chief ore of iron. Give its formula.

20. (a) Why does carbon form largest number of compounds?
   (b) Why are some of these called saturated and other unsaturated compounds?
   (c) Which of these two is more reactive?
   (d) Write the names of the following compounds:
      (i) CH$_3$CH$_2$Br
      (ii) CH$_3$CH$_2$CH$_2$C≡CH

   Or

   Describe one method for the preparation of ethanoic acid. Give two physical properties and three uses.

21. (a) Explain with an example, how evolutionary relationship is liked to classification.
   (b) A study found that children with light coloured eyes are likely to have parents with light coloured eyes. On this basis can we say whether the light eye colour traits to be dominant or recessive. Why or why not?

   Or

   (a) Why are asexually reproducing organisms capable of showing hereditary features?
   (b) If the sperm bearing Y-chromosome fertilizes the egg, the child born will not be entirely like his father. Why is it so?
   (c) What is the relation between heredity and variation in asexual and sexual reproduction?

22. (a) How can the pea plant be prevented from self pollination? How is cross pollination carried out?
   (b) A normal pea plant bearing coloured flowers suddenly starts producing white flowers. What could be the possible cause?

   Or

   (a) Why is regeneration considered a method of reproduction?
   (b) Is copy of DNA form identical to original cell? If yes or no, How it is beneficial to the species?
   (c) Why variation is beneficial to the species but not necessarily for the individual?

23. (a) Draw a ray diagram showing the path of a ray of light when it enters with oblique incidence
       (i) from air into water
       (ii) from water into air
   (b) Under what condition in an arrangement of two plane mirrors, incident ray and reflected ray will always be parallel to each other, whatever may be the angle of incidence. Show the same with the help of diagram.

   Or

   (a) What is refraction of light? Give an expression to relate the absolute refractive index of a medium with speed of light in vacuum.
   (b) The refractive index of water and glass with respect to air are 4/3 and 3/2 respectively. If the speed of light in glass is $2 \times 10^8$ m/s$^{-1}$, then find the speed of light in (i) air, (ii) water.

24. (a) A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram illustrate this effect. List its two possible causes. Draw a ray diagram to show how this defect may be corrected using a lens of appropriate focal length.
   (b) We see advertisements for eye donation on television or in newspaper. Write the importance of such advertisements.

   Or

   (a) An object is placed at a distance of 15 cm from a convex mirror of focal length 20 cm. Find the position and nature of the image.
(b) Define refractive index. Light enters from air to diamond having refractive index 2.42. Find the speed of light in the diamond. The speed of light in vacuum is $3 \times 10^8 \text{ms}^{-1}$.

Section B

25. (a) Which functional group present in acetic acid?
   (b) Write its suffix (notation).

26. A student is given a permanent slide showing binary fission in Amoeba. The following are the steps in focusing the object under the microscope:
   (i) Place the slide on the stage; look through the eye piece and adjust the mirror and diaphragm to get even illumination.
   (ii) Look through the eye piece and raise the objective using coarse adjustment until the object is focused.
   (iii) Make the focus sharp with the help of the fine adjustment.
   (iv) Look through the eye piece and move the slide until the object is visible.

Now give following answers:
(a) What is the proper sequence of steps?
(b) Justify your answer.

27. (a) While performing the experiment with glass slab, what should be the range of incident angle?
(b) Give reason for your answer.

28. Ethanoic acid was added to Sodium bicarbonate solution and the gas evolved was tested with a burning splinter. The following four observations were reported: I. The gas burns with the pop sound and the flame gets extinguished. II. The gas does not burn but the splinter burns with a pop sound.

III. The flame extinguishes and the gas does not burn.
IV. The gas burns with a blue flame and the splinter burns brightly.

The correct observation is reported in:
(a) I (b) II (c) III (d) IV

29. The odour of ethanoic resembles with:
(a) tomato juice (b) kerosene (c) orange juice (d) vinegar

30. During the budding, division of cell in yeast shows:
(a) Meiosis cell division (b) Mitosis cell division
(c) Both Mitosis and Meiosis cell divisions (d) No cell division occurs

31. The outgrowth of Hydra is termed as:
(a) Bulb (b) Bud (c) Daughter hydra (d) Tentacles

32. Slides A and B show stages of asexual reproduction in two different organisms. The slides A and B are depicting:

(a) Binary fission in both Amoeba and yeast
(b) Budding in both Amoeba and yeast
(c) Binary fission in yeast and budding Amoeba
(d) Binary fission in Amoeba and budding in yeast

33. A cross was made between two plants, one having variegated leaves and the other having green leaves. The F1 generation of this hybrid produced plants all having variegated leaves. What can be the reason?
(a) Traits of variegated leave is dominant
(b) Traits of green leaves is recessive
(c) Both (a) and (b)
(d) None of these

34. Your school laboratory has one large window. To find the focal length of a concave mirror using one of the walls as the screen, the experiment may be performed.
(a) near the wall opposite to the window.
(b) on the same wall as the window.
(c) on the wall adjacent to the window.
(d) only on the table as per the laboratory arrangement

35. Refraction cannot cause bending as light moves from one surface to another if the incident and refraction angles $\theta_i$ and $\theta_r$ are related as:

(a) $\theta_i \neq \theta_r = 0$
(b) $\theta_i = \theta_r = 90^\circ$
(c) $\theta_i = \theta_r = 0$
(d) $\theta_i = 90^\circ, \theta_r = 0^\circ$

36. The three ‘R’ rule that will help us to conserve natural resources for long-term use are:
(a) Recycle, Regenerate, Reuse
(b) Reduce, Regenerate, Reuse
(c) Reduce, Reuse, Redistribute
(d) Reduce, Recycle, Reuse