# STUDENT SUPPORT MATERIAL

## CLASS X

## SCIENCE

तत् त्वं पूषन् अपावृणु

केन्द्रीय विद्यालय संगठन

**Session: 2019-20**


केन्द्रीय विद्यालय संगठन, नई दिल्ली

KENDRIYA VIDYALAYA SANGATHAN, NEW DELHI

संतोष कुमार मल्ल, भा.प्र.से.
आयुक्त
Santosh Kumar Mall, I.A.S.
Commissioner

केन्द्रीय विद्यालय संगठन

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## A WORD TO MY DEAR STUDENTS

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

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

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

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

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

Happy learning!

Santosh Kumar Mall
Commissioner, KVS

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## FOREWORD

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

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

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

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

Best of Luck.

U.N. Khaware
Additional Commissioner (Acad.)

Science

# STUDENT SUPPORT MATERIAL

## ADVISORS

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# INDEX

*Course Structure Class - X (Annual Examination) 2019-2020*

Marks: 80

**COURSE STRUCTURE: CLASS X**

**(Annual Examination)**

**Marks: 80**

| Unit No. | Unit | Marks | Periods |
|---|---|---|---|
| I | Chemical Substances-Nature and Behaviour | 25 | 55 |
| II | World of Living | 23 | 50 |
| III | Natural Phenomena | 12 | 23 |
| IV | Effects of Current | 13 | 32 |
| V | Natural Resources | 07 | 20 |
| | **Total** | 80 | |
| | **Internal assessment** | 20 | |
| | **Grand Total** | 100 | |



**Theme: Materials**

**Unit I: Chemical Substances - Nature and Behaviour**

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

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

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

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

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

**Theme: The World of the Living**

**Unit II : World of Living**

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

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

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

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

**Theme: Natural Phenomena**

**Unit III: Natural Phenomena**

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

**Theme: How Things Work**

**Unit IV: Effects of Current**

Electric current, potential difference and electric current. Ohm's law; Resistance, resistivity, Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R.

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

**Theme: Natural Resources**

**Unit V: Natural Resources**

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

**Out environment: Eco**-system, Environmental problems, Ozone depletion, waste production and their solutions. Biodegradable and non-biodegradable substances.

**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. Big dams: advantages and limitations; alternatives, if any. Water harvesting. Sustainability of natural resources.

**PRACTICALS**

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

**LIST OF EXPERIMENTS**

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

   Studying the properties of acids and bases (HCl&NaOH) by their reaction with:
   a) Litmus solution (Blue/Red)
   b) Zinc Metal
   c) Solid Sodium carbonate
2. Performing and observing the following reactions and classifying them into :
   a) Combination reaction
   b) Decomposition reaction
   c) Displacement reaction
   d) Double displacement reaction
      (i) Action of water on quick lime
      (ii) Action of heat on ferrous sulphate crystals
      (iii) Iron nails kept in copper sulphate solution
      (iv) Reaction between sodium sulphate and barium chloride solutions

OR

3. Observing the action of Zn, Fe, Cu and Al metals on the following salt solutions :
   a) $ZnSO_4$ (aq)
   b) $FeSO_4$ (aq)
   c) $CuSO_4$ (aq)

d) $Al_2(SO_4)_3$ (aq)

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

4. Studying the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also plotting a graph between V and I.
5. Determination of the equivalent resistance of two resistors when connected in series and parallel.
6. Preparing a temporary mount of a leaf peel to show stomata.
7. Experimentally show that carbon dioxide is given out during respiration.
8. Study of the following properties of acetic acid (ethanoic acid) :
   i) odour
   ii) solubility in water
   iii) effect on litmus
   iv) reaction with sodium Hydrogen Carbonate
9. Study of the comparative cleaning capacity of a sample of soap in soft and hard water.
10. Determination of the focal length of : i) Concave mirror ii) convex lens
    by obtaining the image of a distant object.
11. Tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. Measure the angle of incidence, angle of refraction, angle of emergence and interpret the result.
12. Studying (a) binary fission in Amoeba, and (b) budding in yeast with the help of prepared slides.
13. Tracing the path of the rays of light through a glass prism.
14. Finding the image distance for varying object distances in case of a convex lens and drawing corresponding ray diagrams to show the nature of image formed.
15. Identification of the different parts of an embryo of a dicot seed (Pea, gram or red kidney bean).

*QUESTION PAER DESIGN FOR SCIENCE (CODE NO. 086) Class - X (2019-20)*

**Time: 3 Hours** **Max. Marks: 80**

## QUESTION PAPER DESIGN
**Class: IX AND X (2019-20)**
**Subject: Science (086)**

1) Board Examination –Theory

Maximum Marks: 80 Duration : 3 Hours

| Sr. No. | Typology of Questions | Objective Type * (01 mark) | SA (03 marks) | LA (05 marks) | Total |
|---|---|---|---|---|---|
| 1 | **Remembering:** Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers. | 07 | 02 | 01 | 22.5% |
| 2 | **Understanding:** Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas | 04 | 02 | 02 | 25% |
| 3 | **Applying:** Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way. | 04 | 01 | 02 | 21.25% |
| 4 | **Analyzing and Evaluating**: Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria. | 05 | 02 | 01 | 20% |
| 5 | **Creating:** Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions. | - | 03 | - | 11.25% |
| | Total | 20 (20) | 10 (30) | 06 (30) | 100% |

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

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

**Note:** Objective Section would have 10 MCQ. Besides this, the section would include VSA, Assertion-Reasoning type questions etc.

# CHAPTER 1- CHEMICAL REACTIONS AND EQUATIONS

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

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

**3. Types of Chemical Reactions**

| S NO | Types of reactions | Examples |
|---|---|---|
| 1 | **Combination reaction**<br>A single product is formed from two or more reactants. | $2Mg + O_2 \rightarrow 2MgO$ |
| 2 | **Decomposition reaction**<br>A single reactant breaks down to yield two or more products.<br>i) Thermal decomposition | $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$ |
| | ii) Electrolysis | $2H_2O \rightarrow 2H_2 + O_2$ |
| | iii) Photo chemical reaction | $2AgBr \rightarrow 2Ag + Br_2$ |
| 3 | **Displacement reaction**<br>One element is displaced by another element. | $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ |
| 4 | **Double displacement reaction**<br>Exchange of ions between reactants. | $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ |
| 5 | **Redox reaction**<br>Both oxidation and reduction take place simultaneously | $CuO + H_2 \rightarrow Cu + H_2O$ |

**4**. **i) <u>exothermicreaction:</u>** A chemical reaction in which heat energy is evolved.

$$C + O_2 \rightarrow CO_2\,(g) + \text{heat}$$

**<u>ii)Endothermic reaction:</u>**A chemical reaction in which heat energy is absorbed.

$$ZnCO_3 + \text{Heat} \rightarrow ZnO + CO_2$$

**5.<u>Redox reaction:</u>**Chemical reaction in which both oxidation and reduction take place simultaneously.

**<u>Oxidation:</u>** Reaction that involves the gain of oxygen or loss of hydrogen.

**Reduction:** Reaction that shows the loss of oxygen or gain of hydrogen
$ZnO + C \rightarrow Zn + CO$
ZnOis reduced to Zn -reduction
C is oxidized to CO ------oxidation

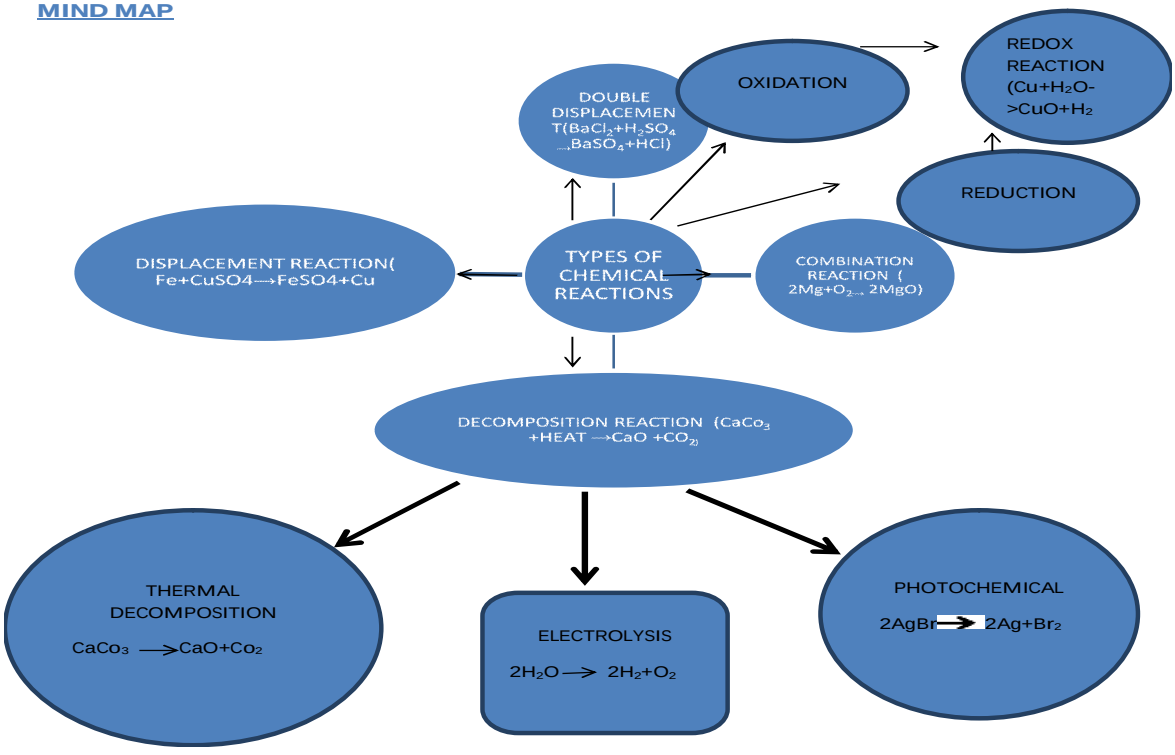
## 6. Effectsofoxidationreactions in our daily life:

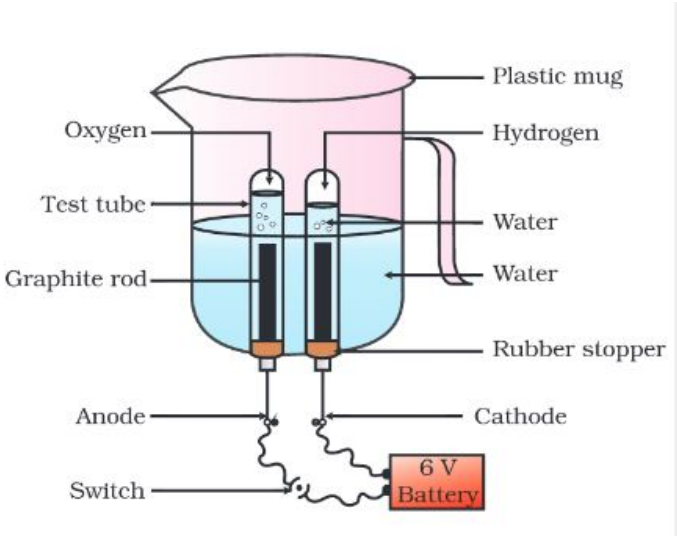
a) **Corrosion**: It is an undesirable change that occurs in metals, when they are attacked by moisture, air, acids and bases.
Corrosion (rusting) of iron**:** $Fe_2O_3. xH_2O$ (Hydrated iron oxide)
Corrosion of copper: $CuCO3.Cu(OH)_2$ (Basic copper carbonate)
Corrosion of silver: Ag2S (Silver sulphide)
Corrosion of Aluminum: $Al_2O_3$ (Aluminum oxide)

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

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

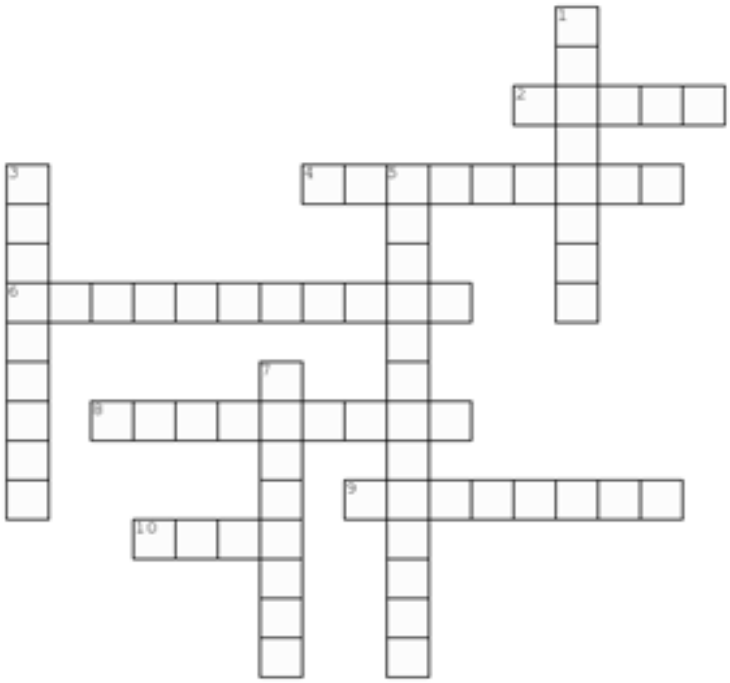
MIND MAP






## CROSSWORD

Complete the crossword belowput the correct word



Created with TheTeachersCorner.net Crossword Puzzle Generator

**Across**

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

**Down**

**1.** Change where new substances produced
**3.** when oil foods are kept for long time
**5.** Single compound broken down into two or more products
**7.** All chemical reactions should be ----

**Very short answer questions. (1 mark)**

1. Identify in the following reaction:

$2PbO + C \rightarrow 2Pb + CO$

a) the substance oxidised and

b) The substance reduced.

Ans: a) Carbon is oxidized to CO.

b)PbO is getting reduced to Pb.

2. A shiny brown coloured element "x" on heating in air becomes black incolour . Name the element "x" and the black coloured compound formed.

Ans:Element 'x'is Copper and the black coloured compound is cupric oxide Cuo

**Short answer type questions (2 mark)**

1. Classify the following reaction as combination,decomposition,displacementand double displacement reaction:-

a) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

**Ans:** Double displacement reaction.

b) $3CuSO_4 + 2Al \rightarrow Al_2(SO_4)_3 + 3Cu$

**Ans:** Displacement reaction.

c) $ZnCO_3 \rightarrow ZnO + CO_2$

**Ans:** Decomposition reaction

d) $C + O_2 \rightarrow CO_2$

**Ans:**Combination reaction

2) What is a precipitationreaction? Give an example.

**Ans**. Reaction in which an insoluble substance or precipitate is formed

$Na_2SO_4 + BaCl_2 \text{----------} BaSO_4 + 2NaCl$

**Short answer type questions (3 mark)**

1. Give an example, each for thermal decomposition and photochemical decomposition reactions. Write balanced equation for the same.

**Ans**.Thermal decomposition - Heating of lime stone.

$CaCO_3 \rightarrow CaO + CO_2$

Photochemical decomposition - Action of light on silver bromide.

$2AgBr \rightarrow 2Ag + Br_2$

**Very long answer type questions (5 mark)**

1. (i) Write chemical equations for the following and balance them.

a) Zinc carbonate(s) →Zinc oxide+ Carbon dioxide

**Ans.** $ZnCO_3 \rightarrow ZnO + CO_2$

b) Potassium bromide (aq) + Barium iodide (aq) → Potassium iodide + Barium bromide.

**Ans.** $2KBr + BaI_2 \rightarrow 2KI + BaBr_2$

c) Nitrogen + Hydrogen → Ammonia

**Ans.** $N_2 + 3H2 \rightarrow 2NH3$

ii) What happens when electricity is passed through acidified water?
**Ans.** Decomposition of water takes place resulting in the formation of hydrogen and oxygen.

## MCQ

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

1. i) $Pb + CuCl_2 \longrightarrow PbCl_2 + Cu$ ii) $Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2NaCl$
   iii) $C + O_2 \longrightarrow CO_2$ iv) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$

   a) (i) and (iv) b) (ii) only c) (i) and (ii) d) (iii) and (iv)
2. Which of the following is not a physical change?
   a) Boiling of water to give water vapour
   b) Melting of ice to give water
   c) Dissolution of salt water
   d) Combustion of liquefied Petroleum Gas (LPG)
3. Which of the following observations help(s) us to determine that a chemical change has taken place?
   a) Change in temperature c)change in colour
   b) Evolution of gas d)All of these
4. The following reaction is used for preparation of oxygen gas in the laboratory

   $2KClO_3(s) \xrightarrow[\text{Catalyst}]{\text{Heat}} 2KCl\,(s) + 3\,O_2\,(g)$

   Which of the following statement(s) is (are) correct about the reaction?
   a)It is a decomposition reaction and endothermic in nature.
   b) it is a combination reaction
   c)It is a decompostion reaction and is accompanied by release of heat.
   d) It is a photo chemical decomposition reaction and exothermic in nature.
5. Chemically the rust is
   a) Ferric sulphate c) ferric oxide
   b) Hydrated ferrous oxide d) hydrated ferric oxide

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

**Reasoning and assertion type questions:**

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

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

1. Assertion (A)- Calcium Carbonate when heated gives calcium oxide and water
   Reason (R) – on heating $CaCO_3$, decomposition reaction takes place.
2. Assertion (A) - White silver chloride turns grey in sunlight.
   Reason (R) – Decomposition of silver chloride in presence of sunlight takes place to form silver metal and chlorine gas.

Ans: 1. d) A is false but R is true
2. a) Both A and R are true and R is correct explanation of A

# CHAPTER 2--ACIDS, BASES AND SALTS

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

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

**Mineral Acids**: Acids which are obtained from minerals likesulphates, nitrates, chlorides etc. are called mineral acids, e.g., $H_2SO_4$(Sulphuric acid), $HNO_3$(Nitric acid) and HCl(Hydrochloric acid).

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

**Hydronium Ions($H_3O^+$)**: They are formed by reaction of $H^+$ (from acid) and $H_2O$. It is because $H^+$ is unstable.

**Strong Acids**: Acids which dissociate into ions completely are called strong acids. E.g. $H_2SO_4$, HCl

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

**Chemical properties of acids**

(i) Acids react with active metals to give salt and hydrogen gas.

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

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

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

**Chemical properties of Bases**

(i) Reaction with Metals – Certain metals such as Zinc, Aluminumand Tin react with alkali solutions on heating and hydrogen gas is evolved

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

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

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

**pH scale**: A scale for measuring hydrogen ion concentration in a solution.

The pH of a solution is defined as the negative logarithm of hydrogen ion concentration in moles per litre.

$pH = -\log [H^+]$

$pH = -\log [H_3O^+]$

where [H+] or $[H_3O^+]$ represents concentrations of hydrogen ions in solution.

The pH of a neutral solution is 7

The pH of an acidic solution is < 7

The pH of a basic solution is> 7

**Some Important Compounds and their uses**

| Common Name | Chemical name/ Chemical formula | Preparation | Uses |
|---|---|---|---|
| Washing soda | Sodium carbonate decahydrate<br>$Na_2CO_3.10H_2O$ | $Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3.10H_2O$ | Manufacture of borax, caustic soda, softening of hard water |
| Baking soda | Sodium hydrogen carbonate<br>$NaHCO_3$ | $NaCl+NH_3+CO_2+H_2O\rightarrow$<br>$NaHCO3 +NH_4Cl$ | Used as antacid, ingredient of baking powder |
| Bleaching powder | Calcium oxychloride<br>$CaOCl_2$ | By the action of chlorine on dry slaked lime<br>$Ca(OH)_{2+}Cl_2 \rightarrow CaOCl_2+H_2O$ | Bleaching clothes, used as oxidizing agent, disinfecting water, manufacture of chloroform |
| Plaster of Paris | Calcium sulphate hemihydrate<br>$CaSO_4.1/2H_2O$ | $CaSO_4.2H_2O \xrightarrow{373K\ (Heat)}$<br>$CaSO_4.1/2\ H_2O + 1.1/2 H_2O$ | Plastering fractured bones, making toys, decorative materials,statues |

**EQUATIONS OF ACIDS,BASES AND SALTS**

Acid + Metal → Salt + Hydrogen gas

$H_2SO_4+Zn \rightarrow ZnSO_4+H_2$

Base+ Metal $\longrightarrow$ Salt + Hydrogen gas

$2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$

(Sodium zincate)

Base + Acid → Salt + Water

$NaOH\ (aq) + HCl\ (aq) \rightarrow NaCl\ (aq) + H_2O\ (l)$

Acids give hydronium ions in water

$HCl+H_2O \longrightarrow H_3O^+ + Cl^-$

Bases generate $OH^-$ ions in water

$NaOH(s) \xrightarrow{H_2O} Na^+(aq) + OH^-(aq)$

**Reactions of Important Chemical Compounds**

On heating, baking soda liberates $CO_2$

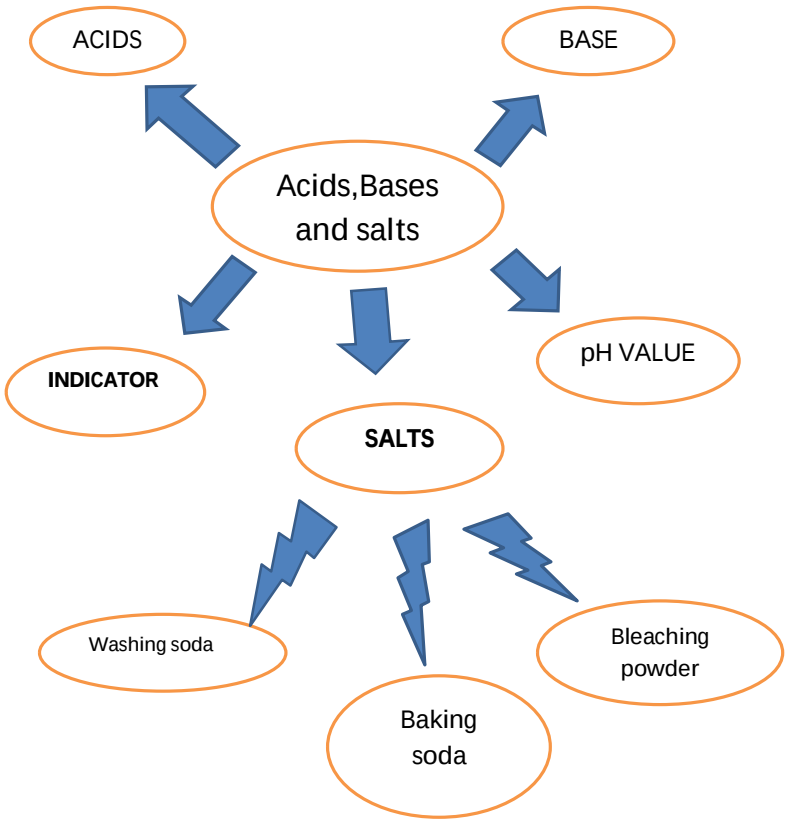
$2NaHCO_3 \xrightarrow{Heat} Na_2CO_3 + H_2O + CO_2$

**Plaster of Paris**

On mixing plaster of Paris with water, gypsum is obtained

$CaSO_4.1/2H_2O + 1\frac{1}{2} H_2O \rightarrow CaSO_4 .2H_2O$

## MIND MAP




**QUESTION BANK**

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

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

2. Write the chemical name and formula of the compound which is used as an antacid.
**Ans:**Sodium bicarbonate, $NaHCO_3$

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

1. Given below are the pH values of different liquids.7.0, 14.0, 4.0, and 2.0.Which of these could be that of a) lemon juice b) distilled water c) sodium hydroxide solution d) tomato juice.
**Ans:** a) lemon juice- 2.0 b) distilled water-7.0 c) sodium hydroxide solution `14.0
d) tomato juice- 4.0

2. What is baking powder? How does it make the cake soft and spongy?
**Ans:**Baking powder is a mixture of sodium hydrogen carbonate and tartaric acid. On heating it liberates$CO_2$ which makes the cake soft and spongy

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

1. Write the chemical name of Plaster of Paris. Write a chemical equation to show the reaction between Plaster of Paris andwater. Name the compound produced in this reaction.
**Ans:**Calcium Sulphate hemihydrate.
$CaSO_4.{}^1/_2H_2O + 1{}^1/_2H_2O \longrightarrow CaSO_4.2H_2O$
The compound produced is Gypsum.

2. A gas X reacts with lime water and forms a compound Y which is used as bleaching agent in the chemical industry. Identify X and Y .Give the chemical equation of the reaction involved.
**Ans:**X is chlorine Y is $CaOCl_2$ (calcium oxy chloride) used as bleaching agent.
$Ca(OH)_2 + Cl_2$-------$CaOCl_2 + H_2O$

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

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

2. a) Crystals of a substance changed their color on heating in a closed test tube but regained it after some time when they were allowed to cool down. Name the substance and write its formula .Explain the phenomenon.
b) How is sodium carbonate prepared? Give two uses of the compound
**Ans:**a) Copper sulphate, CuSO4.5H2O.
It is blue. It becomes white on heating due to loss of water molecule.
$CuSO_4.5H_2O \xrightarrow{Heat} CuSO_4 + 5\ H_2O$
It regains its colour by absorbing water from atmosphere
$CuSO_4 + 5\ H_2O \xrightarrow{Heat} CuSO_4.5H_2O$
b) Prepared by passing $CO_2$ through ammoniacal brine
Used for production of washing powder& manufacture of glass

## MCQ

1. Which of the following gives the correct increasing order of acidic strength?
   a) Water< Acetic acid <Hydrochloric acid
   b) Water<Hydrochloric acid <Acetic
   c) Acetic acid < Water < Hydrochloric acid
   d) Hydrochloric acid < water < Acetic acid

2. Which of the following salts does not contain water of crystallisation?

a)Blue vitriol b) Baking soda c) Gypsum d)Washing soda

3. Common salt, besides used in kitchen, can also be used as the raw material for making:

i) Washing soda iii) bleaching powder
ii) Baking soda iv) slaked lime

a) i) and ii) c) i), ii) and iii)
b) i) and iii) d) i),iii) and iv)

4. The acid having highest hydrogen ion concentration is one with

a) pH=2.5 b)pH = 1.8 c) pH=7 d) pH=10

5. The pH of gastric juices released during digestion is:

a)less than 7 b) more than 7 c) equal to 7 d) equal to 0

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

**Reasoning and assertion type questions**

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

a) Both A and R are true and R is correct explanation of A

b) Both A and R are true and R is not correct explanation of A

c) A is true but R is false

d) A is false but R is true

1. Assertion (A) - The aqueous solutions of glucose and alcohol do not show acidic character.

Reason (R) – Aqueous solutions of glucose and alcohol do not give $H^+$ ions.

2. Assertion (A) - Carbonic acid is weak acid.

Reason (R) – It ionized completely in aqueous solution.

Ans:
1. a) Both A and R are true and R is correct explanation of A
2. c) A is true but R is false

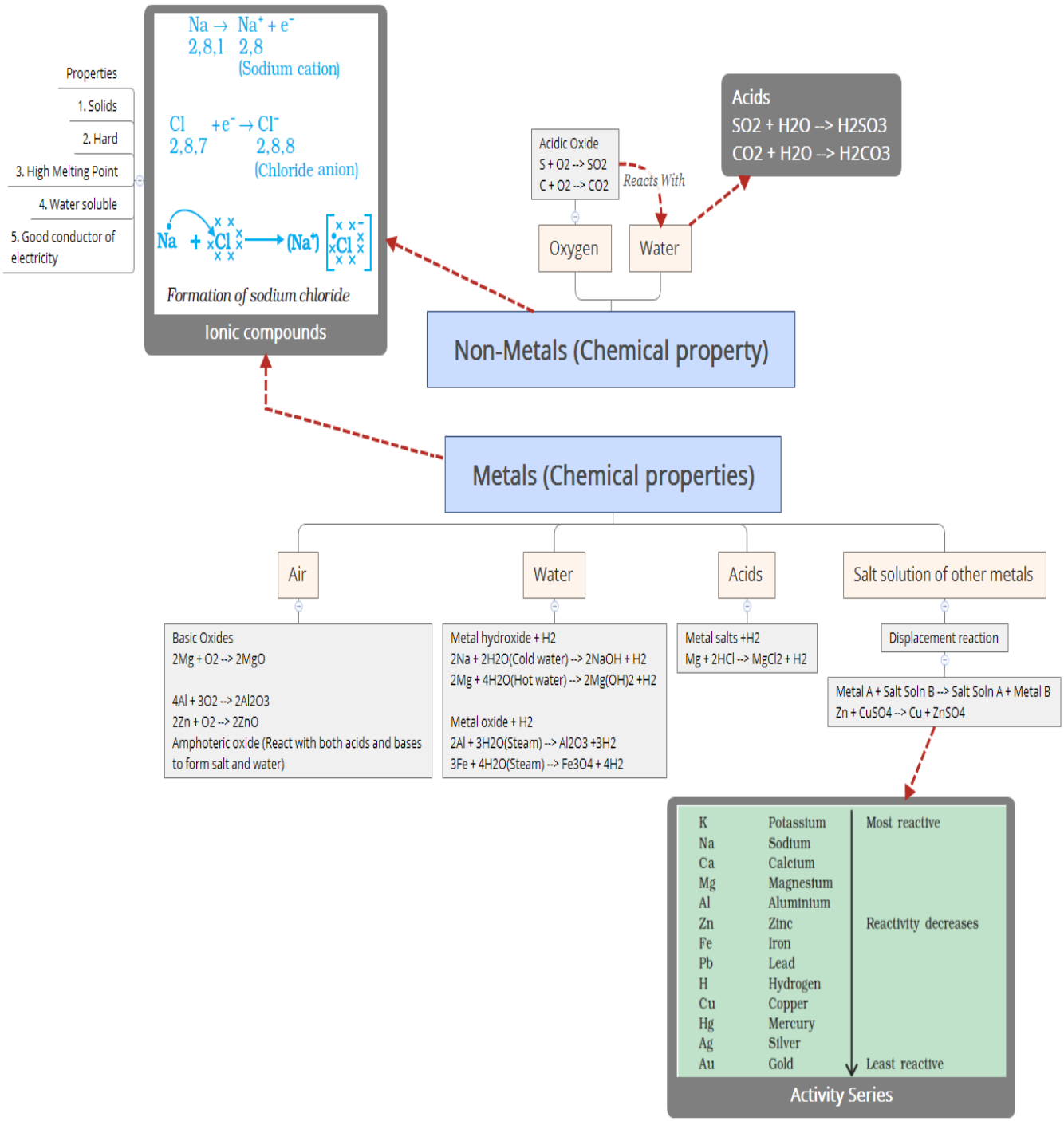
# CHAPTER 3 : METALS AND NON-METALS MIND MAP

## PHYSICAL PROPERTIES

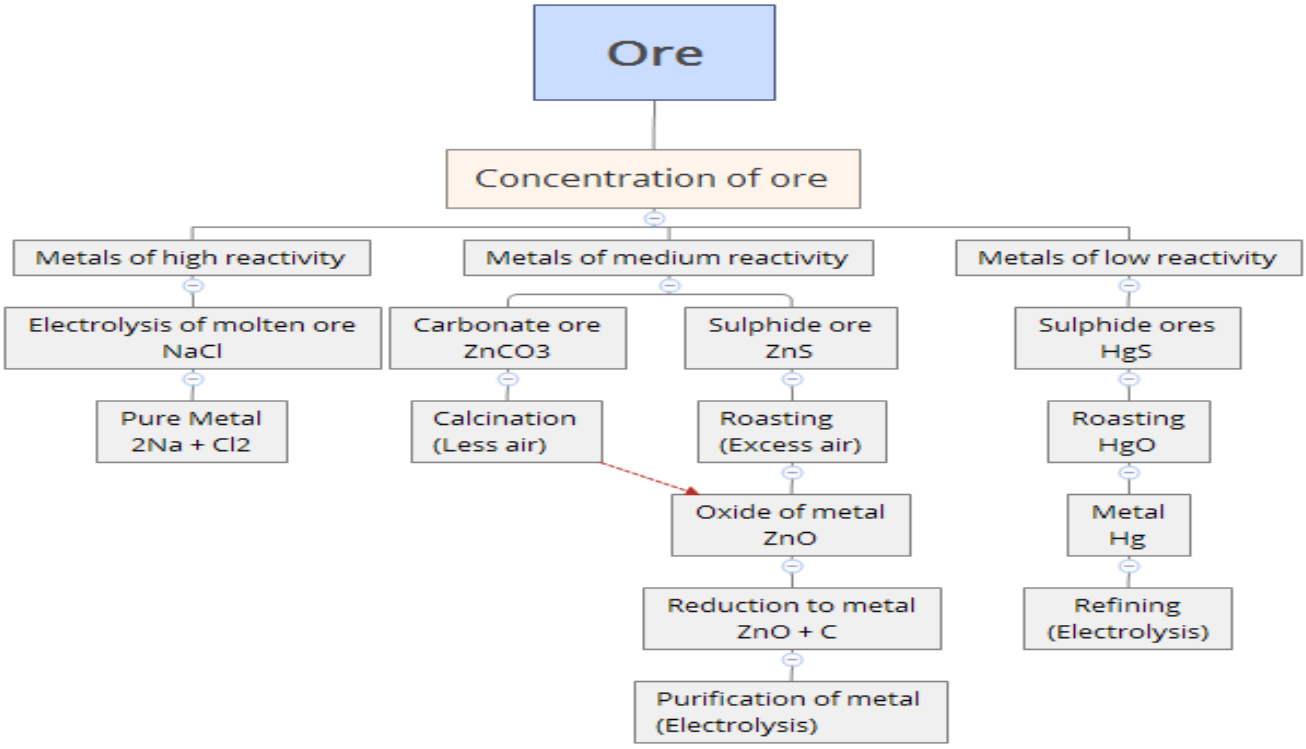
| | METAL | NON-METALS |
|---|---|---|
| LUSTRE | LUSTROUS | NON-LUSTROUS |
| HARDNESS | HARD | BRITTLE |
| MALLEABILITY | MALLEABLE | NON-MALLEABLE |
| DUCTILITY | DUCTILE | NON-DUCTILE |
| CONDUCTIVITY | GOOD CONDUCTOR OF HEAT AND ELECTRICITY | BAD CONDUCTOR OF HEAT AND ELECTROCITY |
| PHYSICAL STATE | GENERALLY SOLID | SOLID, LIQUID OR GAS |
| SONOROUS | MAKES SOUND WHEN STRUCK | DOES NOT MAKES SOUND WHEN STRUCK |
| MELTING AND BOILING POINT | HIGH MELTING POINT AND BOILING POINT | LOW MELTING POINT AND BOILING POINT |

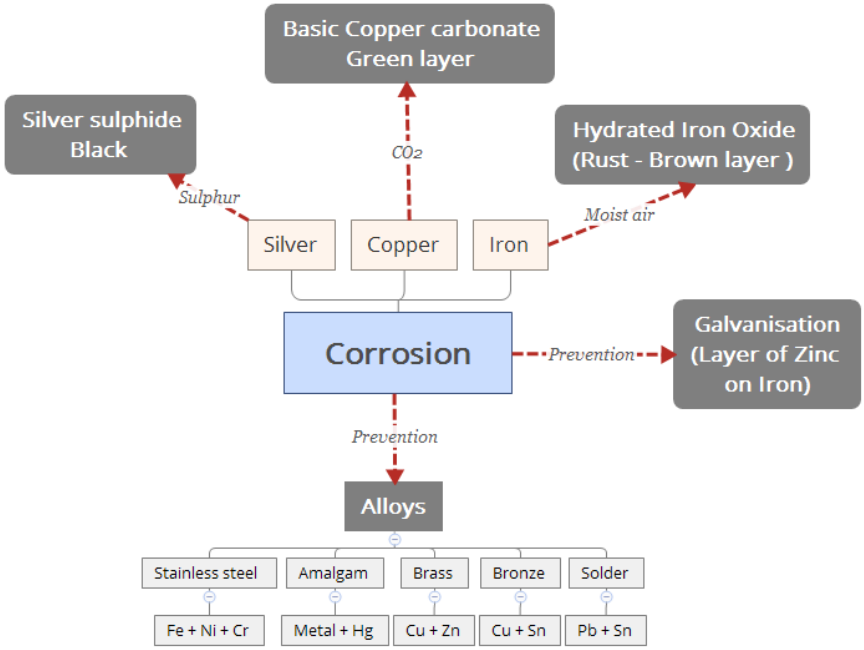
**Exceptional properties of metals and non-metals**

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


Properties
1. Solids
2. Hard
3. High Melting Point
4. Water soluble
5. Good conductor of electricity
Na → Na+ + e-
2,8,1 2,8
(Sodium cation)
Cl +e- → Cl-
2,8,7 2,8,8
(Chloride anion)
Formation of sodium chloride
Ionic compounds
Acidic Oxide
S + O2 --> SO2
C + O2 --> CO2
Reacts With
Acids
SO2 + H2O --> H2SO3
CO2 + H2O --> H2CO3
Oxygen
Water
Non-Metals (Chemical property)
Metals (Chemical properties)
Air
Water
Acids
Salt solution of other metals
Basic Oxides
2Mg + O2 --> 2MgO
4Al + 3O2 --> 2Al2O3
2Zn + O2 --> 2ZnO
Amphoteric oxide (React with both acids and bases to form salt and water)
Metal hydroxide + H2
2Na + 2H2O(Cold water) --> 2NaOH + H2
2Mg + 4H2O(Hot water) --> 2Mg(OH)2 +H2
Metal oxide + H2
2Al + 3H2O(Steam) --> Al2O3 +3H2
3Fe + 4H2O(Steam) --> Fe3O4 + 4H2
Metal salts +H2
Mg + 2HCl --> MgCl2 + H2
Displacement reaction
Metal A + Salt Soln B --> Salt Soln A + Metal B
Zn + CuSO4 --> Cu + ZnSO4
K Potassium
Na Sodium
Ca Calcium
Mg Magnesium
Al Aluminium
Zn Zinc
Fe Iron
Pb Lead
H Hydrogen
Cu Copper
Hg Mercury
Ag Silver
Au Gold
Most reactive
Reactivity decreases
Least reactive
Activity Series

# EXTRACTION OF METALS



## DIAGRAM

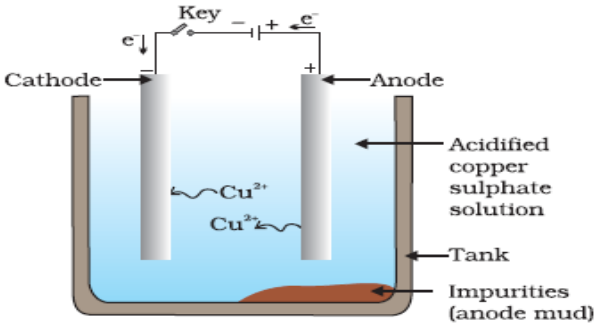
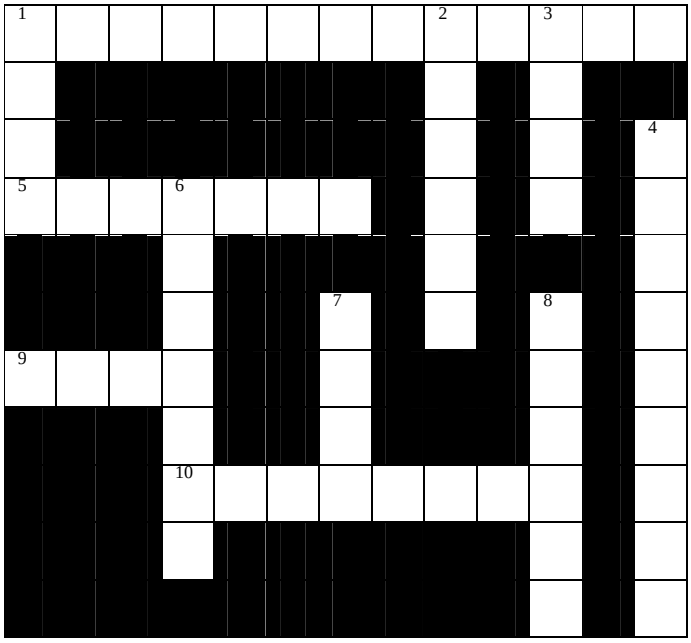



***Figure 3.1***
*Electrolytic refining of copper. The electrolyte is a solution of acidified copper sulphate. The anode is impure copper, whereas, the cathode is a strip of pure copper. On passing electric current, pure copper is deposited on the cathode.*

## CROSSWORD



**Across**

1 Protecting Iron
5 Hardest Substance
9 A metal that has amphoteric oxide
10 Sulphide oresare subjected to_____.

**Down**

1 Most ductile metal
2 Homogenous mixture of metals
3 A Metal which gets rusted
4 Burns with dazzling white flame
6 Liquid at room temperature
7 Minerals from which metal is extracted
8 Impurity in ore

## QUESTION BANK

## VERY SHORT ANSWER TYPE (1 MARK)

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

## SHORT ANSWER TYPE (2 MARK)

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

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

## SHORT ANSWER TYPE (3 MARK)

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

    Give balanced equations for each.

## LONG ANSWER TYPE (5 MARK)

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

## MCQ

1.Which of the following is a liquid non-metal at room temperature:

(a) Mercury (b)Bromine (c)Chlorine (d) Sulphur

2. Which of the following is not an ionic compound.

(a) KCl (b)$MgCl_2$ (c)$CCl_4$ (d)NaCl

3. Aqua regia is called as royal water because it dissolves gold its composition is 1:3 concentrated.

(a) $H_2SO_4$: $HNO_3$ (b) $HNO_3$: $H_2SO_4$ (c) $HNO_3$: HCl (d) HCl: $HNO_3$

4. Which one of the following four metals would be displaced form the solution of its salt by other three metals?

(a) Mg (b) Ag (c) Zn (d) Cu

5. Alloys are homogenous mixtures of a metal with a metal or non-metal. Which of the following alloys contain non-metal as one of its constituents.

(a) Brass (b) Bronze (c) amalgam (d) stainless steel.

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

**ASSERTION QUESTIONS:**

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

**(a) Both A and R are true and R is correct explanation for A.**

**(b) Both A and R are true and R is not the correct explanation for A.**

**(c) A is true but R is false.**

**(d) A is false but R is true.**

1. **Assertion:** Nitrogen is a non-metal.

**Reason:** Nitrogen has 5 valance electron**s.**

**Ans: (b)** Both A and R are true and R is not the correct explanation for A.

2. **Assertion:** Zinc oxide is amphoteric in nature.

**Reason**: Zinc oxide reacts with both acids and bases.

**Ans** (a) Both A and R are true and R is correct explanation for A**.**

## CHAPTER-4CARBON AND ITS COMPOUNDS

### IMPORTANT POINTS


The chemical symbol of Carbon is C. Its atomic number is 6 and mass number is 12.It is a non-metallic element.

### ALLOTROPES OF CARBON

**ALLOTROPES OF CARBON**
These are different forms of carbon that differ in arrangement and physical properties but have similar chemical properties.

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

### VERSATILE NATURE OF CARBON

**VERSATILE NATURE OF CARBON**

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

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

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

**FUNCTIONAL GROUPS**: Atoms or group of atoms responsible for the chemical properties of an organic compound.

**ORGANIC COMPOUNDS**

These are carbon compounds obtained from natural substances and occur within living systems. Carbon compounds, except for oxides of carbon, carbonate and hydrogen carbonate salts are studied under organic chemistry.

**Hydrocarbons** -Compounds containing carbon and hydrogen only

**Unsaturated Hydrocarbons**: Carbon compounds having double or triple bond between carbon atoms.

**Saturated Hydrocarbons:** carbon compounds having single bond between the carbon atoms.

**Aromatic Hydrocarbons** They are unsaturated cyclic hydrocarbon containing one or more benzene rings.

**Alkenes** are unsaturated hydrocarbons having double bond. Represented by general formula $C_nH_{2n}$

**Alkynes** are unsaturated hydrocarbons having triple bond. Represented by general formula $C_nH_{2n-2}$

**Alkanes** are saturated hydrocarbons. Represented by general formula $C_nH_{2n+2}$

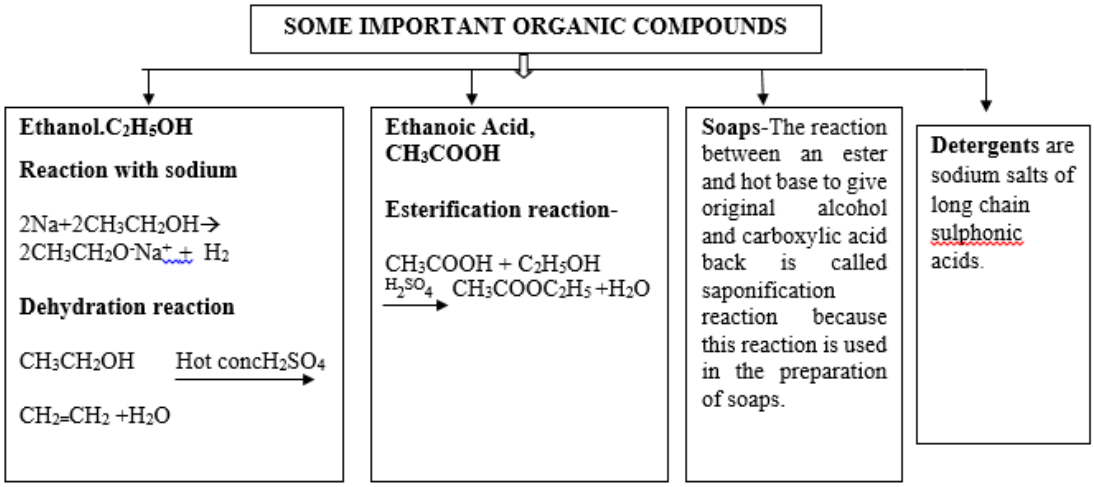
**Saturated cyclic compounds.**

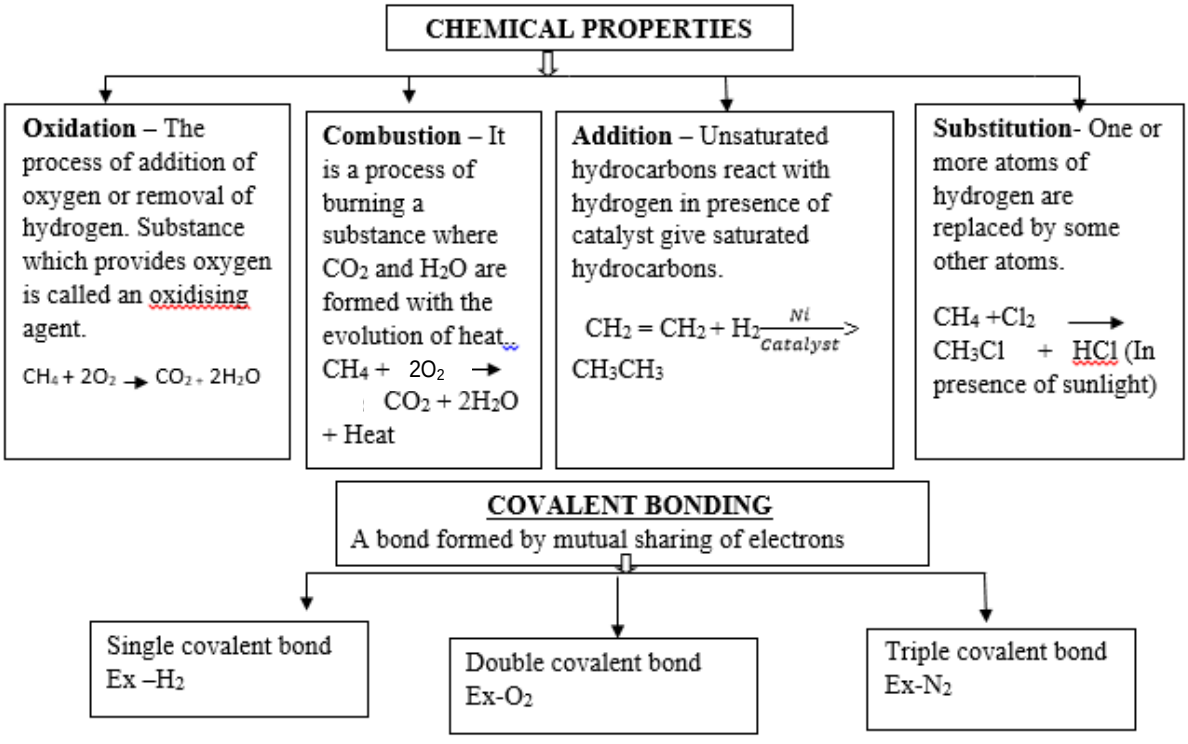
E.g. cyclopropane, cyclobutane, cyclopentane, etc

In a hydrocarbon chain, one or more hydrogens can be replaced by some other element .In such compounds, the element replacing hydrogen is referred to as a **heteroatom**

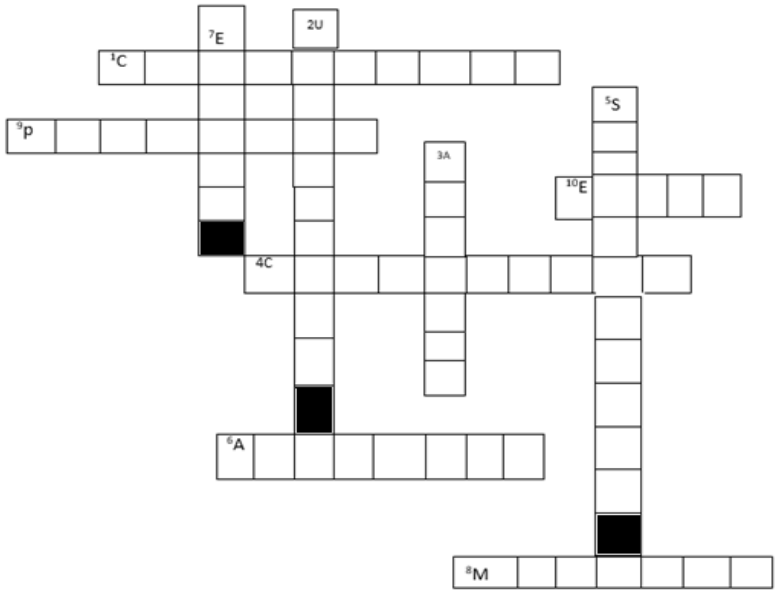
| Functional group | Symbol/formula | Prefix/suffix | Compound name |
|---|---|---|---|
| Halo | -Cl, -Br, - I | Halo (prefix) | Haloalkane |
| Alcohol | -OH | -ol | Alkanol |
| Aldehyde | -CHO | -al | Alkanal |
| Ketone | - CO - | -one | Alkanone |
| Carboxylic acid | -COOH | -oic acid | Alkanoic acid |

**HOMOLOGOUS SERIES** –A series of compounds having same functional group and similar chemical properties but differ by--$CH_2$ unit between two successive members.



## CROSSWORD




**ACROSS**

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

**DOWN**

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

**Question Bank**

**Answer the following questions.**

**Very short answer questions (1 mark)**

1. Which of the following formulae represents a saturated hydrocarbon?

$C_nH_{2n}C_nH_{2n-2}$, $C_nH_{2n+2}$, $C_nH_{2n-1}$

2. Draw the electron dot structure of Ethene.

**Short answer question (2mark)**

1. Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

2. What is meant by denatured alcohol? What is the need to denature alcohol?

**Short answer question (3 mark)**

1. An organic compound A of molecular formula $C_2H_6O$ on heating with excess of conc.$H_2SO_4$ gives compound B of molecular formula $C_2H_4$ .Compound B on addition reaction gives compound C of molecular formula $C_2H_6$.

a) Name A, B and C.
b) Write the chemical equation for the conversion of A to B
c) What is the role of conc.$H_2SO_4$ in above equation? (HOTS)

**Long answer question (5 mark)**

1. An organic compound with molecular formula $C_2H_4O_2$ produces brisk effervescence on addition of sodium carbonate /bicarbonate.

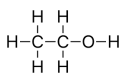
a .Identify the organic compound.
b. Name the gas evolved.
c. How will you test the gas evolved?
d. Write the chemical equation for the above reaction.
e. List two important uses of the above compound (HOTS)
2 .a. List two reasons for carbon forming a large number of compounds.

b. Name the type of bonding found in most of the carbon compounds. Why does carbon form compounds mainly by this kind of bonding?

c. Give reason.

(i) Carbon compounds generally have low melting and boiling points.
(ii) Carbon compounds generally do not conduct electricity.

## MCQ

1. This is an example of a saturated hydrocarbon
   a) $C_2H_4$ c) $C_3H_4$
   b) $C_2H_6$ d) $C_3H_6$
2. The name of this compound  would end with
   a) –ane c) --ol
   b) –ene d) –al

3.The reaction in which $C_2H_4$ is converted into $C_2H_6$ in the presence of a catalyst is called –

a) Oxidation c) Substitution
b) Addition d) Dehydration

4. Hard water is caused due to the presence of –

   a) Salts of Ca and Mg. c) Scum

   b) Salts of Na and K d) Detergents.

5. This is an example of a molecule having a ring of Carbon atoms.

   a)Propene b)Benzene c) Butyne d) Propyne.

**ASSERTION – REASON QUESTIONSM**

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

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

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

2. Assertion (A). Carbon forms strong and stable covalent bonds.
   Reason(R). Carbon is tetravalent and the Carbon atom is small in size.

## CHAPTER 5

## PERIODIC CLASSIFICATION OF ELEMENTS

**Dobereiner's Triads**

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

***Limitation***

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

**Newlands' Law of Octaves**

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

***Limitations***

- Could be valid up to calcium only
- Newlands assumed that only56 elements existed in nature and no more elements would be discovered.

**Mendeleev's Periodic Classification**

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

***Merits of Mendeleev's Periodic Table***

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

***Limitations of Mendeleev's Periodic Table***

- **Position of Hydrogen- C**ould not assign a correct position to hydrogen as hydrogen resembles alkali metals as well as halogens
- **Position of Isotopes- Isotopes are placed in same position though they have different atomic masses**
- **Separation of chemically similar elements while dissimilar elements are placed in the same group.**

**Modern Periodic Classification**

Modern Periodic Law states that properties of elements are the periodic function of their atomic numbers.

**Groups in Modern Periodic Table:**

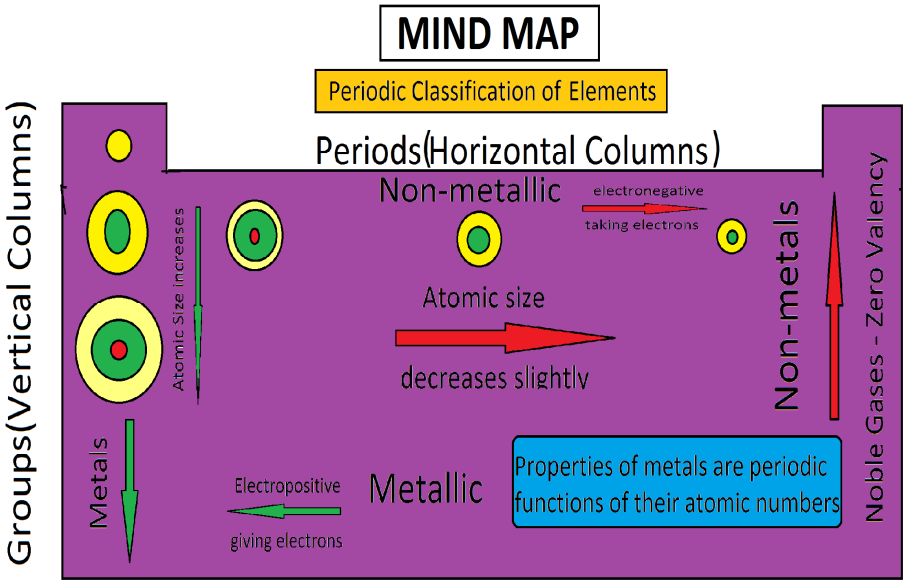
| | |
|---|---|
| Group 1 | Alkali metals |
| Group 2 | Alkaline earth metals |
| Groups 3 to 12 | Transition elements |
| Group 13 | Boron family |
| Group 14 | Carbon family |
| Group 15 | Nitrogen family |
| Group 16 | Oxygen family |
| Group 17 | Halogens |
| Group 18 | Noble gases |

**Periods in Modern Periodic Table**

| **Period** | **No of elements** |
|---|---|
| **1st period** | 2 (H,He) |
| **2nd and 3rd period** | 8 (Li,Be,B ,C,N,O,F,Ne) |
| **4th and 5th period** | 18 |
| **6th period** | 32 |
| **7th period** | Incomplete period |

***Trends in Modern Periodic Table:***

| **Property** | **Variation along the group** | **Variation along the period** |
|---|---|---|
| Valency | Remains the same | Increases up to group 14 then decreases |
| Atomic radii | Increases | Decreases |
| Metallic character | Increases | Decreases |
| Electropositive character | Increases | Decreases |
| Electronegativity | Decreases | Increases |




## DIAGRAMS

**Döbereiner's triads**

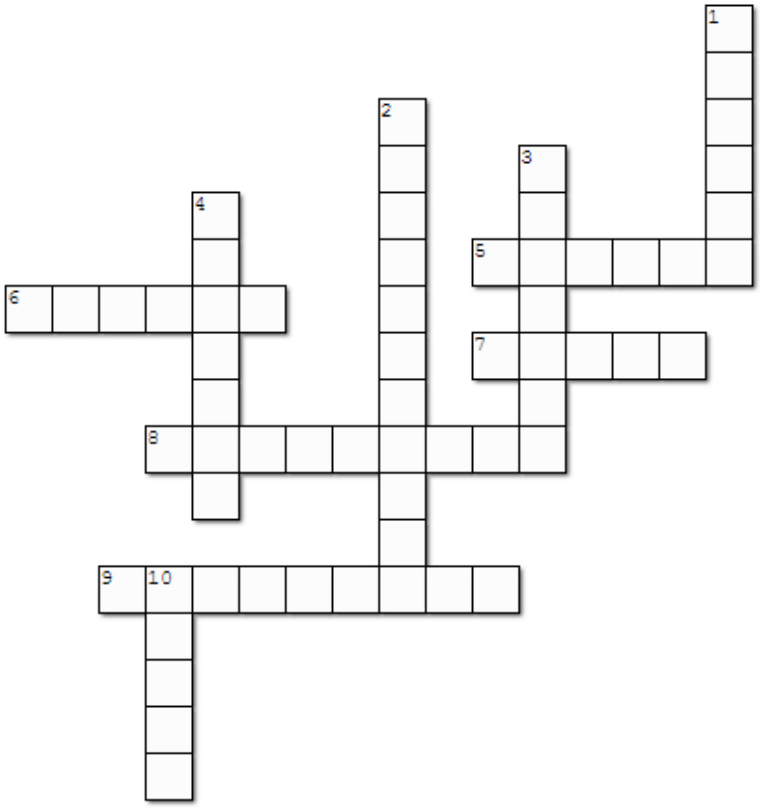
| | | |
|---|---|---|
| Li | Ca | Cl |
| Na | Sr | Br |
| K | Ba | I |

**Notes of music:**

| sa (do) | re (re) | ga (mi) | ma (fa) | pa (so) | da (la) | ni (ti) |
|---|---|---|---|---|---|---|
| H | Li | Be | B | C | N | O |
| F | Na | Mg | Al | Si | P | S |
| Cl | K | Ca | Cr | Ti | Mn | Fe |
| Co and Ni | Cu | Zn | Y | In | As | Se |
| Br | Rb | Sr | Ce and La | Zr | — | — |

## NEWLAND'S OCTAVES

**CROSSWORD**



Created with TheTeachersCorner.net Crossword Puzzle Generator

**Across**

**5.** Vertical columns in the periodic table
**6.** Element with atomic number 6
**7.** Metalloid in Group 13
**8.** Variation of atomic size along the group
**9.** Variation o f electronegativity along the group

**Down**

**1.** Elements that are electropositive in nature
**2.** Other name for inert gases
**3.** Horizontal rows in the periodic table
**4.** Non-metal that exists in liquid state at room temperature
**10.** Number of electrons in L shell

**Question Bank: - Periodic Classification of Elements**

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

Q1. Give an example of Dobereiner's triad.

Q2. What is the basis of Mendeleev's periodic table?

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

Q1. State the modern periodic law for classification of elements. How many groupsandperiods are there in the modern periodic table?

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

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

Q4. An atom has electronic configuration 2, 8,2.
(i) What is the atomic no. of this element?

(ii) Is it a metal or non-metal?

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

Q1. The elements Li (Z = 3), Na (Z = 11) and K (Z = 19) belong to group 1

(i) Predict the periods they belong.

(ii)Which one of them is least reactive?

(iii) Which one of them has the largest atomic radius? Give reason to justify.

Q2. F, Cl and Br are the elements each having seven valence electrons.

Pick the element (i) with the largest atomic radius (ii) which is most reactive. Justify your answer.

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

**Long AnswerType Questions (5marks)**

Q1.(i) How does atomic size vary along the group? Give reason.

(ii) Why are metals electropositive in nature?

(iii) What are metalloids? Give an example.

Q2. Name-

(i) Two elements that have a single electron in their outermost shells.

(ii) Two elements that have two electrons in their outermost shells.

(iii) Two elements with filled outermost shell.

(iv)Two elements thatbelong to halogen family.

(v) An element which is tetravalent and forms the basis of organic chemistry.

## MCQ

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

2. Which of the following elements would lose an electron easily:
   (a) Mg (b)Ca (c)K (d) $Cl_2$

3. Out of the elements given below which one of them is the most non-metallic;
   (a) Fluorine (b) Oxygen (c) Chlorine (d) Calcium

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

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

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

**ASSERTION QUESTIONS:**

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

**(a) Both A and R are true and R is correct explanation for A.**

**(b) Both A and R are true and R is not the correct explanation for A.**

**(c) A is true but R is false.**

**(d) A is false but R is true.**

1. **Assertion:** Fluorine is more reactive than chlorine.

   **Reasons:** Fluorine andchlorinebelong to the $17^{th}$ group called Halogens **.**

   **Ans: (b)** Both A and R are true and R is not the correct explanation for A.

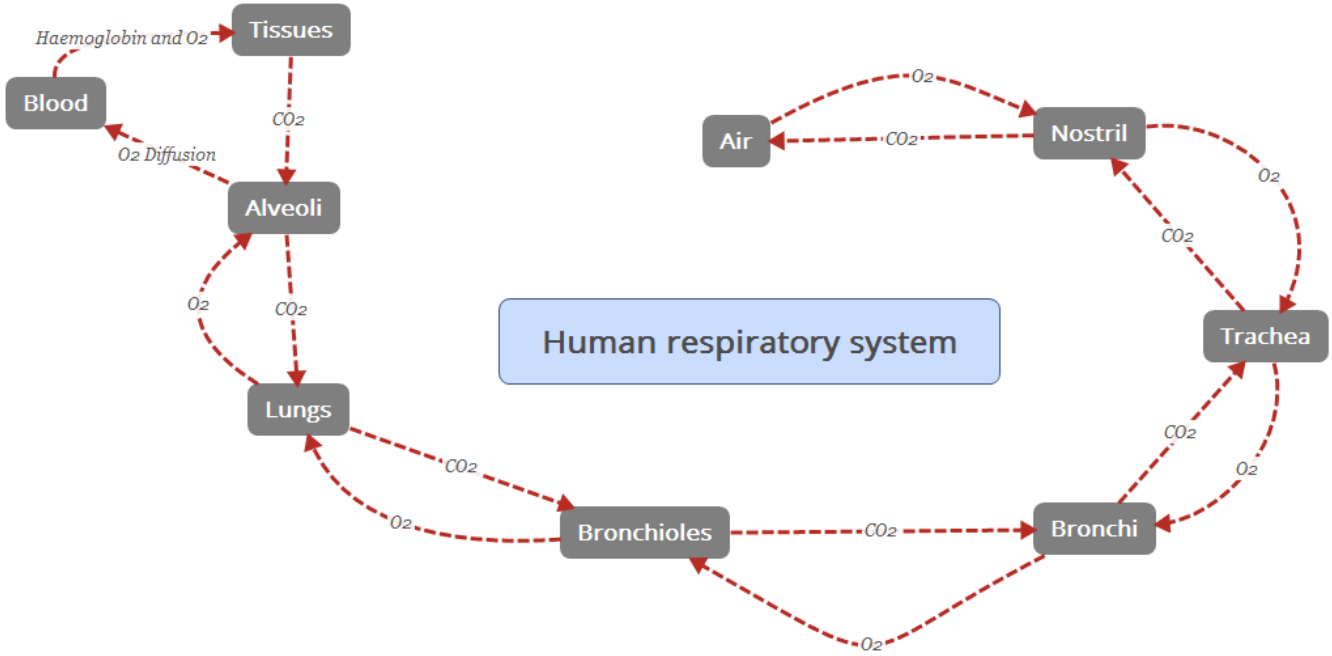
2. **Assertion**. Silicon is a metalloid.

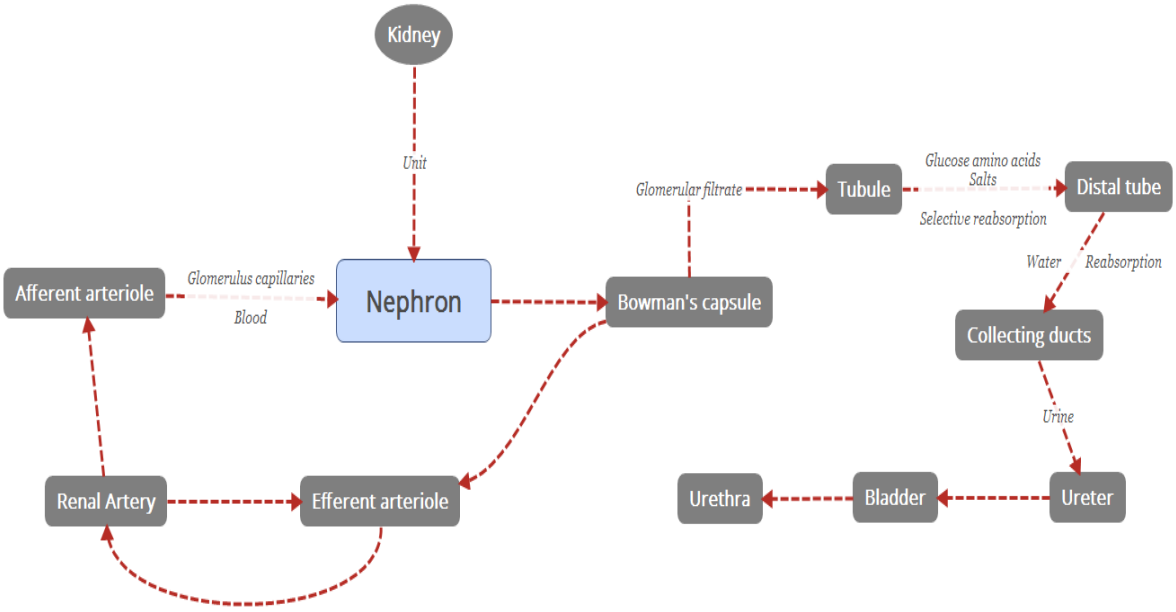
   **Reasons:** Silicon shows only non-metallic properties**.**

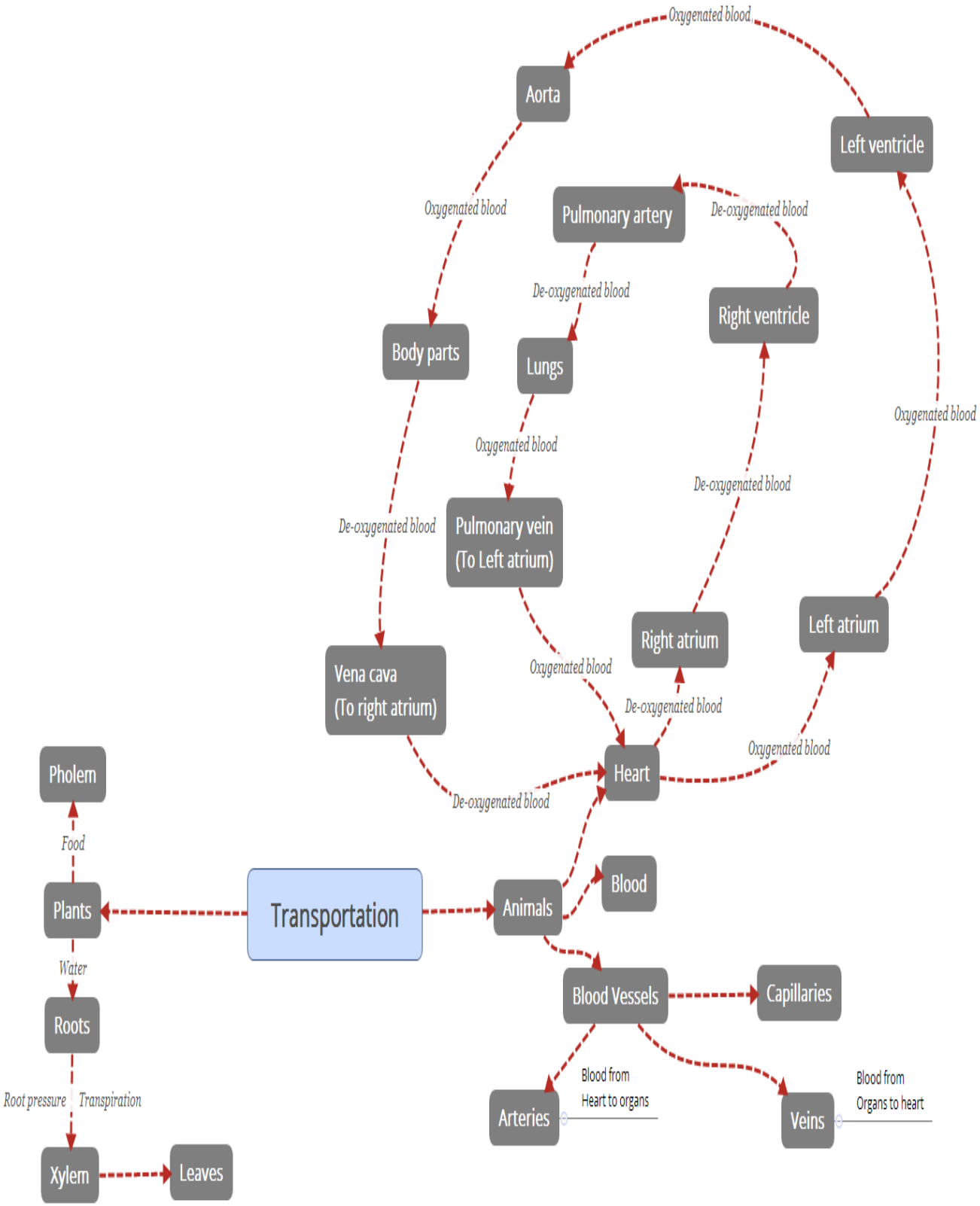
**Ans:** (c) A is true but R is false.

# CHAPTER 6: LIFE PROCESSES

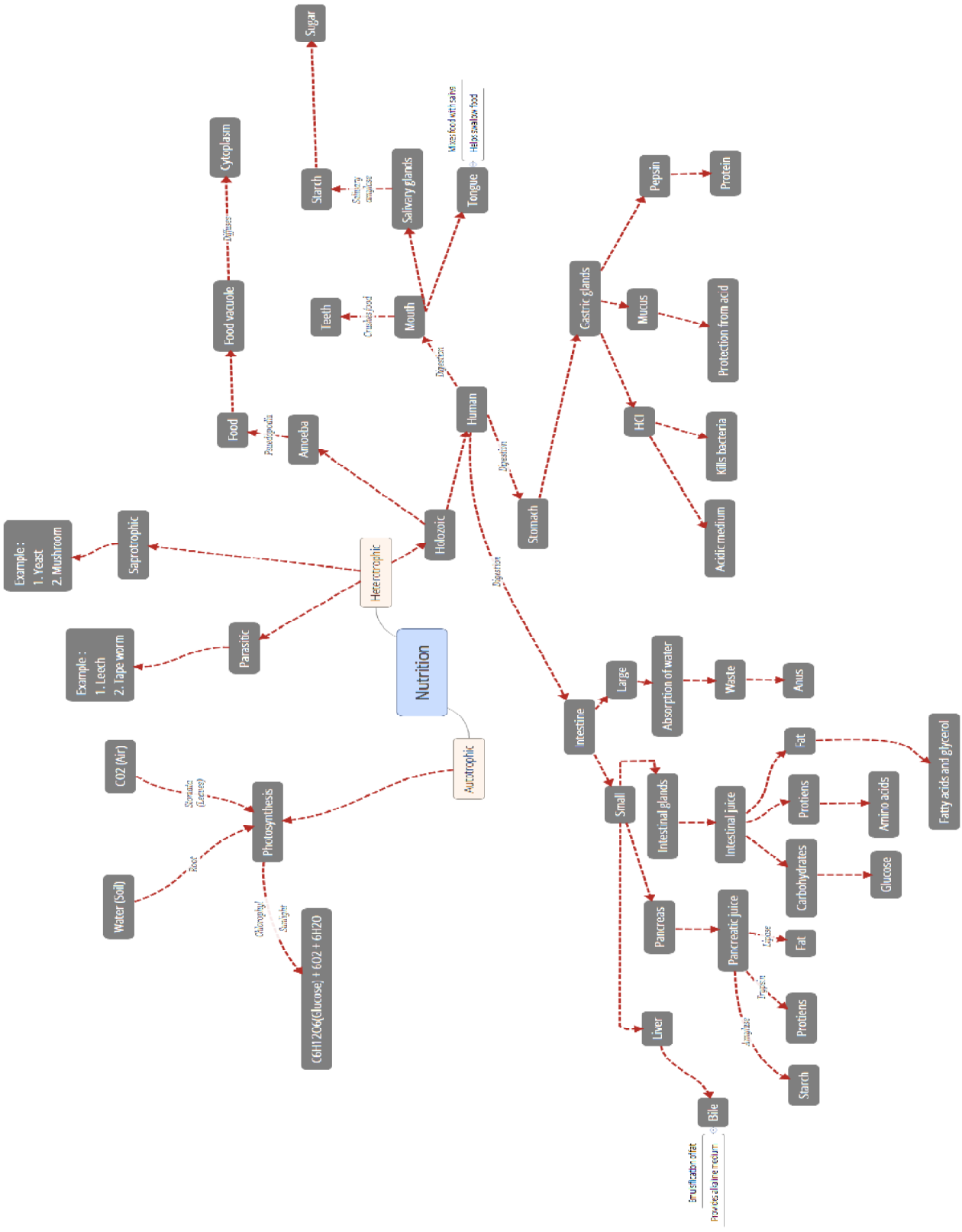
## MIND MAP




Transportation
Plants
Food
Pholem
Water
Roots
Root pressure
Transpiration
Xylem
Leaves
Animals
Blood
Blood Vessels
Capillaries
Arteries
Blood from
Heart to organs
Veins
Blood from
Organs to heart
Heart
Vena cava
(To right atrium)
Body parts
Aorta
Oxygenated blood
De-oxygenated blood
Pulmonary artery
Lungs
Pulmonary vein
(To Left atrium)
Left ventricle
Right ventricle
Right atrium
Left atrium

## DIAGRAMS


Nutrition
Heterotrophic
Holozoic
Saprotrophic
Parasitic
Example : 1. Yeast 2. Mushroom
Example : 1. Leech 2. Tape worm
Autotrophic
Photosynthesis
CO2 (Air)
Water (Soil)
Stomata (Leaves)
Root
Chlorophyll
Sunlight
C6H12O6(Glucose) + 6O2 + 6H2O
Amoeba
Pseudopodia
Food
Food vacuole
Cytoplasm
Digestion
Human
Mouth
Teeth
Crushes food
Salivary glands
Saliva
Starch
Sugar
Tongue
Mixes food with saliva
Helps swallow food
Stomach
Gastric glands
Pepsin
Protein
Mucus
Protection from acid
HCl
Kills bacteria
Acidic medium
Intestine
Large
Absorption of water
Waste
Anus
Small
Intestinal glands
Intestinal juice
Fat
Protiens
Carbohydrates
Fatty acids and glycerol
Amino acids
Glucose
Pancreas
Pancreatic juice
Fat
Protiens
Starch
Lipase
Trypsin
Amylase
Liver
Bile
Emulsification of fat
Provides alkaline medium

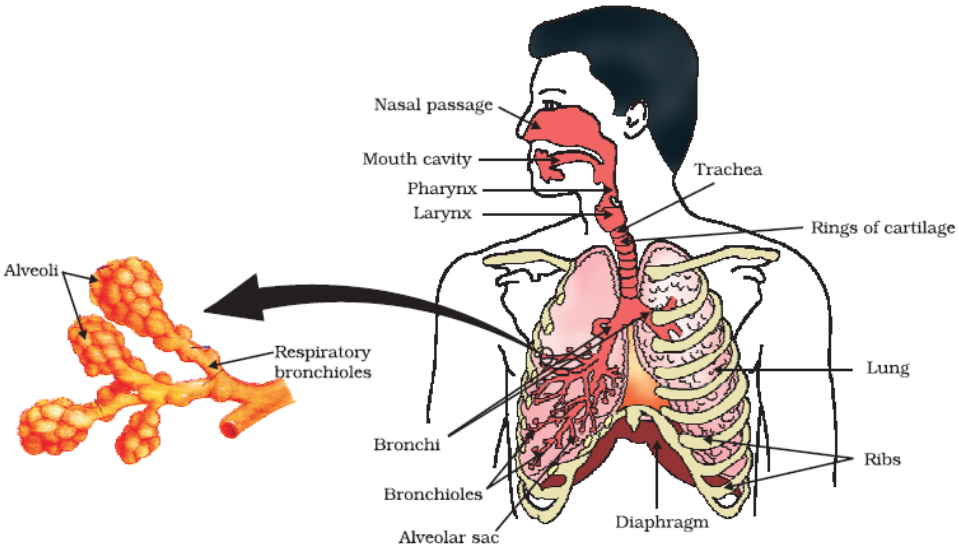



***Figure 6.2*** *Human respiratory system*

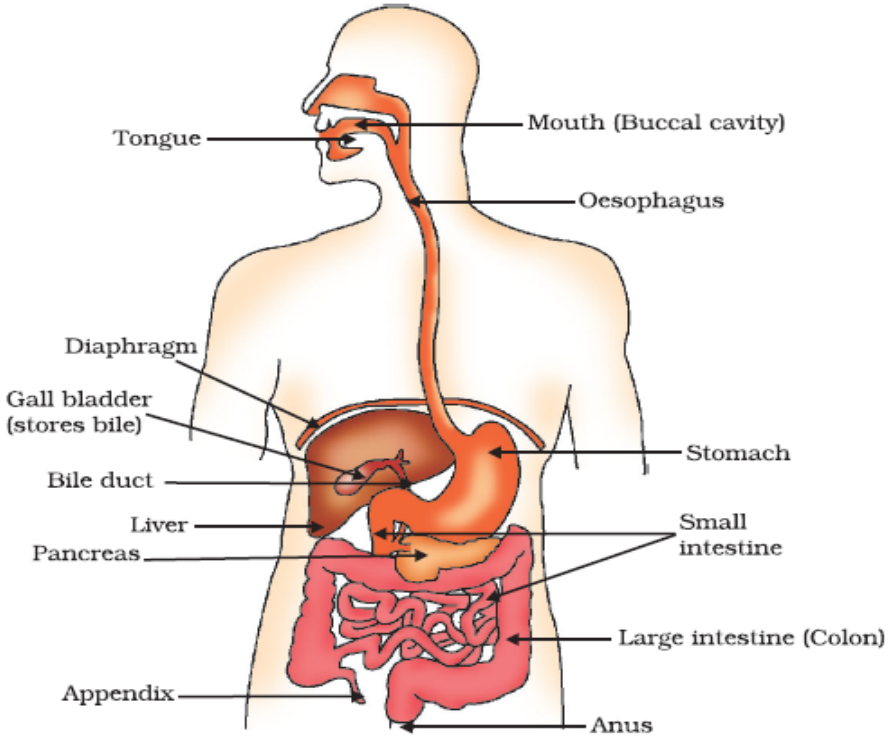



***Figure 6.1*** *Human alimentary canal*

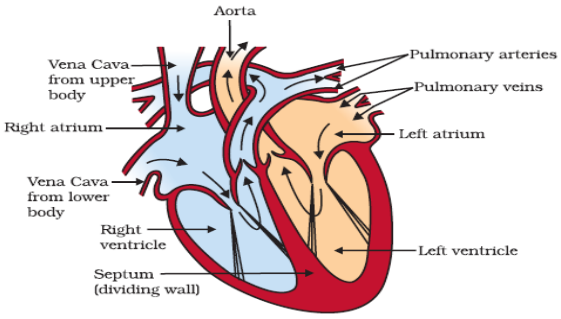



***Figure 6.3***
*Sectional view of the human heart*

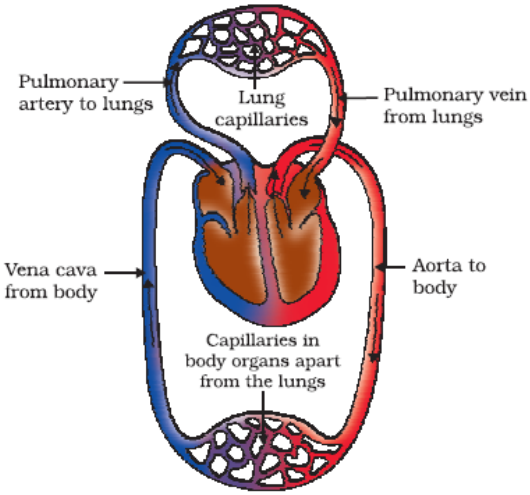



***Figure 6.4***
*Schematic representation of transport and exchange of oxygen and carbon dioxide*

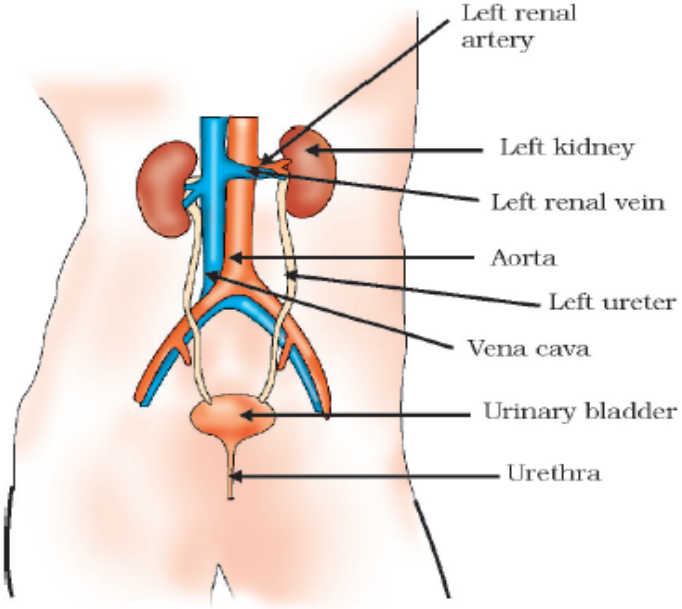



**Figure 6.5**
*Excretory system in human beings*

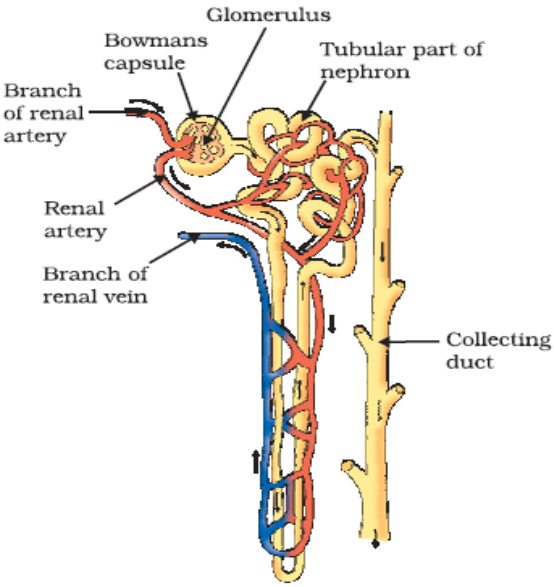
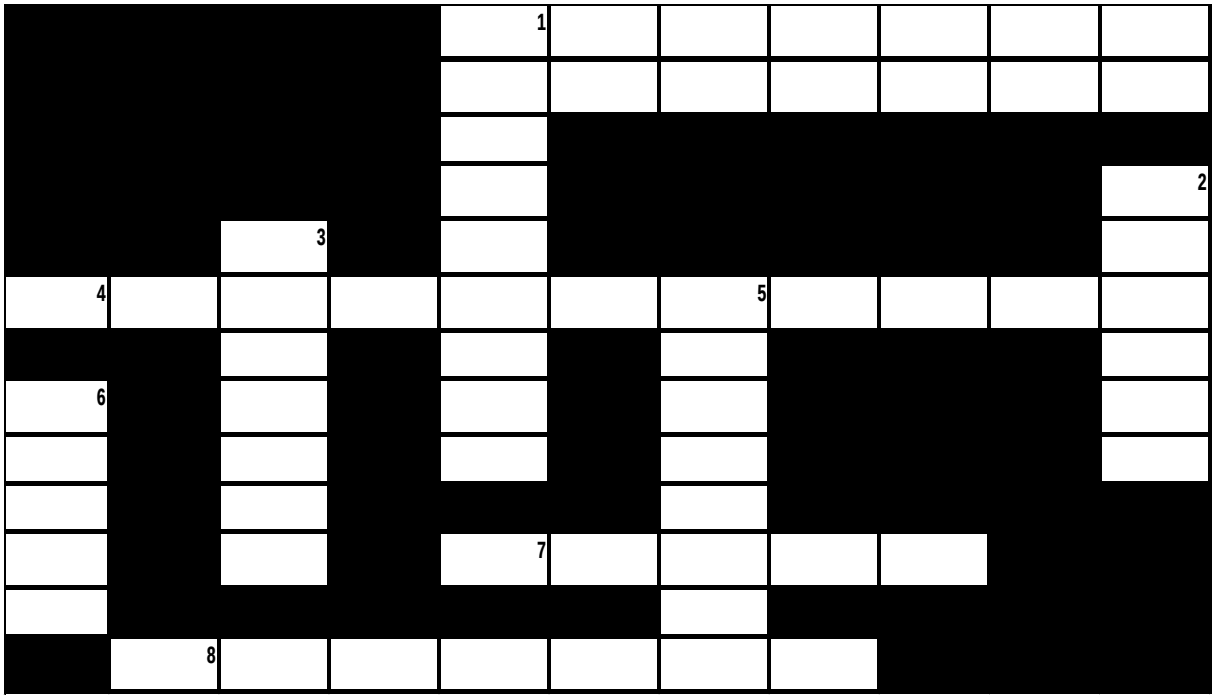



***Figure 6. 6***
*Structure of a nephron*

CROSSWORD



**ACROSS**

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

**DOWN**

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

**QUESTION BANK**

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

1. Which tissue transports soluble products of photosynthesis?

*Ans: Phloem*

2. What is the role of saliva in digestion of food?

*Ans: Digests starch*

**SHORT ANSWER TYPE (2 MARK)**

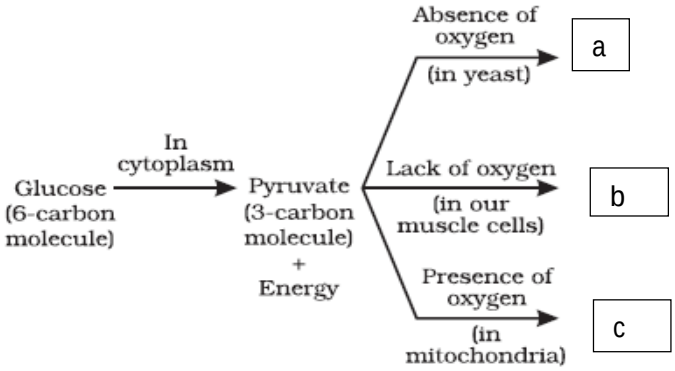
1. Differentiate between blood and lymph
   *Hint: Colour, presence of RBC, direction of flow*
2. What is the advantage of a four chambered heart in humans?
   *Separates oxygenated and deoxygenated blood*
3. Give twopoints of difference between arteries and veins
   Hint: Direction of flow, oxygenated/deoxygenated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

## SHORT ANSWER TYPE (3 MARK)

1. Write the function of the following:

   a) Bile (*Emulsifies fat*)
   b) Hydrochloric acid (*Kills bacteria/acidic medium*)
   c) Villi (*absorption of food*)

2. Complete the following:




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

3. Write the difference between aerobic and anaerobic respiration?

| **Aerobic respiration** | **naerobicrespiration** |
|---|---|
| 1. Takes placeinpresenceofOxygen. | 1.Takes place in absenceofOxygen. |
| 2. End products-Carbon dioxide &Water | 2. End products –Ethanol&Carbon dioxide |
| 3. Moreenergyis released.(38ATP) | 3. Lessenergyisreleased.(2ATP) |
| 4. Takes placeinCytoplasm &Mitochondria | 4. Takes placeinonlyinCytoplasm. |
| 5. Complete oxidation ofglucosetakes place. | 5. Incomplete oxidation ofglucosetakes place. |

## LONG ANSWER TYPE (5 MARK)

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

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

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

1. Amoeba shows thefollowing kind of nutrition –

   a) Autotrophic
   b) Holozoic
   c) Saprotrophic
   d) Parasitic

   ANS: (b)

2. The process by which blood is cleared of metabolic wastes in case of kidney failure is called

   a) Artificial kidney
   b) Dialysis
   c) Transplantation
   d) Filtration

   ANS: (b)

3. In Human beings the process of digestion of food begins in:

   a) Stomach
   b) Food Pipe
   c) Mouth
   d) Small Intestine

   ANS: (c)

4. Which of the following organisms have parasitic mode of nutrition?

   a) Penicillium
   b) Plasmodium
   c) Paramecium
   d) Rhizobium

   ANS: (b)

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

ANS: (d)

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

**The following two questions consists of two statements-ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below**
**a) Both A and R are true and R is the correct explanation for A**
**b) Both A and R are true and R is not the correct explanation for A**
**c) A is true but R is false**
**d) A is false but R is true**
i) **ASSERTION (A):** Aerobic respiration require less energy as compared to anaerobic respiration.
**REASON(R):** Mitochondria is the power house of the cell.
ANS-(d)
ii **ASSERTION (A):**Energy is required to carry out different life processes.
**REASON(R):** Energy is obtained in the form of ATP in the mitochondria.
ANS-(a)

# CHAPTER 7-CONTROL AND COORDINATION

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

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

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

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

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

Synapse:-Junction between two adjacent nerves

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

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

(2) Peripheral Nervous System (PNS)

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

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

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

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

(ii) It has 3 main areas-

a. Sensory area- to receive impulses from sense organs via Receptors
b. Motor area- control voluntary movements
c. Association areas- Reasoning, learning & intelligence.

Thalamus- It relays sensory information to the cerebrum.

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

Mid brain- It connects fore brain and hind brain

Hind Brain- connects the fore brain and hind brain

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

Pons- acts as a bridge between brain and spinal cord

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

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

Protection of the brain & the spinal cord-

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

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

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

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

Important Endocrine glands, the hormone they secrete & their function

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

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

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

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

Plant hormones (Phytohormones)

## PLANT HORMONES(PHYTOHORMONES)

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

1) Auxins

2) Gibberellins

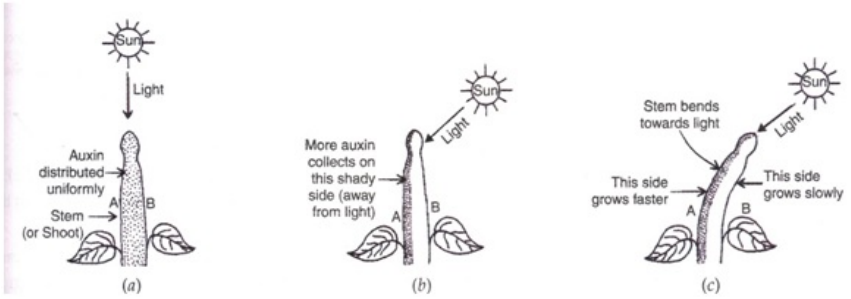
3) Cytokinins

4) Abscisic acid (ABA)

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

**Auxins**

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




*This diagram explains the bending of a plant stem or shoot towards light by the action of 'auxin hormone'.*

Auxins promote cell enlargement, cell differentiation and fruit growth

**Gibberellins**

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

**Cytokinins**

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

**Abscisic acid**

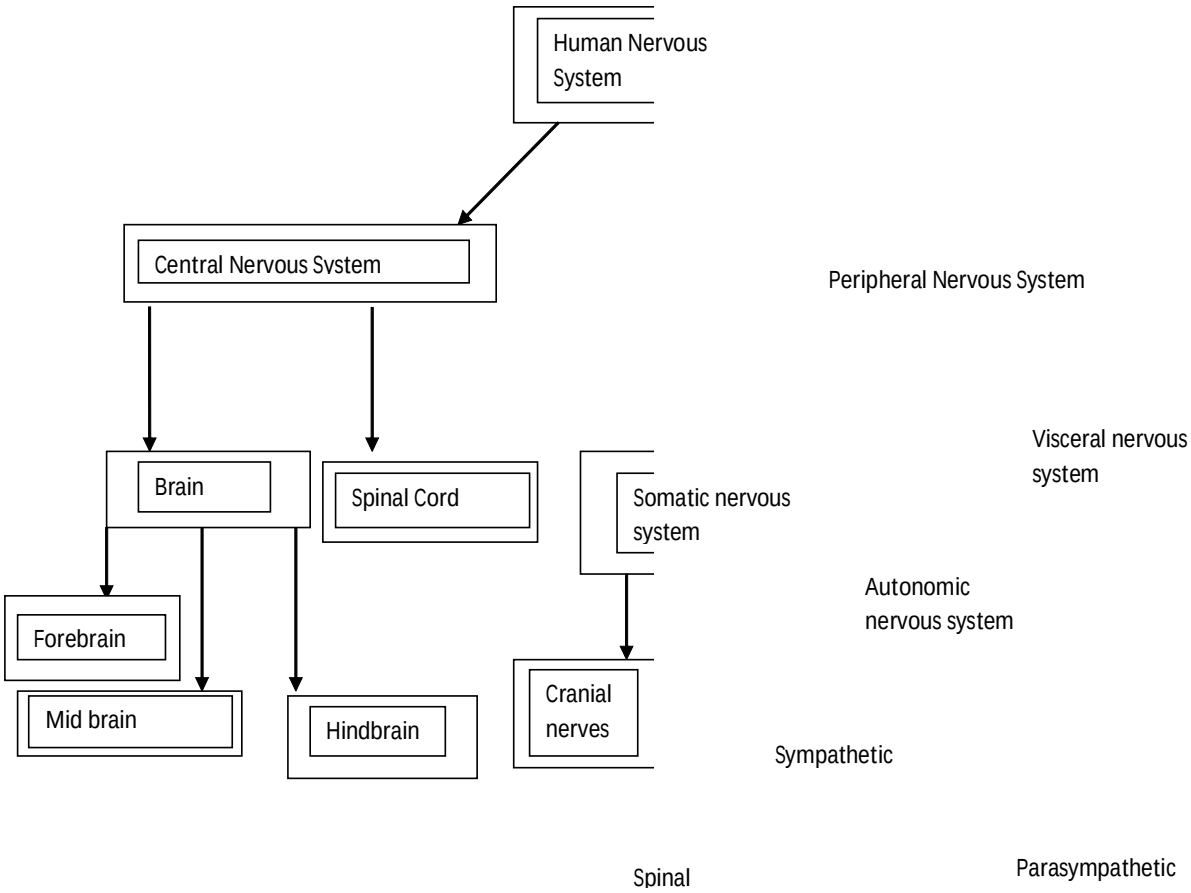
This hormone inhibits the growth of a plant. Therefore abscisic acid promotes dormancy in seeds and buds. It promotes closing of stomata, wilting and falling of leave and detachment of fruit and flower from the plant.

**Important Endocrine glands, the hormone they secrete & their function**

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

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

MIND MAP




## DIAGRAMS

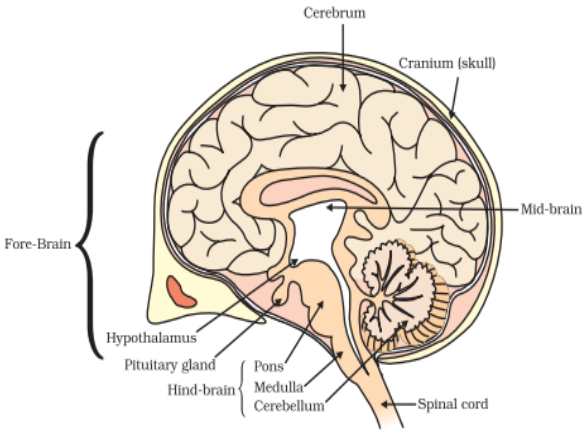



**Figure 7.3** *Human brain*

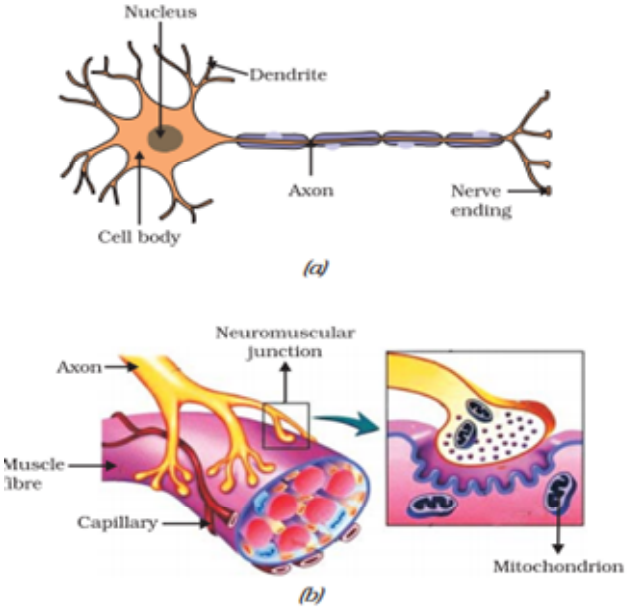
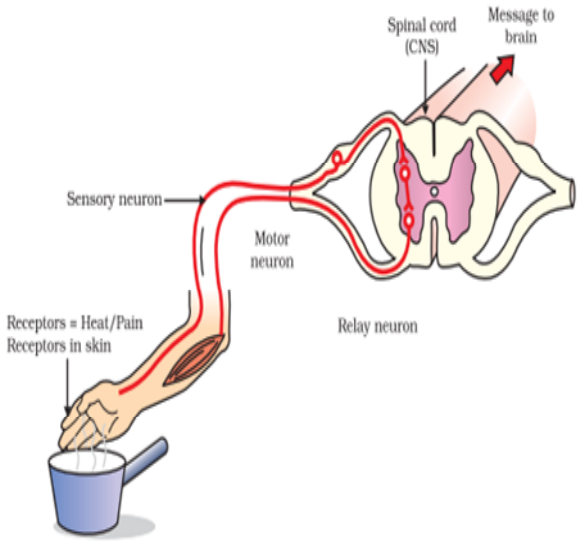



**Figure 7.1** *(a) Structure of neuron, (b) Neuromuscular junction*




REFLEX ARC

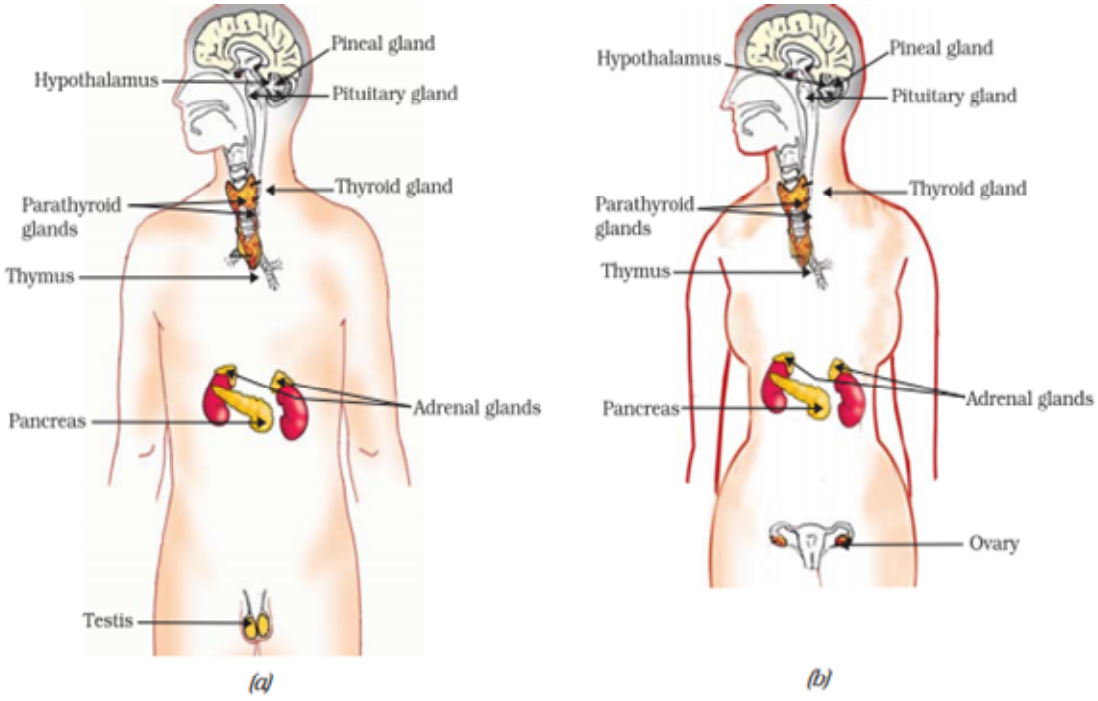



**Figure 7.7** *Endocrine glands in human beings (a) male, (b) female*

**QUESTION BANK**

**VERY SHORT ANSWER TYPE QUESTIONS 1 mark**

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

**(SHORT ANSWER TYPE QUESTIONS**) 2 MARK

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

**SHORT ANSWER QUESTIONS (3 MARK)**

1. A compound of iodine is compulsorily added to common salt in small quantity.

(a) Why is it important for us to have iodized salt in our diet?

(b) Name the disease caused by its deficiency.

(c) Write the symptoms of the disease.

2. What is reflex action? Describe the steps involved in reflex action.

3) Name the following:

Response of plants to light, chemical and water.

**LONG ANSWER QUESTIONS (5 Mark)**

1. Name the plant growth hormone which is synthesized at the shoot tip. Explainbriefly why a plant bends towards light during its growth.
2. Draw the diagram of human brain and label the parts. Write the function of cerebellum and pons

3. What is reflex action? Describe the steps involved in reflex action.
4) Name the following:Response of plants to light, chemical and water.

**<u>CHOOSE THE BEST OPTION FROM EACH OF THE FOLLOWING:</u>**

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

ANS-(a)

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

ANS-(d)

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

ANS-(c)

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

ANS-(a)

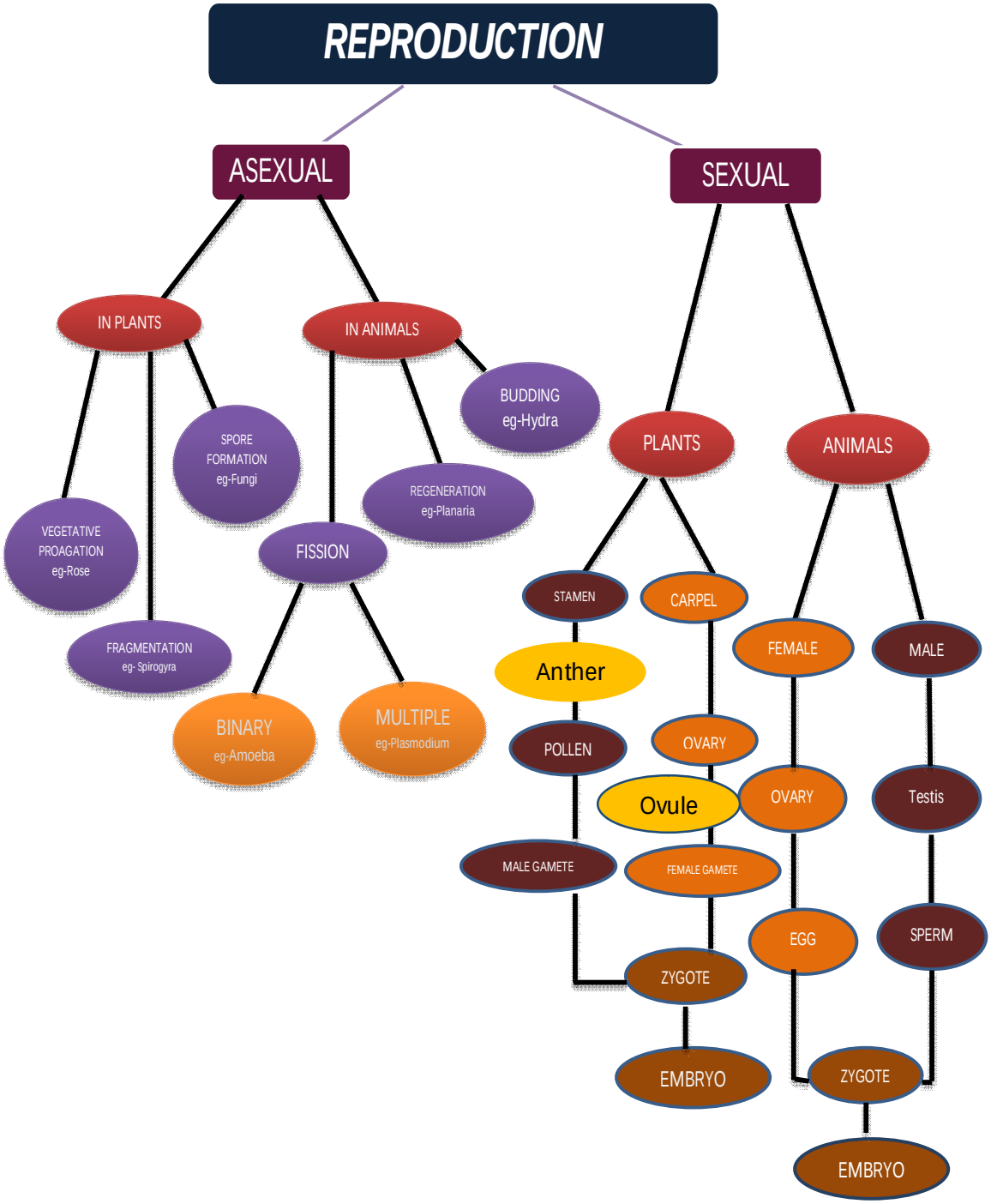
5. The growth of tendrils in pea plants is due to
a) Effect of light
b) Effect of gravity
c) Rapid cell division in tendrillar cells in contact with the support
d) Rapid cell divisions in tendrillar cells that are away from the support.

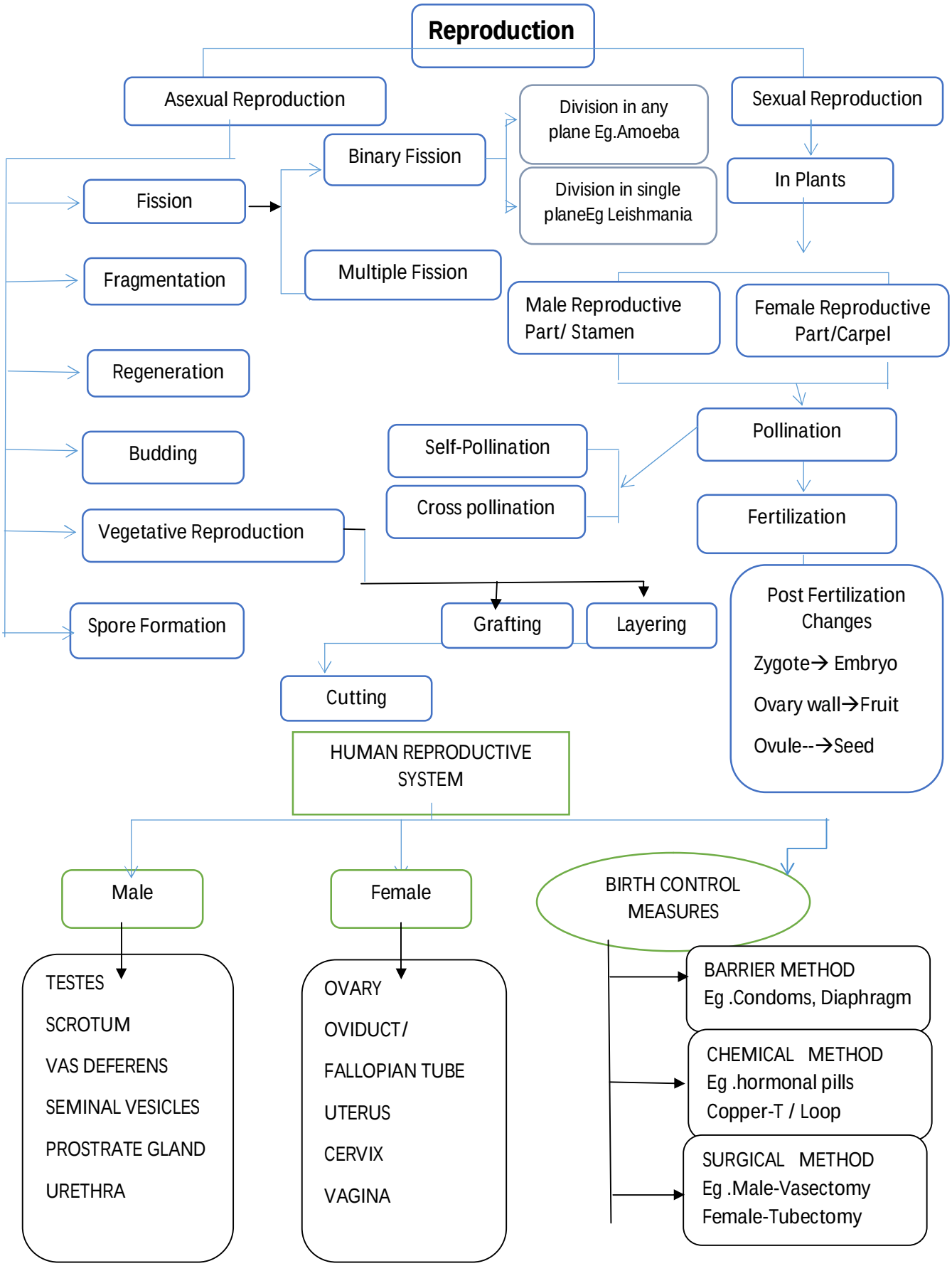
ANS-(d)

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

**The following two questions consists of two statements-ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below**
**a) Both A and R are true and R is the correct explanation for A**
**b) Both A and R are true and R is not the correct explanation for A**
**c) A is true but R is false**
**d) A is false but R is true**
i) **ASSERTION (A)**: Insulin regulates blood sugar level.
**REASON(R):** insufficient secretion of insulin will cause diabetes.
ANS-(a)
ii **ASSERTION (A):** a nerve impulse is an electrochemical event.
**REASON(R):** In a nerve impulse there are changes in the resting potential which spread down the nerve fiber
ANS-(a)

# CHAPTER: 8 HOW DO ORGANISMS REPRODUCE




Reproduction
Asexual Reproduction
Sexual Reproduction
Division in any plane Eg.Amoeba
Binary Fission
Division in single planeEg Leishmania
Fission
In Plants
Fragmentation
Multiple Fission
Male Reproductive Part/ Stamen
Female Reproductive Part/Carpel
Regeneration
Budding
Pollination
Self-Pollination
Cross pollination
Fertilization
Vegetative Reproduction
Post Fertilization Changes
Zygote→ Embryo
Ovary wall→Fruit
Ovule--→Seed
Spore Formation
Grafting
Layering
Cutting
HUMAN REPRODUCTIVE SYSTEM
Male
Female
BIRTH CONTROL MEASURES
TESTES
SCROTUM
VAS DEFERENS
SEMINAL VESICLES
PROSTRATE GLAND
URETHRA
OVARY
OVIDUCT/
FALLOPIAN TUBE
UTERUS
CERVIX
VAGINA
BARRIER METHOD
Eg .Condoms, Diaphragm
CHEMICAL METHOD
Eg .hormonal pills
Copper-T / Loop
SURGICAL METHOD
Eg .Male-Vasectomy
Female-Tubectomy

**1. AdvantagesofVegetativePropagation**

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

**2 Disadvantages ofVegetative Propagation**

Vegetative propagation doesn'tfavourmuch variation and evolution of new species.

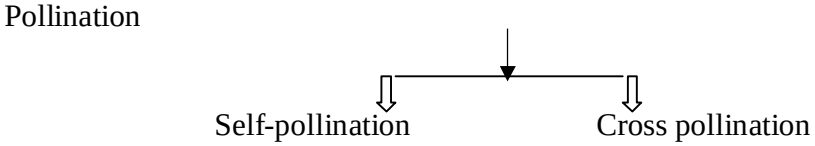
**3. Regeneration** is the ability of an organism to regenerate the lost part.(e.g.:arm regeneration in star fishes).Sometimes, an organism can be made from its fragmented body parts.e.g. *Planaria*.

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

**5 Unisexual flowers and bisexual flowers**

| Unisexual flowers | Bisexual flowers |
|---|---|
| Have either stamen or carpel<br>e.g. Water melon, papaya | Have both stamen and carpel<br>e.g. hibiscus, rose mustard |

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




**7<u>Post pollination changes in plants</u>**

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

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

**9Unisexual and bisexual organisms**

| Unisexual organisms | Bisexual organisms (Hermaphrodites) |
|---|---|
| Have only male or female reproductive organs<br>e.g. Human beings,cats,dogs (in animals)<br>Watermelon, Papaya ( in plants) | Have both male and female reproductive organs.<br>E.g. Flatworms,earthworms,leeches. ( in animals)<br>Hibiscus, mustard (in plants) |

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

**11 Parts and functions**

| Male | Female |
|---|---|
| Testis :sperm production | Ovary : Egg production |
| Vas deferens :Sperm conducting path | Fallopian tube :Site of fertilization |
| Urethra: Common passage for urine and sperms | Uterus :Site of implantation |
| Seminal vesicle and prostate gland: Nutrition and mobility | Vagina : Opening of birth canal |

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

**13** Itis through placenta glucose and oxygen are given to the developing embryo and waste materials are removed from embryo and given to the mother's blood.

**14 Common birth control measures**

(a) Physicalbarriermethodslikecondoms and vaginal diaphragm

(b) chemical methods like oral or vaginal pills

(c) surgical methods like tubectomy in females and vasectomy in males

(d) IUCD - Copper T

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

## IMPORTANT DIAGRAMS

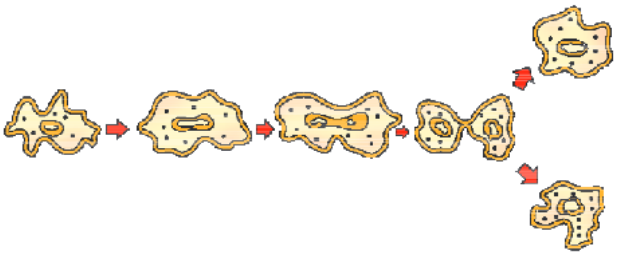


***Figure 8.1*** *Binary fission in Amoeba*

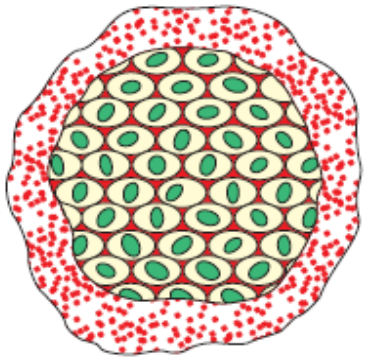


***Figure 8.2***
*Multiple fission in Plasmodium*

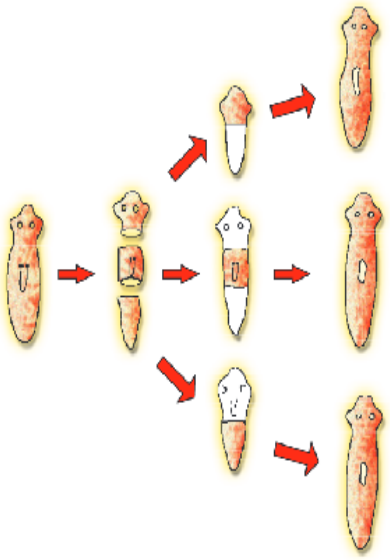


**Figure 8.3** *Regeneration in Planaria*

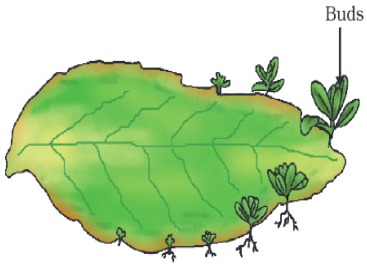



**Figure 8.5**
*Leaf of Bryophyllum with buds*

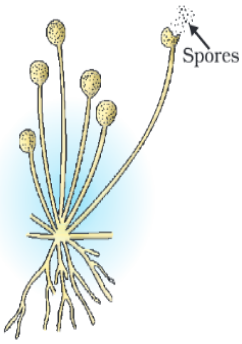



**Figure 8.6**
*Spore formation in Rhizopus*

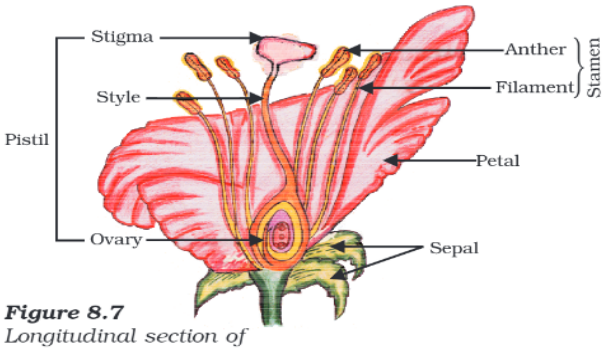



**Figure 8.7**
*Longitudinal section of flower*

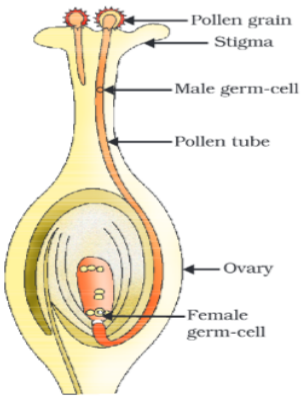



**Figure 8.8**
*Germination of pollen on stigma*

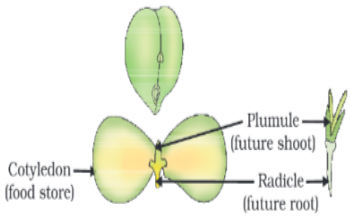



**Figure 8.9**
*Germination*

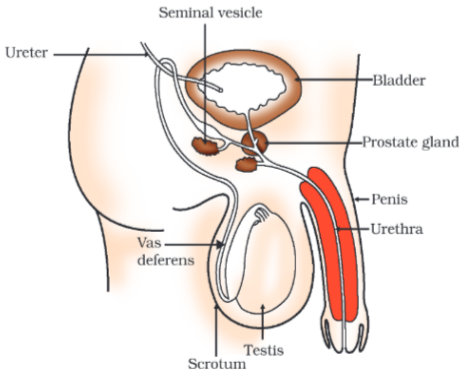



**Figure 8.10** *Human–male reproductive system*

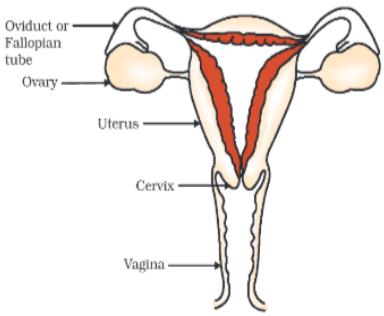
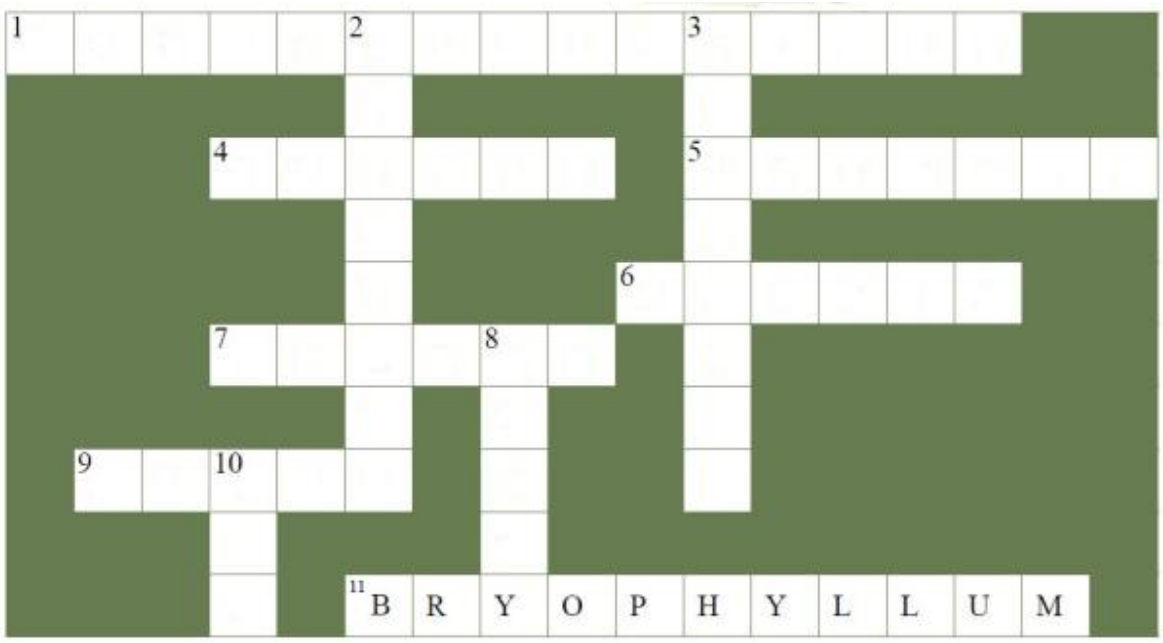



**Figure 8.11** *Human–female reproductive system*

CROSSWORD




## Across

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

## Down

2. Embryo gets rid of waste through
3. A STD
8. The lower flask shaped part of the carpel.
10. I am the blue print of life

## QUESTION BANK

### Very short answer questions (1 mark)

1. Name the plant in which vegetative propagation takes place by leaves.
Ans)Bryophyllum.
2.Writescientific term for the following:

a) Release of ovum from ovary.

Ans. Ovulation

b) Onset of menstrual cycle in a female.

Ans) Menarche.

3. Where does fertilization takes place in human female?

Ans.) Oviduct (fallopian tube)

### Short answer questions (2 mark)

1 .What is the importance of DNA copying in reproduction?

Ans. DNA copying is essential for transferring genetic material from one generation to another.

2.How is pollination different from fertilization?

Ans. Pollination is the process of transfer of pollen grains from the anther lobe to the stigma of the flower, while fertilization is the process of fusion of malegamete and female gamete to form the zygote.

3.What is the role of seminal vesicles and the prostate gland?

Ans: Seminal vesicle and prostate gland help in nutrition and mobility of sperms.

### Short answer questions (3 mark)

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

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

3. a)What is AIDS?
b)Name the causative organism?
c)List the important modes of transmission of the disease.
Ans.a)Acquired immuno deficiency syndrome.
b) HIV (Virus)
c) i) Through infected blood transfusion
ii) Contaminated syringes.
iii) Infected mother to child.
iv) Sexual contact

4. What are the different methods of contraception?

Ans. a) Barrier method: condoms used by males /vaginal diaphragm used by females.

b) Chemical method: e.g. oral pills /vaginal pills used by females

c) Surgical method: vasectomy in males /tubectomy in females

**Long answer questions (5 mark)**

1. Explain the process of fertilization in plants with the help of neat labeled diagram

Ans. Hints: Formation of pollen tube, movement of male gametes towards the ovule. Fertilization: Fusion of male and female gamete.

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

10. Describe the different methods of asexual reproduction seen in animals with the help of neat labelled diagrams.

Ans.Description for the following:

1. Fission : binary and multiple fission
2. Regeneration
3. Bud formation

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

**MCQ**

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

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

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

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

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

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

**ASSERTION QUESTIONS:**

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

**(a) Both A and R are true and R is correct explanation for A.**

**(b) Both A and R are true and R is not the correct explanation for A.**

**(c) A is true but R is false.**

**(d) A is false but R is true.**

1. **Assertion:** In human beings the female produces two types of gametes.

   **Reason:** Female has two X chromosomes.

**Ans**: (d) A is false but R is true.

2. **Assertion:** A bisexual flower produces ova as well as the pollen.

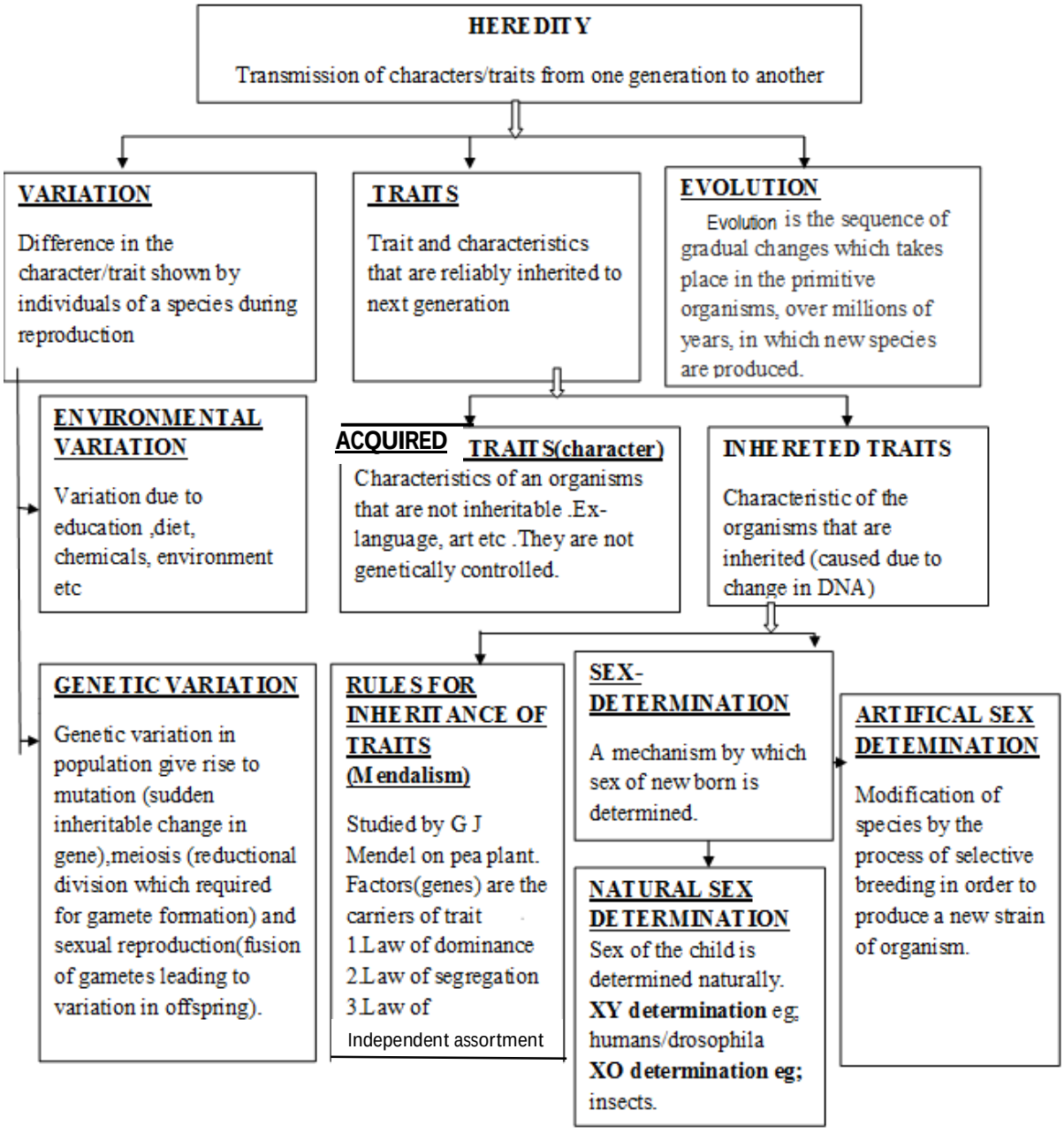
   **Reason:** Ova and pollen are produced in the carpel.

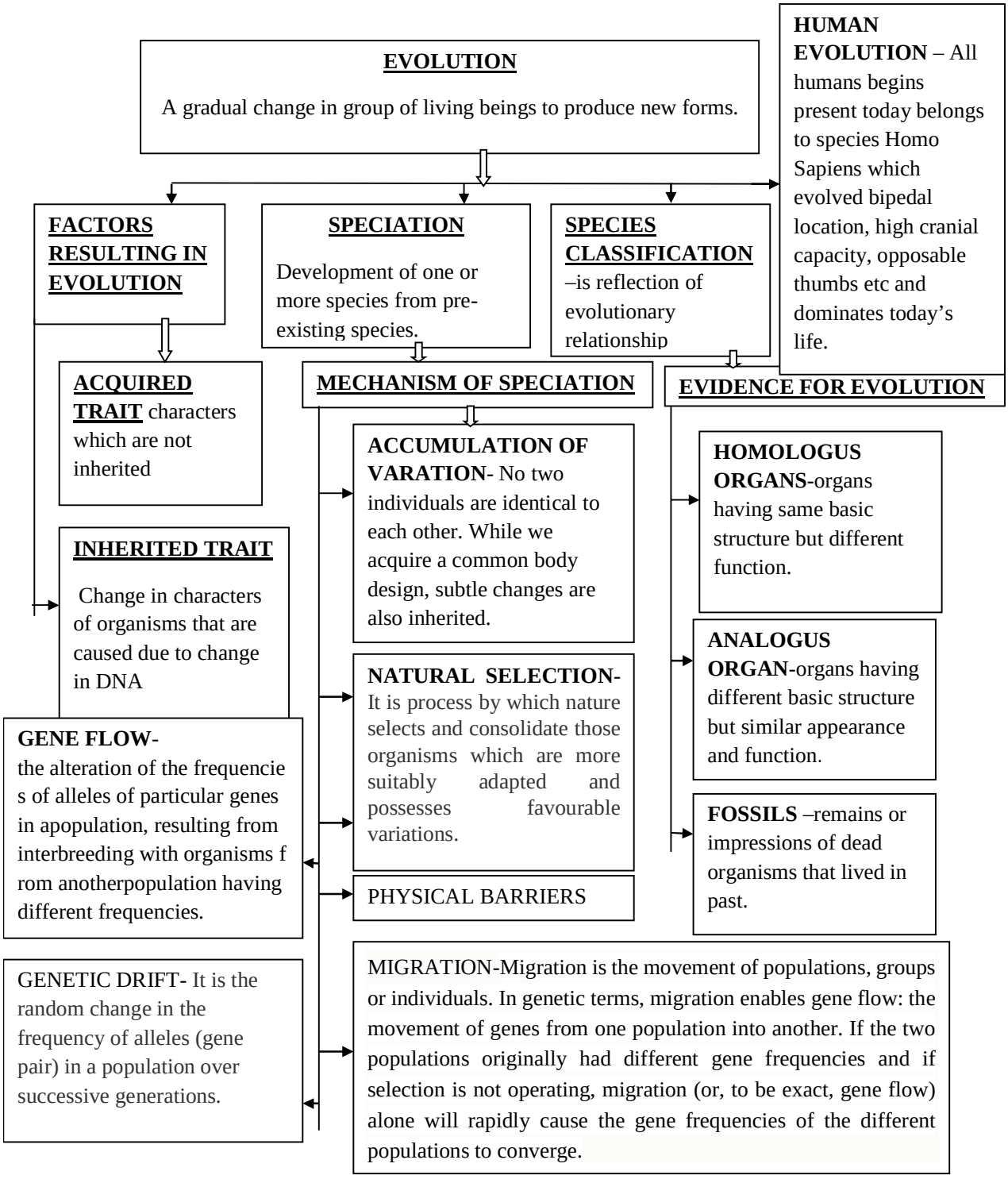
**Ans**: (c) Atrue is but R is false.

## CHAPTER-9

## HEREDITY AND EVOLUTION

## FLOW CHART



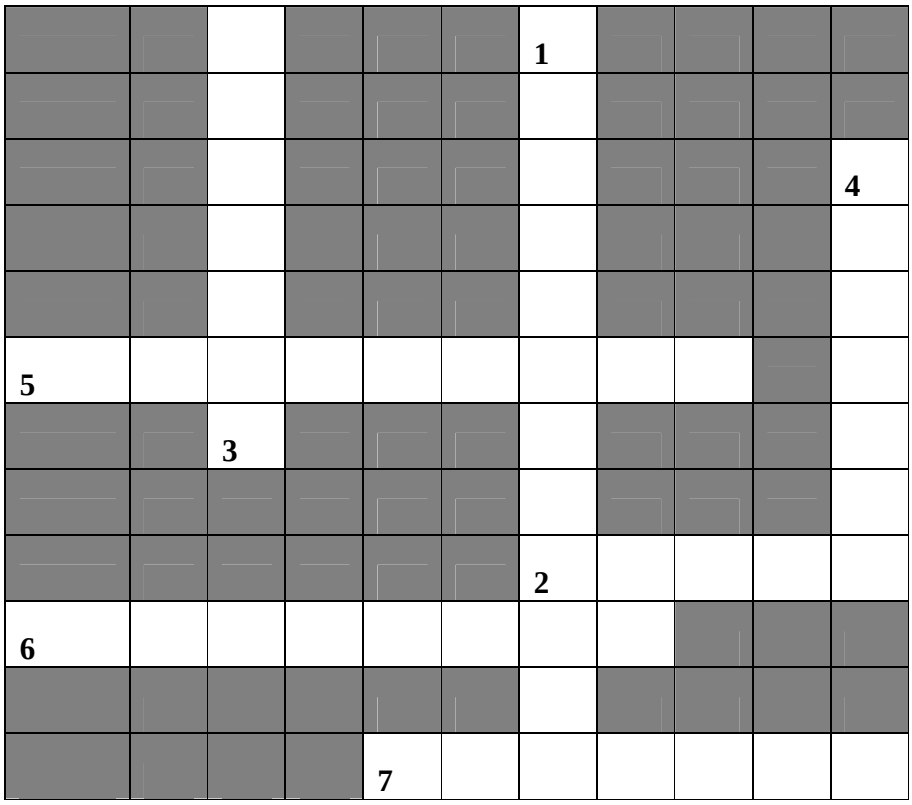

EVOLUTION
A gradual change in group of living beings to produce new forms.
HUMAN EVOLUTION – All humans begins present today belongs to species Homo Sapiens which evolved bipedal location, high cranial capacity, opposable thumbs etc and dominates today's life.
FACTORS RESULTING IN EVOLUTION
SPECIATION
Development of one or more species from pre-existing species.
SPECIES CLASSIFICATION –is reflection of evolutionary relationship
ACQUIRED TRAIT characters which are not inherited
MECHANISM OF SPECIATION
EVIDENCE FOR EVOLUTION
ACCUMULATION OF VARATION- No two individuals are identical to each other. While we acquire a common body design, subtle changes are also inherited.
HOMOLOGUS ORGANS-organs having same basic structure but different function.
INHERITED TRAIT
Change in characters of organisms that are caused due to change in DNA
ANALOGUS ORGAN-organs having different basic structure but similar appearance and function.
NATURAL SELECTION- It is process by which nature selects and consolidate those organisms which are more suitably adapted and possesses favourable variations.
FOSSILS –remains or impressions of dead organisms that lived in past.
GENE FLOW- the alteration of the frequencies of alleles of particular genes in apopulation, resulting from interbreeding with organisms from anotherpopulation having different frequencies.
PHYSICAL BARRIERS
GENETIC DRIFT- It is the random change in the frequency of alleles (gene pair) in a population over successive generations.
MIGRATION-Migration is the movement of populations, groups or individuals. In genetic terms, migration enables gene flow: the movement of genes from one population into another. If the two populations originally had different gene frequencies and if selection is not operating, migration (or, to be exact, gene flow) alone will rapidly cause the gene frequencies of the different populations to converge.

**DEFINITIONS:-**
1) GENE- Functional unit of DNA.
2) GENOTYPE- Genes inherited from both the parents, may or may not be expressed are called genotype.

3) PHENOTYPE-Expressed structural and functional traits as a result of genes as well as environment

4) FOSSIL- Dead remain of plant and animal.

**CROSSWORD**




**DOWN**

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

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

**UP**
3. Theory of inheritance of acquired character is given by

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

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

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

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

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

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

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

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

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

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

(a) 15:1

(b) 9:3:3:1

(c) 9:3:4

(d) 12:3:1

ANS-(b)

2. Some dinosaurs had feathers although they could not fly but birds have feathers that help them to fly. In the context of evolution this means that-

(a) Reptiles have evolved from birds

(b) There is no evolutionary connection between reptiles and birds

(c) Feathers are homologous structure in both the organisms

(d) Birds have evolved from reptiles.

ANS-(d)

3. The genetic constitution of an organism is called.

(a) Genotype

(b) Phenotype

(c) Variation

(d) Gene.

ANS-(a)

4. Two colouredflowers on crossing results in 3 red and 1white flower progeny. The nature of the cross is-

(a) Cross pollination

(b) Self-pollination

(c) Double fertilization

(d) No fertilization

ANS-(a)

5. A basket of vegetable contains carrot, potato, radish, and tomato. Which of them represent the correct homologous structure

(a) Carrot and potato

(b) Carrot and tomato

(c) Radish and carrot

(d) Radish and potato

ANS-(c)

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

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

**a) Both A and R are true and R is the correct explanation for A**

**b) Both A and R are true and R is not the correct explanation for A**

**c) A is true but R is false**

**d) A is false but R is true**

**i) ASSERTION (A):** Evolution is extremely slow process.

**REASON(R):** New characters are accumulated in an organisms during its life time.

ANS-(c)

ii **ASSERTION (A):** Geographical isolation cannot be major factor in speciation of asexually reproducing organism.

**REASON(R):** Asexually reproducing organisms do not require any other organism for reproduction.

ANS-(a)

# Chapter - 10

## LIGHT –REFLECTION AND REFRACTION

**LIGHT**

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

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

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

**Types of Image formed by**

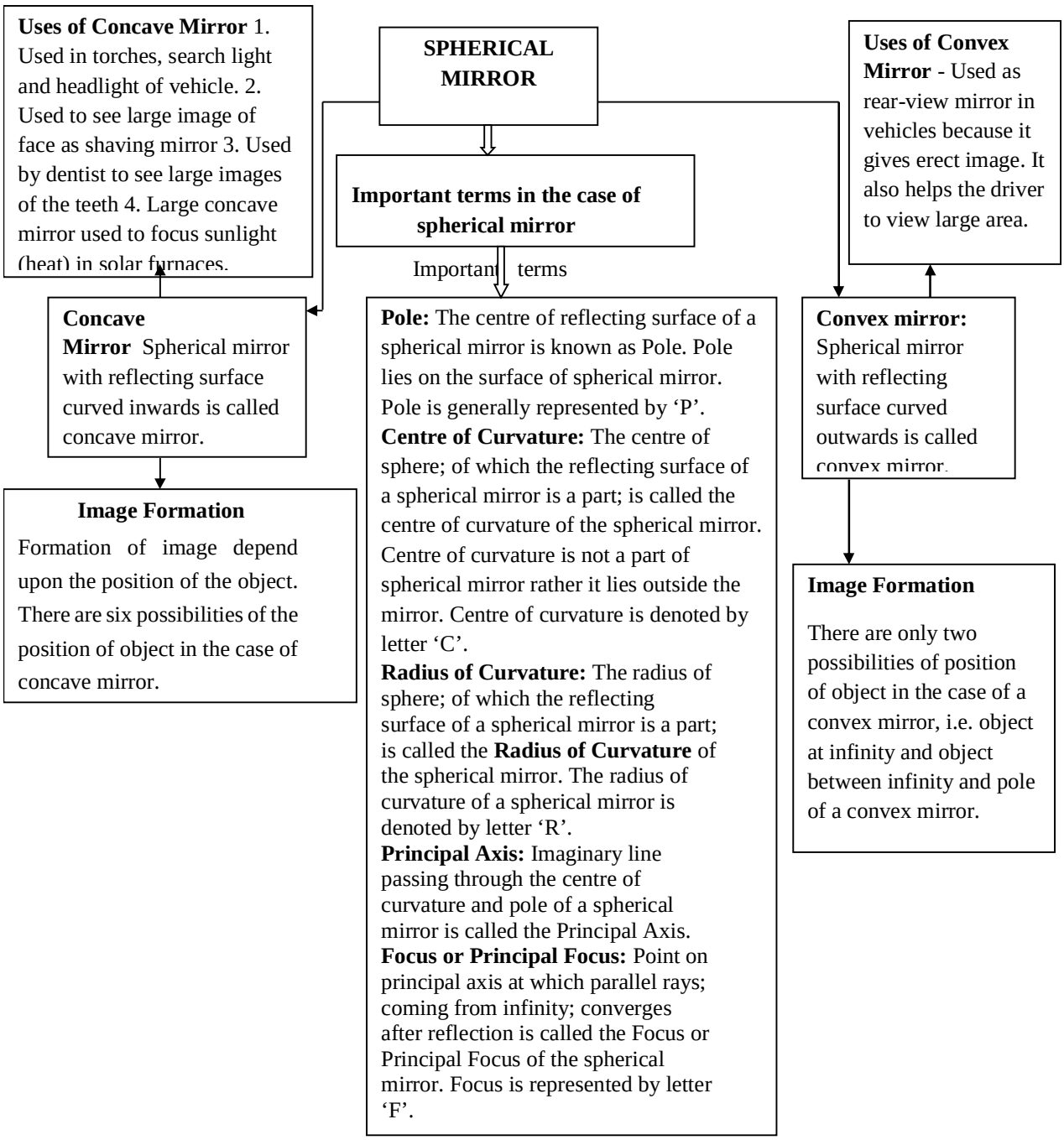
**Real Image:** Image which is formed in front of the mirror and it can be obtained on a screen is called real image.

**Virtual Image:** Image which is formed behind the mirror and cannot be obtained on a screen is called virtual image.

**Types of Mirror**

**Plain Mirror:** A mirror having a flat surface is called plane mirror.

**Spherical Mirror**
Mirrors having curved reflecting surface are called spherical mirrors. A spherical mirror is a part of a sphere.


SPHERICAL MIRROR
Uses of Concave Mirror 1. Used in torches, search light and headlight of vehicle. 2. Used to see large image of face as shaving mirror 3. Used by dentist to see large images of the teeth 4. Large concave mirror used to focus sunlight (heat) in solar furnaces.
Uses of Convex Mirror - Used as rear-view mirror in vehicles because it gives erect image. It also helps the driver to view large area.
Important terms in the case of spherical mirror
Important terms
Concave Mirror Spherical mirror with reflecting surface curved inwards is called concave mirror.
Convex mirror: Spherical mirror with reflecting surface curved outwards is called convex mirror.
Image Formation
Formation of image depend upon the position of the object. There are six possibilities of the position of object in the case of concave mirror.
Pole: The centre of reflecting surface of a spherical mirror is known as Pole. Pole lies on the surface of spherical mirror. Pole is generally represented by 'P'.
Centre of Curvature: The centre of sphere; of which the reflecting surface of a spherical mirror is a part; is called the centre of curvature of the spherical mirror. Centre of curvature is not a part of spherical mirror rather it lies outside the mirror. Centre of curvature is denoted by letter 'C'.
Radius of Curvature: The radius of sphere; of which the reflecting surface of a spherical mirror is a part; is called the Radius of Curvature of the spherical mirror. The radius of curvature of a spherical mirror is denoted by letter 'R'.
Principal Axis: Imaginary line passing through the centre of curvature and pole of a spherical mirror is called the Principal Axis.
Focus or Principal Focus: Point on principal axis at which parallel rays; coming from infinity; converges after reflection is called the Focus or Principal Focus of the spherical mirror. Focus is represented by letter 'F'.
Image Formation
There are only two possibilities of position of object in the case of a convex mirror, i.e. object at infinity and object between infinity and pole of a convex mirror.

**Sign Convention for Reflection by Spherical Mirror**

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

**IMAGE FORMATION BY CONCAVE MIRROR FOR DIFFERENT POSITION**

**IMAGE FORMATION BY CONVEX MIRROR FOR DIFFERENT POSITION**

**SPHERICAL MIRROR**

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

See figure - 10.1

| POSITION OF THE OBJECT | POSITION OF THE IMAGE | SIZE OF THE IMAGE | NATURE OF THE IMAGE |
|---|---|---|---|
| At infinity | At the focus F, behind the mirror | Highly diminished, point-size | Virtual and erect |
| Between infinity and pole P of the mirror | Between P and F, behind the mirror | Diminished | Virtual and erect |

See figure - 10.2

Index of Refraction, **n**
n=c/v
c : the speed of light in a vacuum 3 x $10^8$ m/sec
v : speed of light in the medium.
n : medium's index of refraction

**Centre of curvature** - A lens, either a convex lens or a concave lens has two spherical surfaces. Each of these surfaces form a part of sphere. The centre of these two spheres are called centre of curvature represented by C and C.
**Principal axis** - Imaginary straight line passing through the two centres of curvature
**Optical Centre** - The central point of lens is its optical centre (O). A ray of light, when passes through 'O' it remains undeviated i.e. it goes straight.
**Aperture** -The effective diameter of the circular outline of a spherical lens.
**Focus of lens** - Beam of light parallel is principal axis, after refraction from 1) Convex lens, converge to the point on principal axis, denoted by F, known as Principal focus 2) Concave lens, and appear to diverge from a point on the principal axis, known as principal focus.

**REFRACTION**

Spherical Lens a transparent material bound by two surface, of which one or both surfaces are spherical, forms a lens.

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

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

| POSITION OF THE OBJECT | POSITION OF THE IMAGE | SIZE OF THE IMAGE | NATURE OF THE IMAGE |
|---|---|---|---|
| At infinity | At the focus F2 | Highly diminished, point-size | Real and inverted |
| Beyond 2F1 | Between F2 and 2F2 | Diminished | Real and inverted |
| At 2F1 | At 2F2 | Same size | Real and inverted |
| Between F1and 2 F1 | Beyond 2F2 | Enlarged | Real and inverted |
| At F | At infinity | Highly Enlarged | Real and inverted |
| Between P and F | Behind the mirror | Enlarged | Virtual and erect |

See figure – 10.3

| Object position | Image position | Size of image | Nature of image |
|---|---|---|---|
| At infinity | At the focus F1 | Highly diminished point size | Virtual and erect |
| Between infinity and optical centre of the lens | Between F1 and O | diminished | Virtual and erect |

See figure – 10.4

The degree of convergence or divergence of light ray achieved by a lens is known as power of a lens. It is defined as the reciprocal of its focal length Represented by P i.e. P=1/f SI unit – Dioptrer (D),

**IMPORTANT FORMULAE**

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

**RAY DIAGRAMS**

**Fig 10.1**

**NATURE, IMAGE AND ITS FORMATION (CONCAVE MIRROR)**

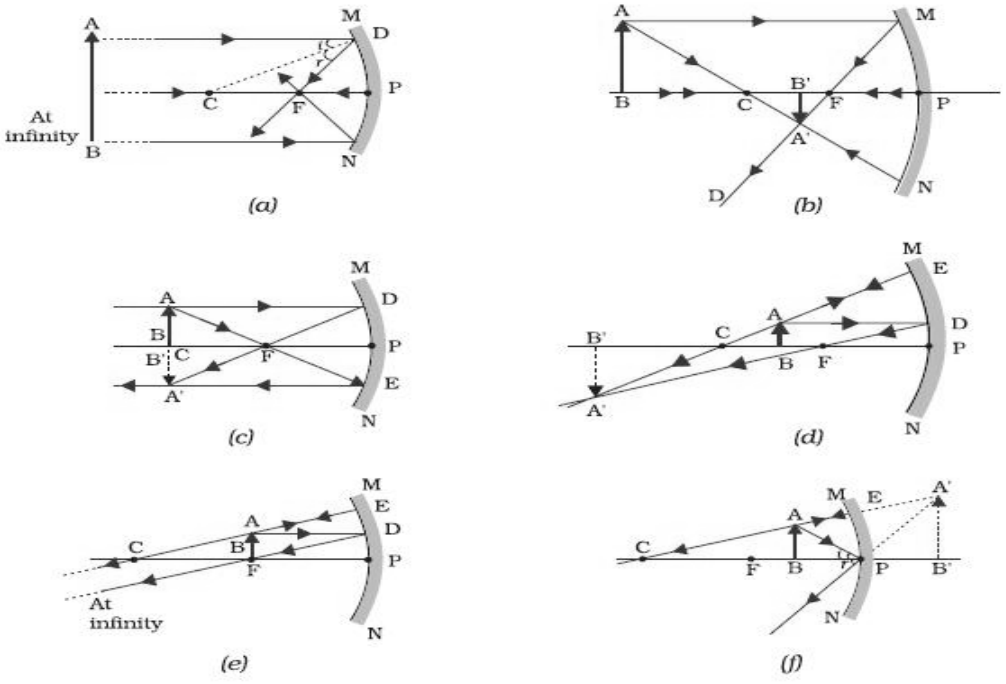


**FIG – 10.2**

**NATURE, IMAGE AND ITS FORMATION (CONVEX MIRROR)**

**Object at infinity** **Object between infinity and pole**

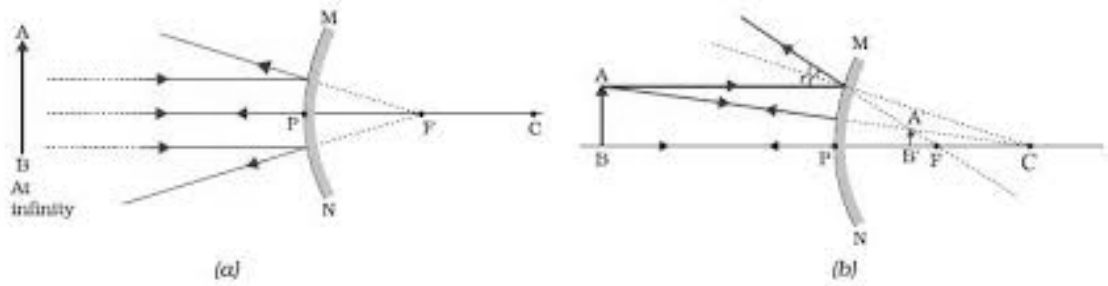



**Fig- 10.3**

**NATURE, IMAGE AND ITS FORMATION (CONVEX LENS)**

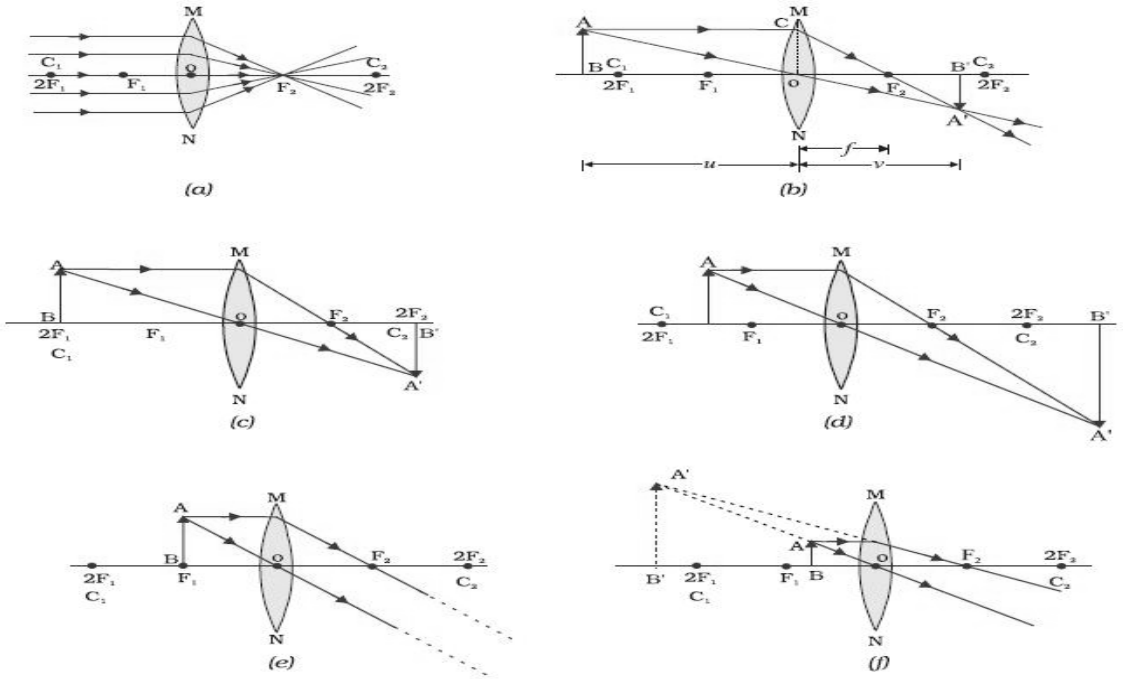
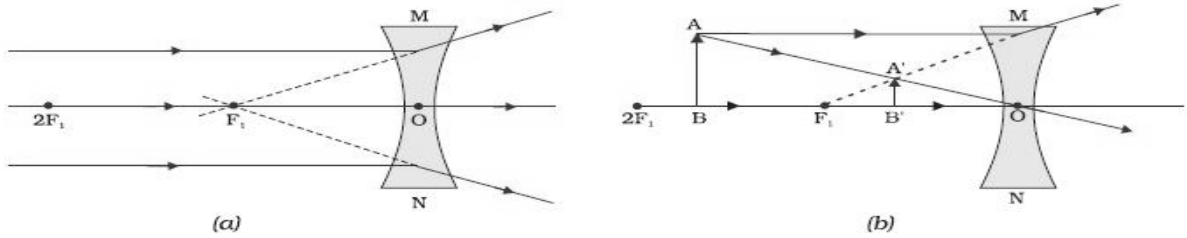



**Fig-10.4**

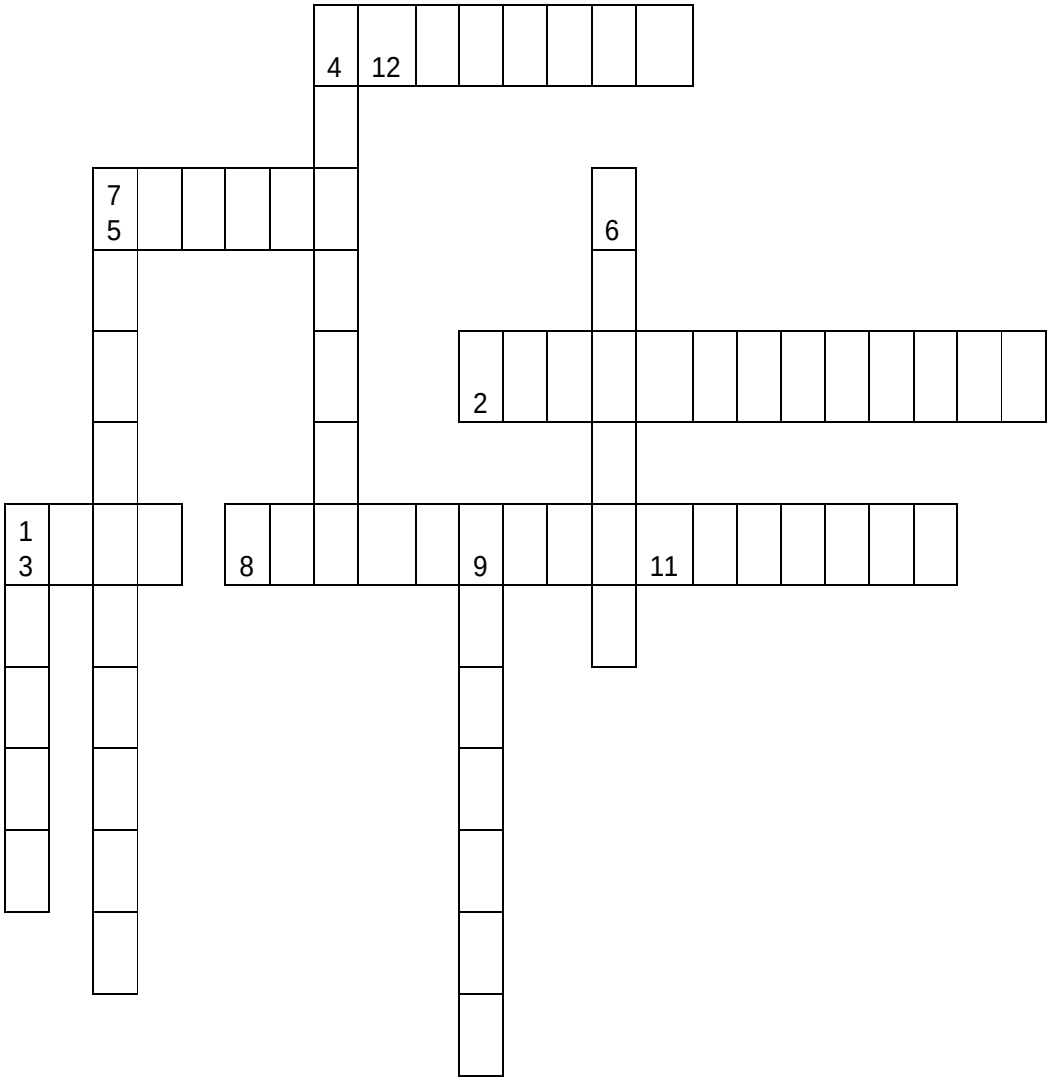
**NATURE, IMAGE AND ITS FORMATION (CONCAVE LENS)**




a) Object at infinity

b) Object (any point between infinity and O)

## CROSSWORD




**Across**

1 A transparent medium bounded by the spherical surfaces.

2. Ratio of height of the image to the height of object

5. The medium where the speed of light is less.

8. An instrument which is used to see details of distant object.

11. Unit of power

12. The mirror used by dentist to see patient's teeth

**Down**

3. Form of energy that enables to see.

4. The nature of the image formed by the convex lens when the object is placed between optical center and focus.

6. A converging lens.

7. The size of the image formed by the concave lens.

9. The lens having negative power

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

1 .Refractive index of water is 4/3 and that of the glass is 3/2 with regard to air. What is the refractive index of glass with respect to the water? [Ans ▶ 9/8]

2. What is the power of concave lens of focal length 200cm?

3. The radius of curvature of spherical mirror is 20cm.What is its focal length?

4. What is the angle of reflection when a ray of light fall normally on a plane mirror?

5. What is the magnification produced by a plane mirror.

6. What is the nature of image formed by concave mirror if magnification produced by mirror is +3?

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

1. An object 2cm high produce areal image 3 cm high, when placed at a distance of 15cm from concave mirror. Calculate the position of the image. (HOTS)

2. The power of a focal length is – 4D.State the nature of lens and any two characteristics of the image formed by the lens.

3. State two examples based on phenomenon of refraction of light in everyday life situation.

4. Distinguish between real and virtual image.

5. Name the type of mirror used in the following situations:

a) Headlights of car

b) Rear – view mirror of vehicles

6. An object is placed at a distance of 10 cm from convex mirror of focal length 15 cm. Find the position and nature of image.

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

1. The refractive index of alcohol and turpentine oil with respect to air are 1.36 and 1.47 respectively. Find the refractive index of turpentine oil with respect to alcohol. In which of the two media the speed of light will be more.

2. a )Define power of a lens and give its unit.

b) A convex lens forms a real and inverted image of needle at a distance of 50cm from it. Where is the needle placed in front of this lens if the size of the image is equal to the size of the object? Also find power of the lens

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

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

b) What is the focal length of mirror?

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

1. Draw a ray diagram in each of the following cases to show the formation of an image, when an object is placed

a) Between optical center and principal focus of a convex lens.

b) Between F and 2F of concave lens

c) At 2F of convex lens

Write the characteristic of image formed in each case.

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

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

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

## MCQ

1. A convex mirror used for the rear view on an automobile has a focal length of 2.5m. A car is located at a distance of 4m from the mirror.
   In the above scenario the sign that should be assigned to **f** and **u** is-
   a) u positive, f negative
   b) f positive, u negative
   c) f and u are positive
   d) f and u negative
2. In a concave mirror an erect and virtual image is formed when the object is placed-
   a) Between C and F
   b) Beyond C
   c) Between P and F
   d) At C
3. The diameter of the reflecting surface of a spherical mirror is called its-
   a) Centre of curvature
   b) R=2f
   c) Aperture

d) Principal focus.

4. The magnification (m) of a lens can be calculated by using the formula-
   a) m=-v/u
   b) m=v/u
   c) $m=h^i/h$
   d) both b and c

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

Ans)1.b 2.c3.c 4.d 5.a

**ASSERTION – REASON QUESTIONS**

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

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

1. Assertion (A). 1.33 is the absolute refractive index of water.

Reason (R). Air is optically denser than water.

2. Assertion (A).The value of **F** in a concave mirror is taken as –ve and in a convex mirror is taken as +ve.

Reason(R). All distances measured to the right of the origin are taken as +ve and those measured along the left of the origin are taken as –ve.

Ans)1.c 2.a

# CHAPTER 11-HUMAN EYE AND COLOURFUL WORLD

**Power of accommodation**:

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

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

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

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

**Myopia or Near-sightedness:**

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

**Hypermetropia or Far-sightedness**:

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

**Presbyopia:**

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

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

**Dispersion of Light:**

Splitting of light into its component colours.

White light disperses into its seven-colour components in the order VIBGYOR (violet, Indigo, Blue, Green, Yellow, Orange, And Red).

Red light bends least, Violet the most.

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

**Atmospheric Refraction**: Refraction of light by the earth's atmosphere Twinkling of stars, Advanced sunrise, Delayed sunset, Flattening of disc of sun at sunrise and sunset are due to atmospheric refraction

**Tyndall effect:**

- When a beam of light strikes fine particles in air, path of the beam becomes visible.
- Very fine particles scatter mainly blue light while particles of larger size scatter light of longer wavelengths

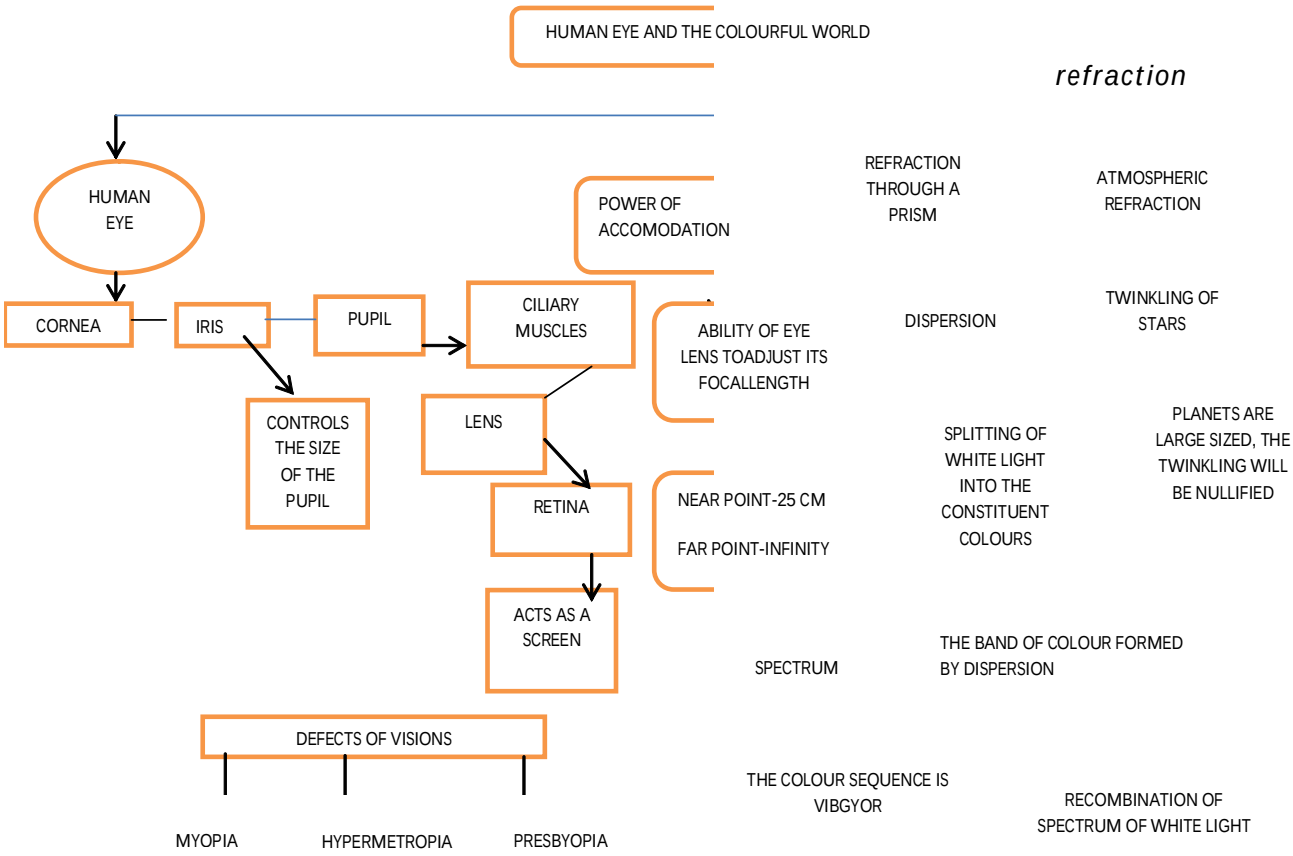
DEFECTS OF VISION

| Sl. No. | Name of defect | Type of defect | Reason | Remedy |
|---|---|---|---|---|
| 1. | Myopia | Nearsightedness | (i) Elongation of eye ball.<br>(ii) Excessive curvature of lens. | Use of concave lens. |
| 2. | Hypermetropia | Farsightedness | (i) Longer focal length of eye lens.<br>(ii) Shortening of eye ball. | Use of convex lens. |
| 3. | Presbyopia | Decrease in power of accommodation | Ageing, leading to weak ciliary muscles and loss of flexibility of eye lens. | Use of eye glasses having bifocal lens. |
| 4. | Cataract | Milkiness of eye lens | Ageing, leading to partial or complete loss of eye sight. | Surgery. |

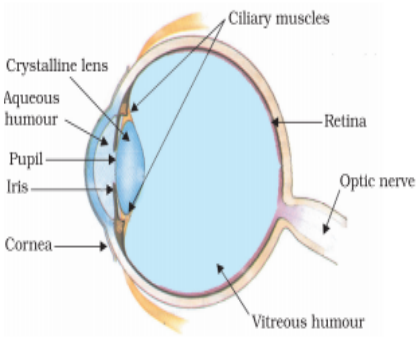
SOME NATURAL PHENOMENON &CAUSES

| S.No. | Phenomenon | Reason |
|---|---|---|
| 1. | Multicolored light coming out of a triangular slab | Dispersion of light |
| 2. | Rainbow | Refraction, dispersion of light and total internal reflection of light in rain drops |
| 3. | Twinkling of stars, Advanced sunrise, Delayed sunset ,Flattening of disc of sun at sunrise and sunset | Atmospheric refraction of sunlight |
| 4. | Blue colour of sky ,Reddening of sun at sun rise and sunset Tyndall effect | Scattering of light |

## ***Mind map***




## HUMAN EYE




## TWINKLING OF STARS

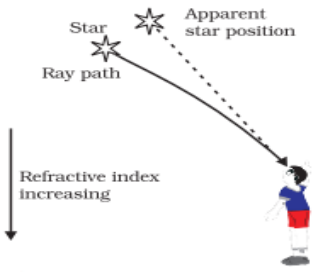



***Figure 11.9***
*Apparent star position due to atmospheric refraction*

FORMATION OF RAINBOWMYOPIA

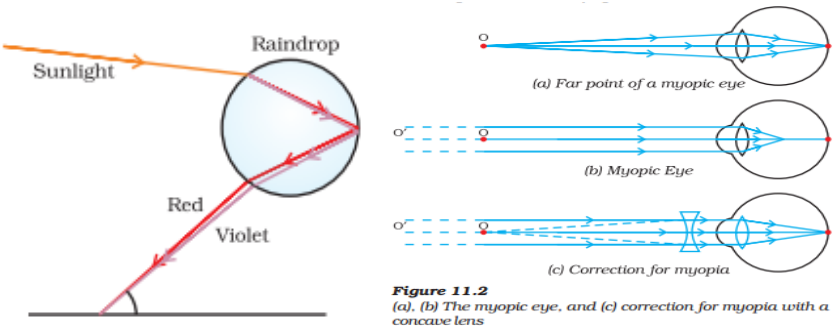
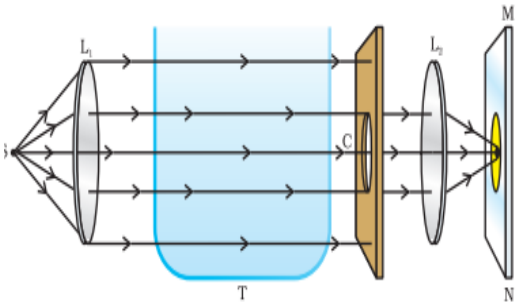



**Figure 11.2**
(a), (b) The myopic eye, and (c) correction for myopia with a concave lens

SCATTERING OF LIGHTDISPERSION OF WHITE LIGHT



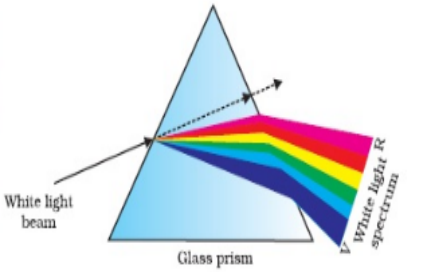




**Figure 11.5** Dispersion of white light by the glass prism

HYPERMETROPIA

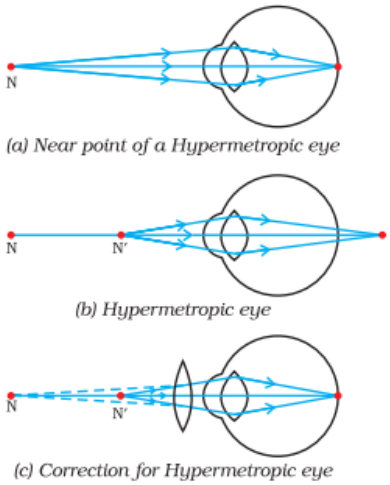



**Figure 11.3**
(a), (b) The hypermetropic eye, and (c) correction for hypermetropia

RECOMBINATION

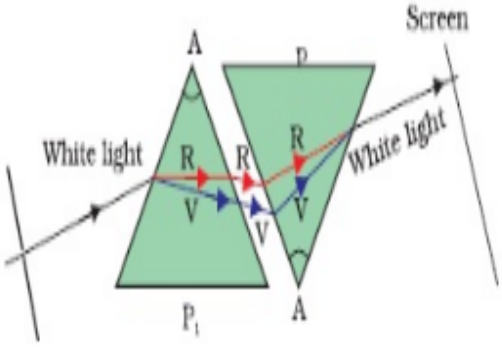



**Figure 11.6** Recombination of the spectrum of white light

QUESTION BANK

**1 mark questions (very short answer questions)**

1. What is the far point and near point of the human eye with normal vision?
   Answer: For normal vision, the near point is about 25cm and far point is infinity. Thus, a normal eye can see objects clearly that are between 25cm and infinity.
2. List the three phenomenon of light which is responsible for formation of rainbow in sky?
   Answer: Refraction, dispersion and total internal reflection.

**2markquestions**

1. Why are 'danger' signal lights red in colour?

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

2. Give reasons why the planets do not twinkle

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

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

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

2. Ritu needs a lens of power -2D for correct of her vision.

a) What kind of defect in vision is she suffering from?

b) What are the possible cause of this defect?

c) What is the nature of corrective lens?

Answer: (a) Ritu is suffering from myopia or short sightedness.

(b) Two possible causes of this effect are:Increase in size of eye ball or decrease in focal length of eye lens.

(c) Concave lens / diverging lens

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

1. Explain myopia and hypermetropia with the help of ray diagrams and show how these defects can be corrected?

Answer: (a)Explanationof Myopia and Hypermetropia
(b) Fig.11.2&11.3NCERT TEXTBOOK
(c) The type of lens: Concave lens, convex lens

2. What is meant by dispersion and recombination? Explain with the help of a diagram? What is a spectrum? Name the various colours of spectrum of white light in proper sequence.

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

(Fig11.5&11.6 NCERT TEXT BOOK)

**MCQ**

1. Aging causes weakness of the_____ resulting in presbyopia.
   a) Lens c) Ciliary muscles
   b) Retina d) Optic nerve
2. In the condition myopia the person
   a) Cannot see far off things
   b) Can see things close by clearly
   c) Can be corrected using a concave lens
   d) All of the above.

3. Twinkling of stars is a phenomenon that occurs due to

   a) Refraction b) Reflection

   c) Varying conditions of the earth's atmosphere d) a and c.

4. In a spectrum of light the colour that has the least wavelength is -

a) Red b) Violet c) Green d) Yellow.

5. The eye defect Hypermetropia can be corrected by using a-

a) Plano convex lens b) Double convex lens

c) Plano concave lens d) Double concave lens

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

**ASSERTION – REASON QUESTIONSM**

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

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

1. Assertion (A). The sky appears dark to people flying at high altitudes.

   Reason(R). The atmosphere is denser close to the earth.

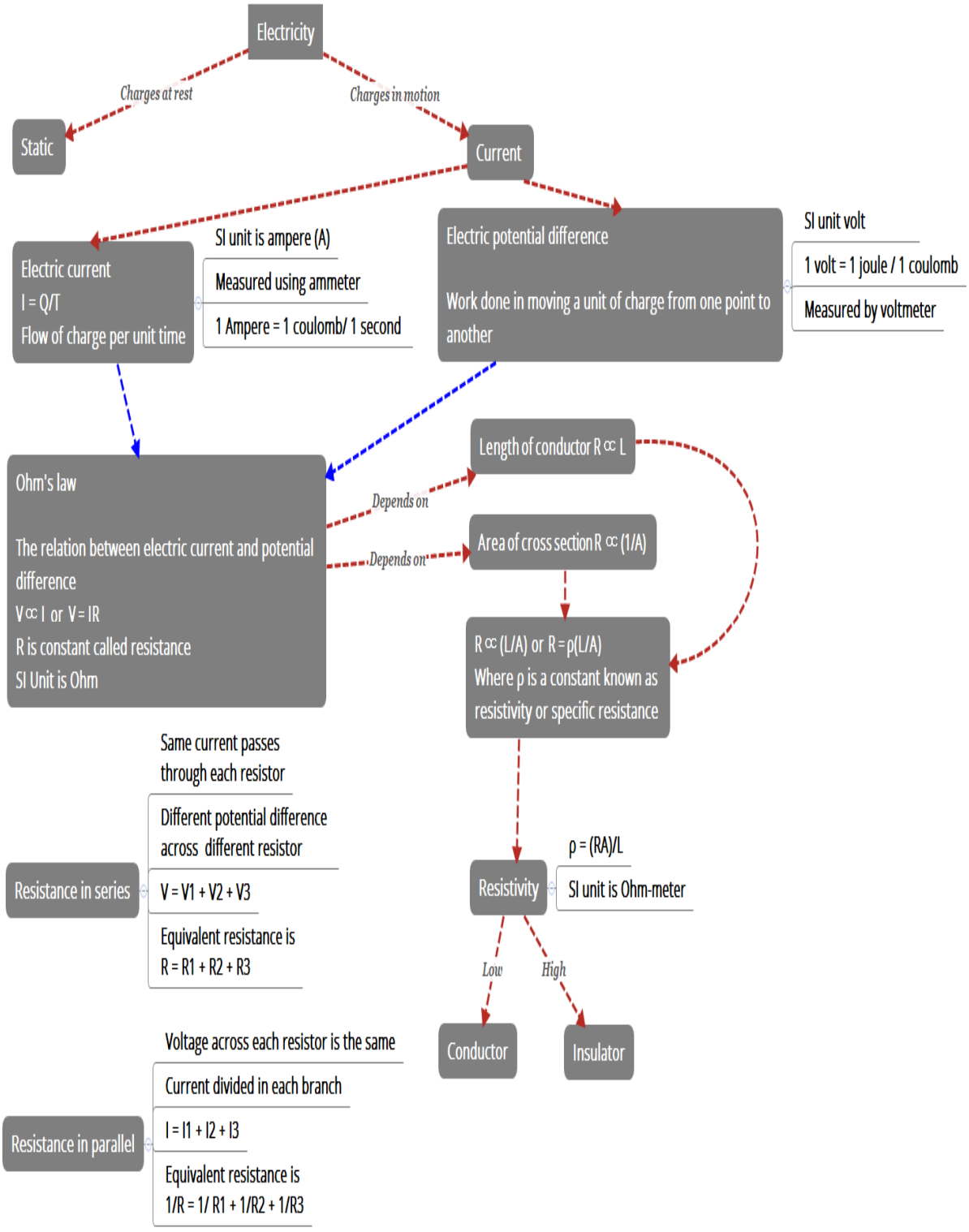
2. Assertion (A). A rainbow always appears on the same side as the sun.

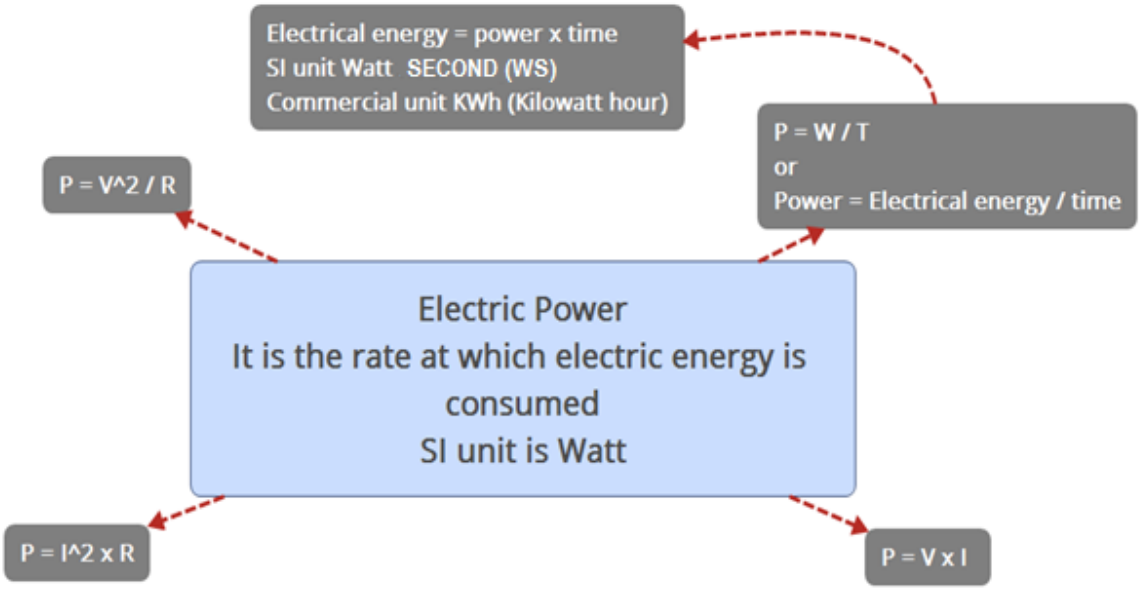
   Reason(R). A rainbow is a natural spectrum which occurs after a shower.

Ans) 1.b 2.d

# CHAPTER12: ELECTRICITY

## MIND MAPS






1KWh = 1 unit

1 KWh = $3.6 \times 10^6$ joule

## HEATING EFFECT OF CURRENT

Joule's law of heating

**$H = I^2RT$ (I = Current, R = Resistance, T = Time)**

## PRACTICAL APPLICATIONS OF HEATING EFFECT

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

## FORMULAE

| | | SI unit |
|---|---|---|
| **1. $I = Q/T$** | **(**Calculation of current**)** | **Ampere** |
| **2. $V = W/Q$** | (Calculation of potential difference) | **Volt** |
| **3. $R = V/I$** | (Ohm's law, R is resistance) | **Ohm** |
| **4. $\rho = RA/L$** | **(**Calculation of resistivity**)** | **Ohm metre** |
| **5. $R = R_1 + R_2 + R_3$** | **(**Resistance in series**)** | **Ohm** |
| **6. $R = 1/R_1 + 1/R_2 + 1/R_3$** | **(**Resistance in parallel**)** | **Ohm** |
| **7. $H = I^2RT$** | **(**Joules law of heating**)** | **Joule** |
| **8. $P = VI = I^2R = V^2R$** | **(**Calculation of power**)** | **Watt** |
| **9. E = P x t** | **(**Electric energy**)** | **Watt second (Joule)** |

## DIAGRAMS

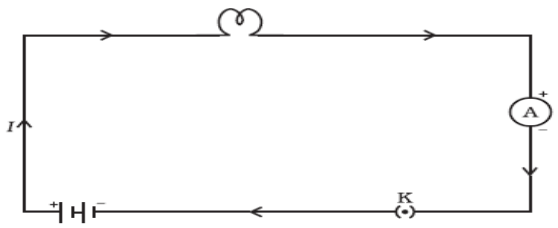



***Figure 12.1***
*A schematic diagram of an electric circuit comprising – cell, electric bulb, ammeter and plug key*

**Table 12.2** Symbols of some commonly used components in circuit diagrams

| Sl. No. | Components | Symbols |
|---|---|---|
| 1 | An electric cell | |
| 2 | A battery or a combination of cells | |
| 3 | Plug key or switch (open) | |
| 4 | Plug key or switch (closed) | |
| 5 | A wire joint | |
| 6 | Wires crossing without joining | |
| 7 | Electric bulb | or |
| 8 | A resistor of resistance *R* | |
| 9 | Variable resistance or rheostat | or |
| 10 | Ammeter | A |
| 11 | Voltmeter | V |

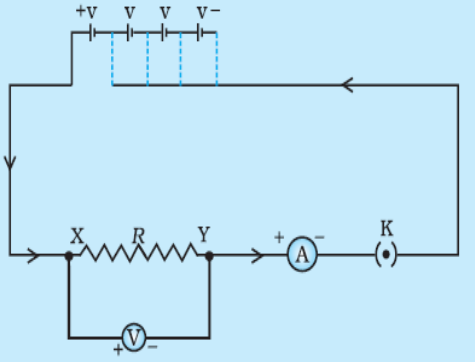



**Figure 12.3** *Electric circuit for studying Ohm's law*

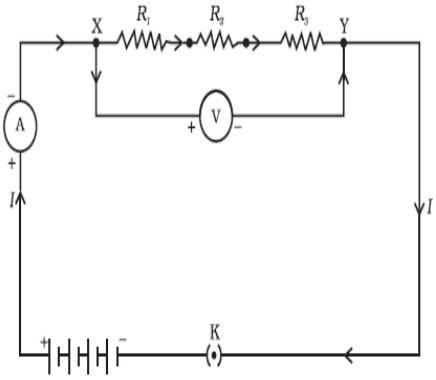



**Figure 12.4** *Resistors in series*

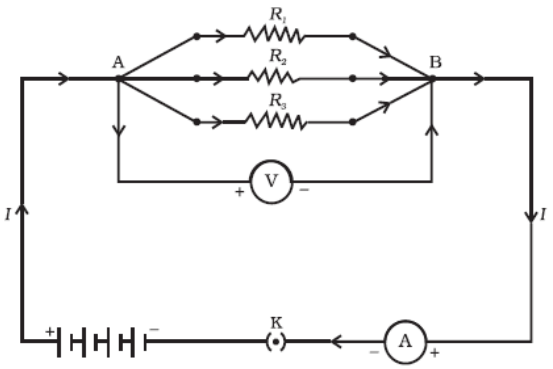
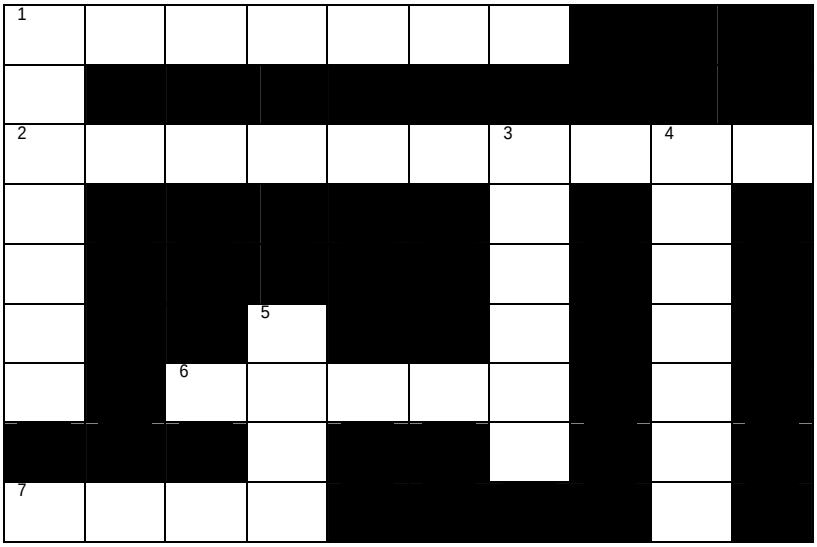



**Figure 12.5** *Resistors in parallel*

## CROSSWORD



**ACROSS**

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

**DOWN**

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

## QUESTION BANK

### VERY SHORT ANSWER TYPE (1 MARK)

1. Calculate the amount of charge flowing in a wire if it draws a current of 2A in 10 minutes.
   *Ans: 2 x 10 x 60 = 1200 C*
2. What happens to resistance of a conductor if area of cross-section is doubled?
   *Ans: It halves*
3. Which device helps to maintain a potential difference across a conductor?
   *Ans: Cell or battery*

### SHORT ANSWER TYPE (2 MARK)

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

### SHORT ANSWER TYPE (3 MARK)

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

*(2)Potential difference is constant for all devices.*
(3) *Total resistance in the circuit is decreased*

## LONG ANSWER TYPE (5 MARK)

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

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

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

*Ans. a) Ohms law state that current flowing in aconductoris directly proportional tothe applied potentialprovided that temperature and physical conditions remainssame.*

*b) Energy consumed per day = 1 KWh (P x t) cost for 30 days = 1 X 5 X 30 = Rs.150.00*

MULTIPLE CHOICE QUESTIONS

1. Two resistors of resistance 2 Ω and 4 Ω when connected to a battery will have
   (a) Same current flowing through them when connected in parallel
   (b) Same current flowing through them when connected in series
   (c) Same potential difference across them when connected in series
   (d) Different potential difference across them when connected in parallel
2. Electric current is measured by
   a) A voltmeter
   b) An ammeter
   c) A rheostat
   d) A potentiometer
3. How many electrons constitute a current of 1 ampere?
   a) $6*10^{15}$
   b) $6*10^{18}$
   c) $1.6*10^{-19}$

d) $6*10^{20}$

4. What is the maximum resistance which can be made using five resistors each of 1/5 Ω?

   (a) 1/5 Ω

   (b) 10 Ω

   (c) 5 Ω

   (d) 1 Ω

5. The resistivity does not change if

   (a) The material is changed

   (b) The temperature is changed

   (c) The shape of the resistor is changed

   (d) Both material and temperature are changed

**Assertion and reasoning questions**

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

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

6. Assertion (A): If a graph is plotted between potential difference and current a linear graph is obtained.

   Reason(R): current is directly proportional to the potential difference.

7. Assertion (A): A cell converts chemical energy into electrical energy.

   Reason(R): A cell maintains a potential difference across its terminals due to chemical reactions.

   Ans) 1.b 2.b 3.b 4.d 5.c 6.a7.b

# CHAPTER 13- MAGNETIC EFFECTS OF ELECTRIC CURRENT

Magnet is an object that attracts objects made of iron, cobalt & nickel.
When a magnet suspended freely it will align in North-South direction. Like poles repel each other and unlike poles attract each other
Magnets are used: (i) In radio & stereo speakers, (ii) In refrigerator doors, (iii) in audio & video cassettes players, (iv) in hard discs & floppies of computers & (v) in children's toys.
**Magnetic field**: The area around a magnet where the magnetic force can be detected by a unit North Poleis called a magnetic field. It is a quantity that has both direction & magnitude.
**Magnetic field lines**: Magnetic field is represented by field lines. The path traced by a unit north pole in a magnetic field is a field line. Magnetic field lines are called as Magnetic lines of force.
Refer to figure 13.3 & 13.4 page no. 225 of N.C.E.R.T Text book)
Properties of Magnetic field lines:
(i)They do not intersect each other. (ii)It is taken by convention that magnetic field lines emerge from North Pole and merge at the South Pole. Inside the magnet, their direction is from South Pole to North Pole. Therefore magnetic field lines are closed curves. (iii)The density of the field lines gives the strength of the magnetic field.
Magnetic field lines due to a current through a straight conductor (wire) - consist of series of concentric circles whose direction is given by the Right hand thumb rule.
**Right hand thumb rule**: If a current carrying straight conductor is held in your right hand such that the thumb points towards the direction of current, then the wrapped fingers show the direction of magnetic field lines.
(Refer to figure 13.7, page no. 228 of N.C.E.R.T Text book)
**Magnetic field lines due to a current through a circular loop**
(Refer to figure 13.8, page no. 228 of N.C.E.R.T Text book)
The strength of the magnetic field at the center of the loop (coil)depends on:
(i)The radius of the coil- The strength of the magnetic field is inversely proportional to the radius of the coil. If the radius increases, the magnetic strength at the center decreases. (ii)The number of turns in the coil: As the number of turns in the coil increase, the magnetic strength at the center increases, because the current in each circular turn is having the same direction, thus the field due to each turn adds up.
(iii)The strength of the current flowing in the coil: as the strength of the current increases, the strength of the magnetic fields also increases.
**Solenoid**: (Refer to figure 13.10, page no. 229 of N.C.E.R.T Text book)
(i) A coil of many turns of insulated copper wire wrapped in the shape of a cylinder is called a Solenoid.
Magnetic field produced by a Solenoid is similar to a bar magnet.
The strength of magnetic field is proportional to the number of turns & magnitude of current.
**Electromagnet**: An electromagnet consists of a long coil of insulated copper wire wrapped on a soft iron core. (Refer to figure 13.11, page no. 229 of N.C.E.R.T Text book)
**Fleming's Left hand rule**: Stretch the thumb, forefinger and middle finger of left hand such that they are mutually perpendicular. Forefinger points in the direction of magnetic field and middle finger in the direction of current, then the thumb gives the **direction of force acting on the conductor.**
(Refer to figure13.13, page no. 231 of N.C.E.R.T Text book)
**Electric motor**: A device that converts electric energy to mechanical energy.
(Refer to figure 13.15, page no. 232 of N.C.E.R.T Text book)

**Principle of Electric motor:** When a rectangular coil is placed in a magnetic field and a current is passed through it, force acts on the coil, which rotates it continuously. With the rotation of the coil, the shaft attached to it also rotates.

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

**Fleming's Right hand rule**:

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

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

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

Principle of Electric generator: Electromagnetic induction

Domestic electric circuits: (Refer to figure 13.20, page 238 of N.C.E.R.T Text book)

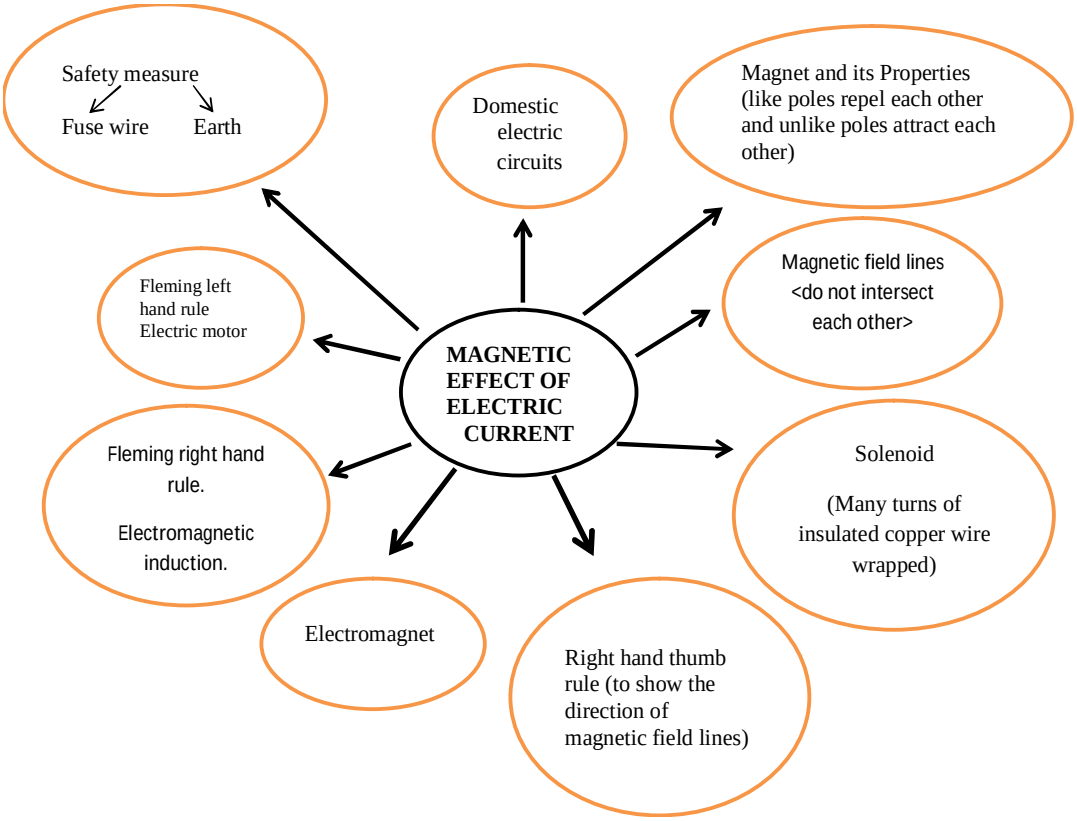
We receive electric supply through mains supported through the poles or cables. In our houses we receive AC electric power of 220V with a frequency of 50Hz.

**The 3 wires are as follows**- (i) Live wire- (Red insulated, Positive)

(ii)Neutral wire- (Black insulated, Negative) (iii)Earth wire- (Green insulated) for safety measure to ensure that any leakage of current to a metallic body does not give any serious shock to a user.

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

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



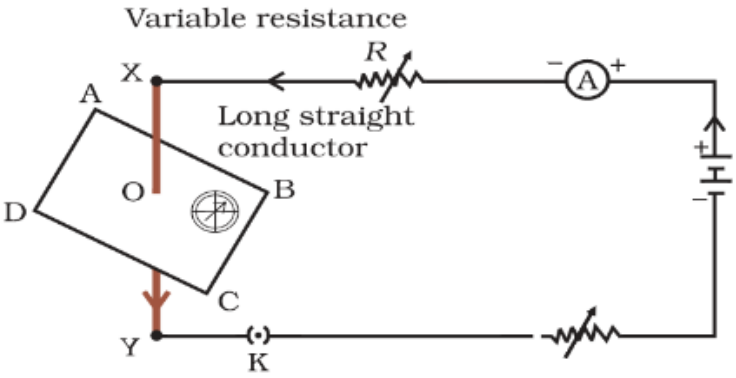



**Figure 13.1**
*Compass needle is deflected on passing an electric current through a metallic conductor*

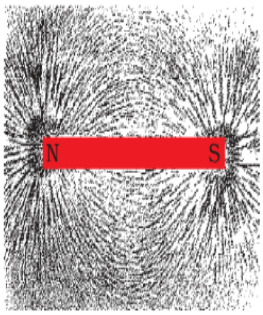



**Figure 13.2**
*Iron filings near the bar magnet a themselves along the field lines.*

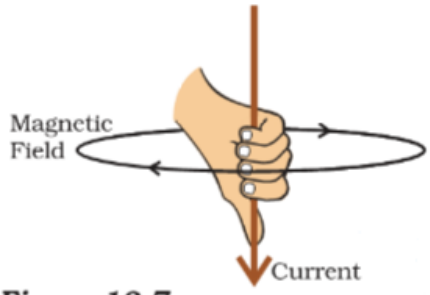



**Figure 13.7**
*Right-hand thumb rule*

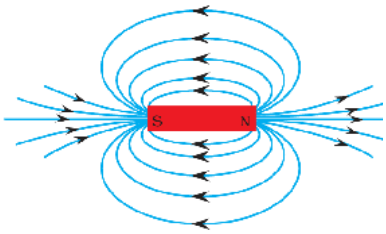



**Figure 13.4**
*Field lines around a bar magnet*

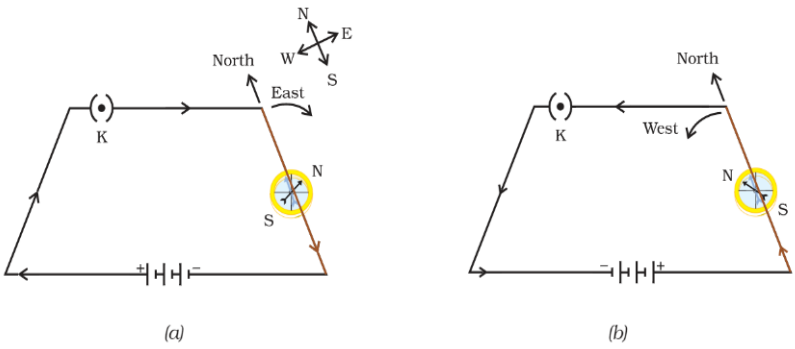



**Figure 13.5** *A simple electric circuit in which a straight copper wire is placed parallel to and over a compass needle. The deflection in the needle becomes opposite when the direction of the current is reversed.*

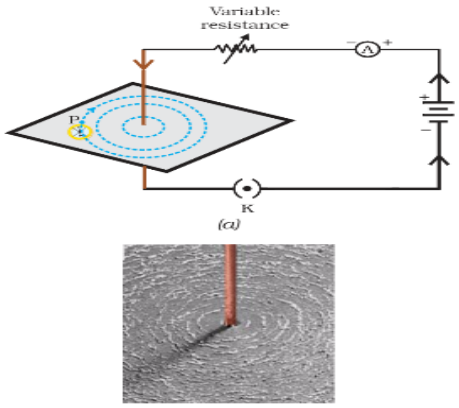



**Figure 13.6**
*(a) A pattern of concentric circles indicating the field lines of a magnetic field around a straight conducting wire. The arrows in the circles show the direction of the field lines. (b) A close up of the pattern obtained.*

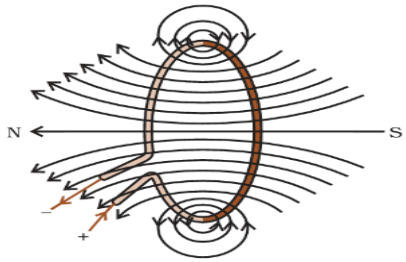



**Figure 13.8**
*Magnetic field lines of the field produced by a current-carrying circular loop*

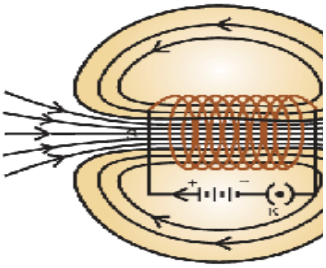



**Figure 13.10**
*Field lines of the magn through and around carrying solenoid.*

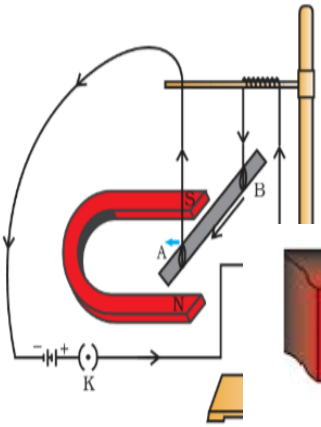
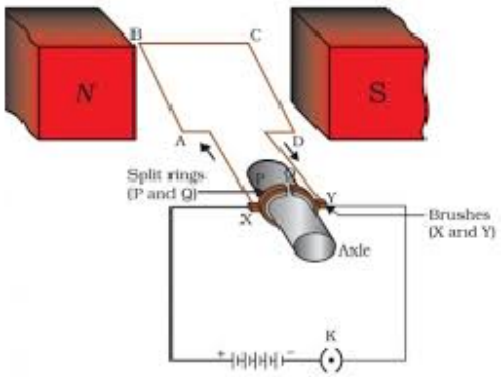



**Figure 13.12**
*A current-carrying rod, AB, e a force perpendicular to its l the magnetic field.*




*A simple electric motor*

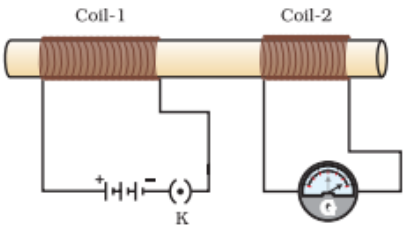



**Figure 13.17**
*Current is induced in coil-2 when current in coil-1 is changed*

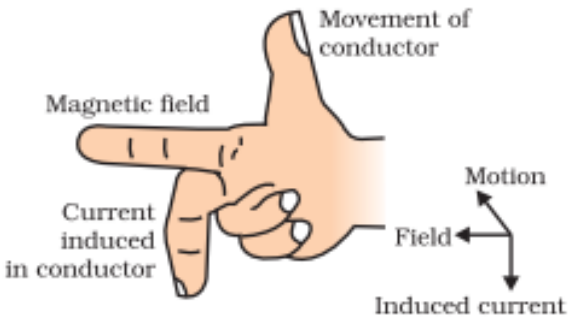
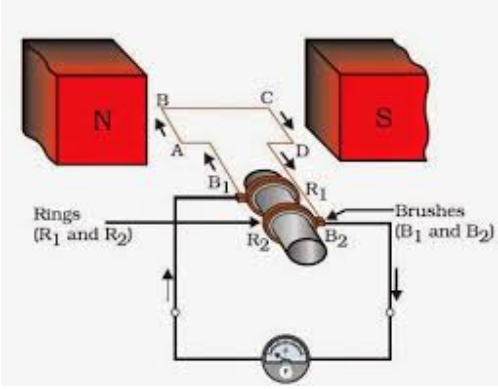



**Figure 13.18**
*Fleming's right-hand rule*




## Electric generator(AC)

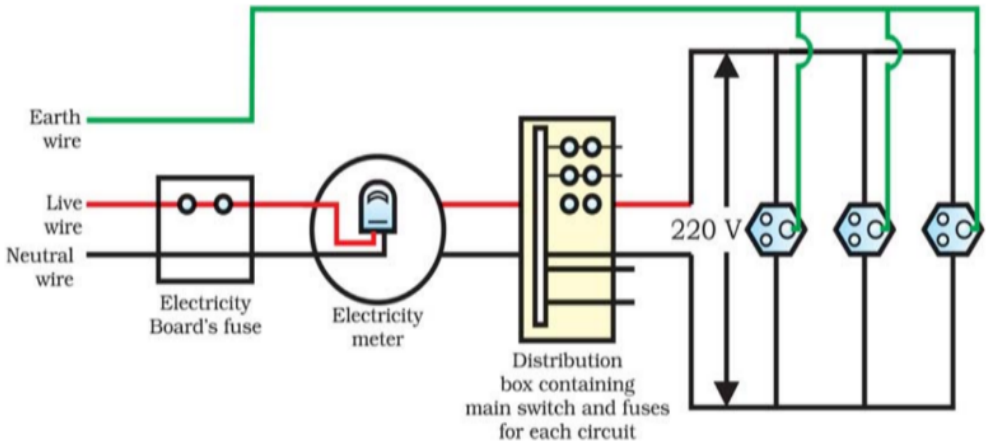



***Figure 13.20*** *A schematic diagram of one of the common domestic circuits*

**Question Bank**

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

Q.1What is a solenoid?

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

Q.2What is the direction of the magnetic field lines inside a bar magnet?

Ans) from the south to North Pole.

Q.3What is the direction of the magnetic field lines outside a bar magnet?

Ans) from the north to South Pole.

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

Q.1What is an electromagnet?

Ans)An electromagnet consists of a long coil of insulated copper wire wrapped on a soft iron core.

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

| DC | AC |
|---|---|
| The current flows in a single direction | Direction of current changes periodically(every 1/100 second in India) |
| Cannot be transmitted over long distances. | Can be transmitted over long distances without mush loss in energy. |
| Source of DC –cell or battery | Source of AC – AC generator |

Q.3 State the rule to find the direction of magnetic field produced around a straight current-carrying conductor**.**

**Ans**) Right hand thumb rule

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

Q.1What is the role of fuse, used in series with any electrical appliance?

Ans) a fuse is a safety devise which cuts of electric supply when unduly high current flows through a circuit, this prevents damage to electrical appliances.

Q.2why does a magnetic compass needle deflect when a current-carrying loop is brought near it.

Ans) The current carrying loop behaves like a magnet and deflects the needle.

Q3.Explain the construction, working and principle applied in D C Motor.

Multiple choice questions

1) Commercial electric motors do not use
   (a) An electromagnet to rotate the armature

(b) Effectively large number of turns of conducting wire in the current carrying coil
(c) A permanent magnet to rotate the armature
(d) A soft iron core on which the coil is wound

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

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

4) Choose the incorrect statement
   (a) Fleming's right-hand rule is a simple rule to know the direction of induced current
   (b) The right-hand thumb rule is used to find the direction of magnetic fields due to current carrying conductors
   (c) The difference between the direct and alternating currents is that the direct current always flows in one direction, whereas the alternating current reverses its direction periodically
   (d) In India, the AC changes direction after every1/50 second

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

**Assertion and reasoning**

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

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

6) Assertion (A): No two magnetic field lines will intersect.
   Reason(R): Magnetic field lines do not have a specific direction.
7) Assertion (A): The magnetic field inside a solenoid is uniform
   Reason(R): the magnetic field lines inside a solenoid are parallel.

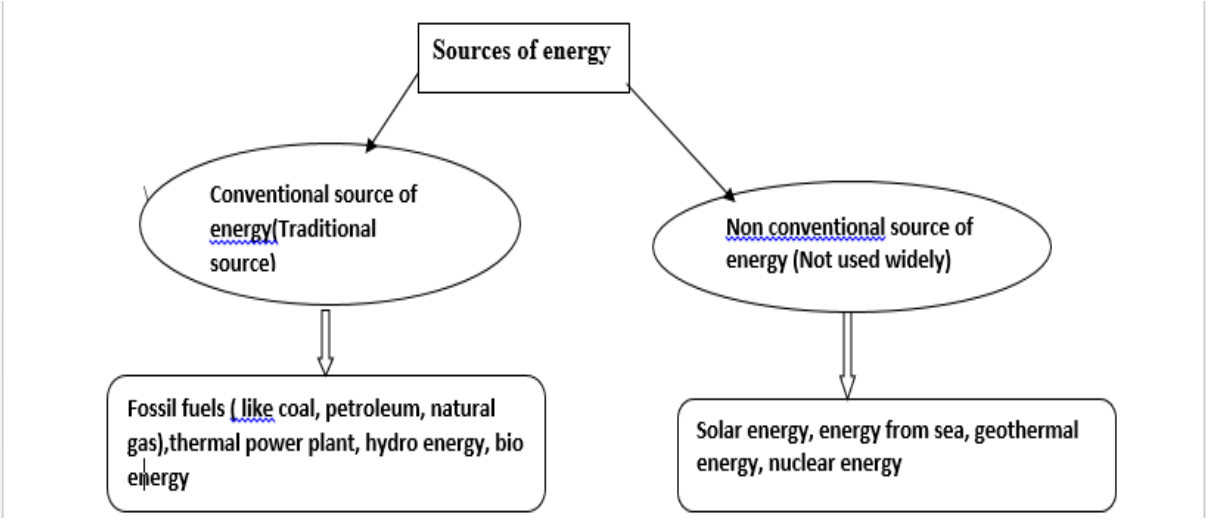
Ans) 1.c 2.C 3.b 4.d 5.a 6.c 7.a

# CHAPTER 14- SOURCES OF ENERGY

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

2. Characteristics of good source of energy.

1. High efficiency/easy to use/easy to store and transport/ economical/easily accessible.




2. Fossil fuels are non-renewable/exhaustible/causes air pollution, acid rain and global warming.

3. Biogas is formed by the decomposition of cow dung, agricultural and domestic wastes.

Composition of biogas → Methane, Hydrogen sulphide, Hydrogen, Carbon dioxide

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

6. Wind energy : Kinetic energy of the wind is used to do the useful work.

Advantages: Renewable/inexhaustible/pollution free/no residue.

Disadvantages:-High cost of installation/minimum wind speed 15km/h/ maintenance cost high/requirement of large area of land.

7. Solar cells are devices which convert light energy into electric energy.

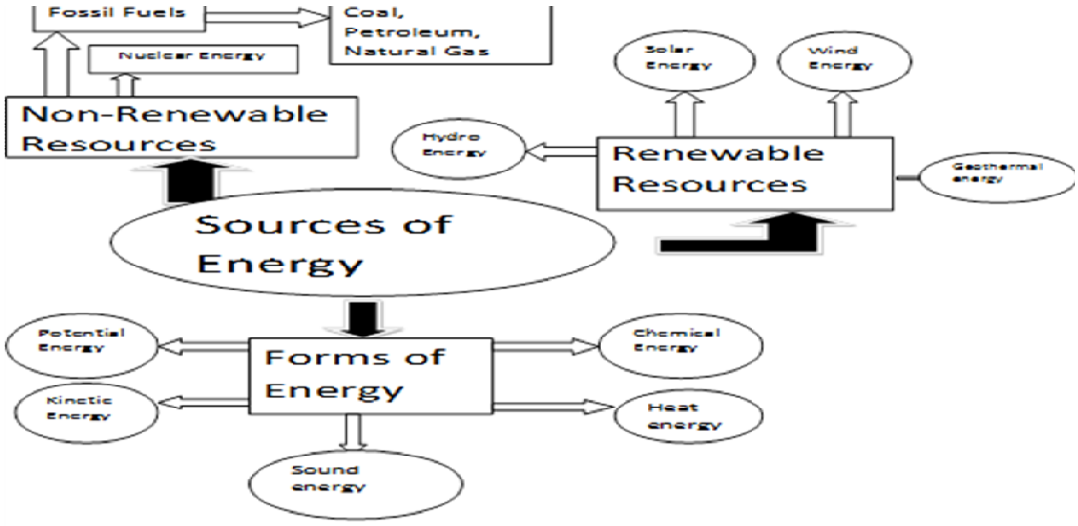
Advantages:-inexhaustible/pollution free/used in artificial satellites/can be used in remote areas/ low cost of maintenance.

Disadvantages:-Requirement of special grade of silicon/high cost of installation/moderate efficiency.

8. In nuclear power plants, nuclear energy is used for the production of electricity.

Advantage:-Very high efficiency

Disadvantage:-Radioactive emissions/fear of nuclear power plant accidents/disposal of Radioactive wastes.



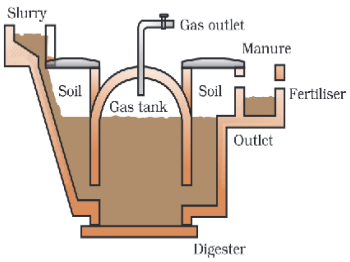




*Figure 14.1*
*Schematic diagram of a bio-gas plant*

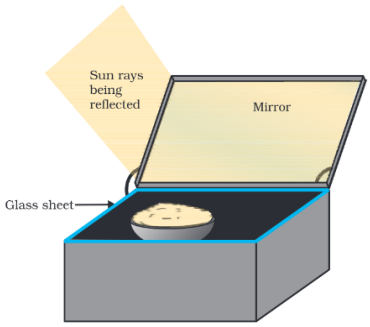



***Figure 14.2*** *A solar cooker*

**CROSSWORD**

**Find the hidden words related with the chapter sources of energy.**

**(You can go across and down)**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | F | S | O | S | T | D | N | K | M | G |
| E | D | W | D | D | M | M | B | C | F | E | E |
| F | A | G | G | D | K | E | M | M | T | Y | O |
| Q | E | E | F | F | L | T | F | F | V | U | T |
| K | D | Q | A | R | I | H | Q | H | R | K | H |
| L | L | H | D | B | R | A | S | D | F | G | E |
| S | O | L | A | R | E | N | E | R | G | Y | R |
| O | Y | G | H | K | J | E | F | K | D | B | M |
| L | C | L | K | H | G | D | L | K | H | M | A |
| A | B | I | O | G | A | S | N | J | K | L | L |
| R | I | Y | T | G | K | H | M | J | K | L | E |
| C | O | T | E | F | I | S | S | I | O | N | N |
| E | M | V | C | V | B | M | T | B | V | K | E |
| L | A | R | T | I | U | K | Y | G | J | L | R |
| L | S | A | G | F | I | L | U | T | K | I | G |
| D | S | D | G | G | T | N | I | E | R | T | Y |

**QUESTION BANK**

**Very short answer type questions (1mark)**

1. Expand OTEC.

2 Thermal power plants are set up near coal or oil fields. Give reason

**Short answer type questions. (2 mark)**

1. Hydrogen has been used as a rocket fuel. Would you consider it a cleaner fuelthan CNG? Why or why not?

2. Fire wood is our conventional fuel. List any four reasons of replacing it withthealternate sources of energy.

3. List two advantages and disadvantages each for using wind as a source of energy.

**Short answer type questions. (3mark)**

1. What is solar panel? List two advantages and disadvantages each of using Solarcellsforproducing electricity.

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

1. Describe the design and function of each part of a solar cooker with the help of a neat labelled diagram.

Multiple choice questions

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

Assertion and reasoning

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

a) Both A and R are true and R is the correct explanation for A

b) Both A and R are true and R is not the correct explanation for A

c) A is true but R is false

d) A is false but R is true.

6) Assertion (A): construction of dams leads to global warming.
   Reason(R): The vegetation submerged under the dams' rots under anaerobic conditions to release methane.
7) Assertion (A): The steam trapped in rocks is used to generate geothermal power.
   Reason(R): Geothermal power is not dependent on solar power.

Ans) 1.a 2.c 3.a 4.b 5.c 6.a 7.b

# CHAPTER15- OUR ENVIRONMENT

## GIST OF THE LESSON/FLOW CHART

**OUR ENVIRONMENT**

**ECOSYSTEM**
Interacting Organisms of an area
+ Non living Constituents.

**WASTE**

**TYPES**

**NATURAL**

**TERRESTRIAL**Eg Forest, Grasslands.
**Aquatic**. Pond, Lakes, Oceans

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

**COMPONENTS**

**BIOTIC** Living components Eg. Plants, Animals and Microbes.

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

**REPRESENTATION**
of relation between different biotic components.

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


**FOOD WEB**
A network of interconnected food chains.


**FLOW OF ENERGY**

**1 % energy** available from the sun to the terrestrial plants is converted into food.

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

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

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

**Flow of energy** in a food chain is unidirectional.

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

**TROPHIC LEVELS**
It is each step or level of the food chain.
**I-TROPHIC LEVEL: Producers** Eg green plants, Blue green algae (Cyanobacteria), Phytoplankton's (Microscopic free floating aquatic plants)
**II- TROPHIC LEVEL:Primary consumers** or herbivores
**III- TROPHIC LEVEL:Secondary consumers** or small carnivore.
**IV- TROPHIC LEVEL:Tertiary consumers** or large carnivore

**WASTE**

**TYPES OF WASTE**

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

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

**EFFECT OF WASTE**

**OZONE DEPLETION**: CFC damage ozone layer.
**PROBLEM OF WASTE DISPOSAL**
**POLLUTION Bio magnificationof pollutants:** Progressive accumulation of harmful substances like pesticides takes place in a food chain.

**WASTE MANAGEMENT**

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

**Environment:** Our surrounding is called environment.

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

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

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

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

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

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

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

Producer → Primary Consumer → Secondary Consumer

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

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

**Balance in the Ecosystem:**

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

Plant ⟹ Deer ⟹ Lion

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

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

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

**Ozone Layer Depletion:**

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

$$O_2 \xrightarrow{UV\ radiation} O + O$$

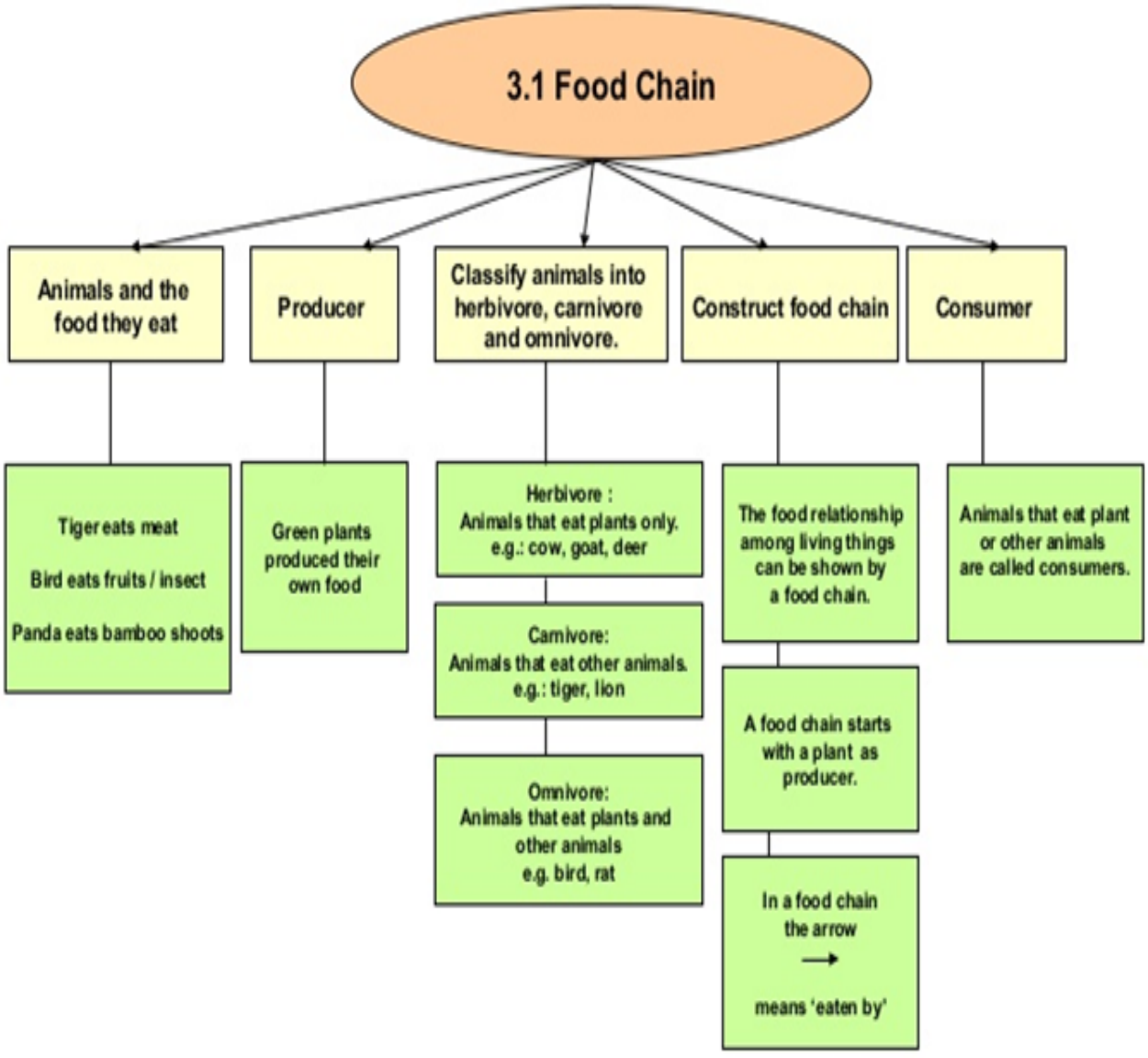
$$O + O_2 \rightarrow O_3$$

Ozone layer works like a protective shield for living beings.

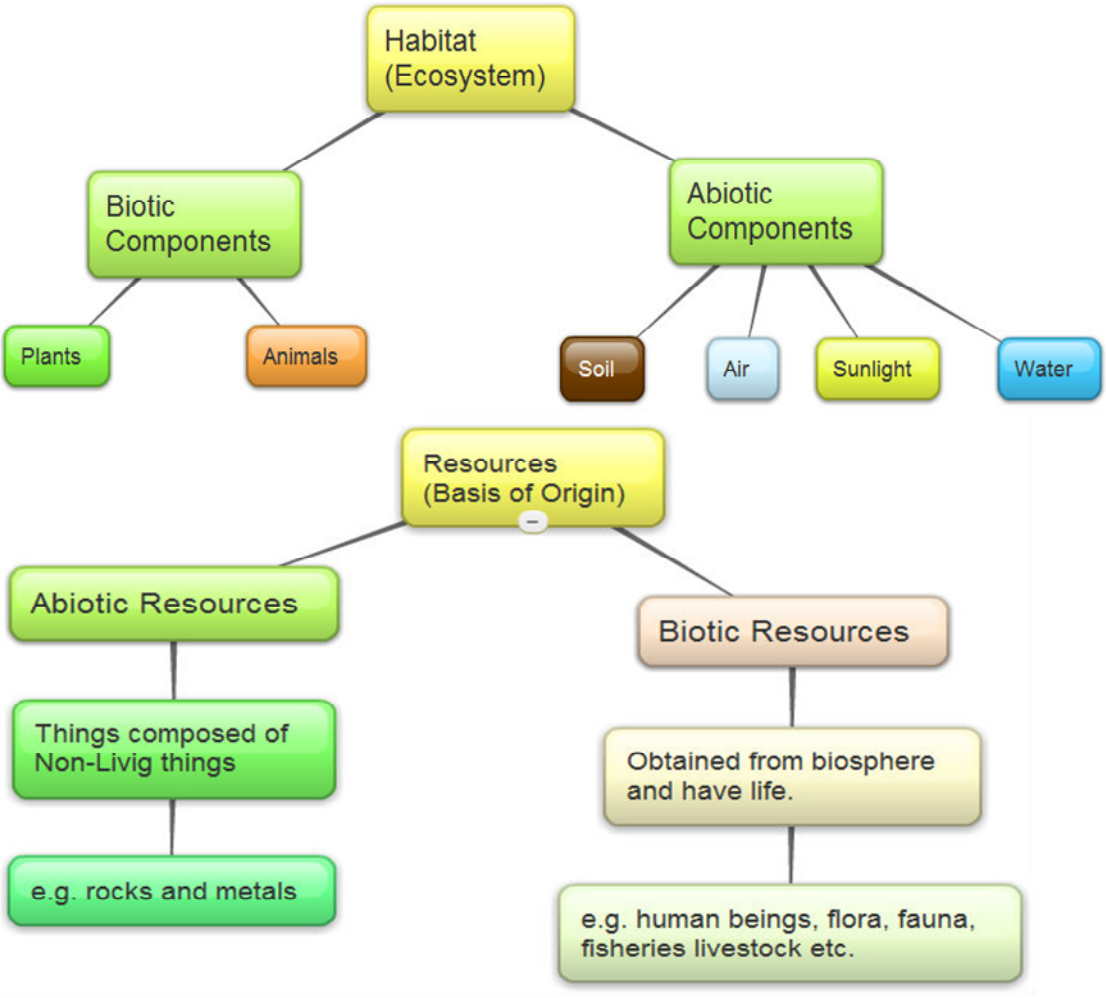
**Effect of CFCs:** Use of CFCs (Chlorofluorocarbon) has damaged the ozone layer. It is used in refrigerators and aerosol spray.

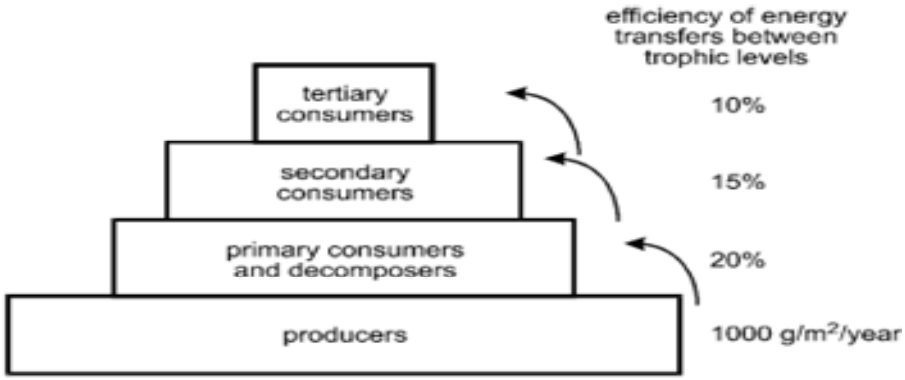
**Problems of Waste Disposal** Plastic waste is a serious concern because plastic is non-biodegradable. Proper segregation of wastes before disposal helps us to save our environment.

**Mind Map — Our Enviornment**



## FLOW CHART


Habitat (Ecosystem)
Biotic Components
Abiotic Components
Plants
Animals
Soil
Air
Sunlight
Water
Resources (Basis of Origin)
Abiotic Resources
Biotic Resources
Things composed of Non-Livig things
Obtained from biosphere and have life.
e.g. rocks and metals
e.g. human beings, flora, fauna, fisheries livestock etc.


efficiency of energy transfers between trophic levels
tertiary consumers
secondary consumers
primary consumers and decomposers
producers
10%
15%
20%
1000 g/m²/year

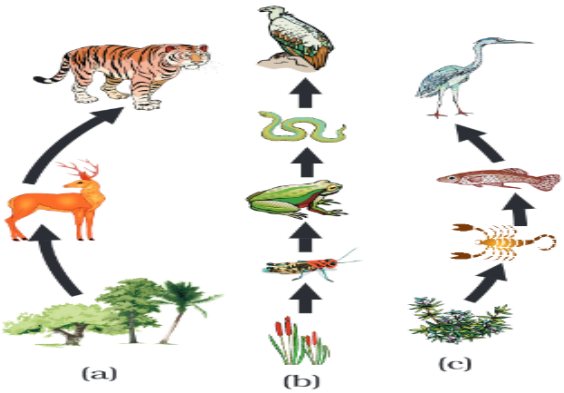



**Figure 15.1**
*Food chain in nature (a) in forest, (b) in grassland and (c) in a pond*

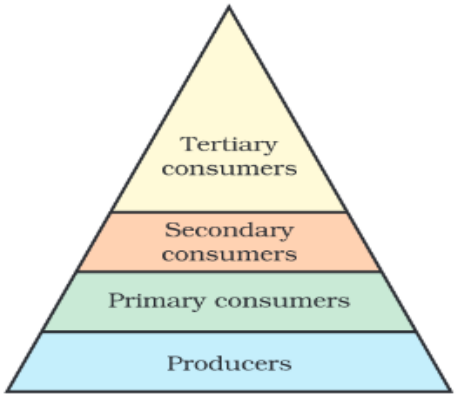



**Figure 15.2**
*Trophic levels*

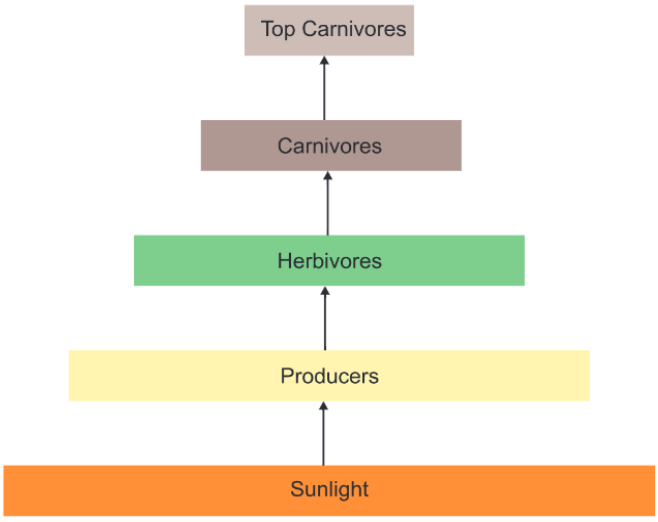
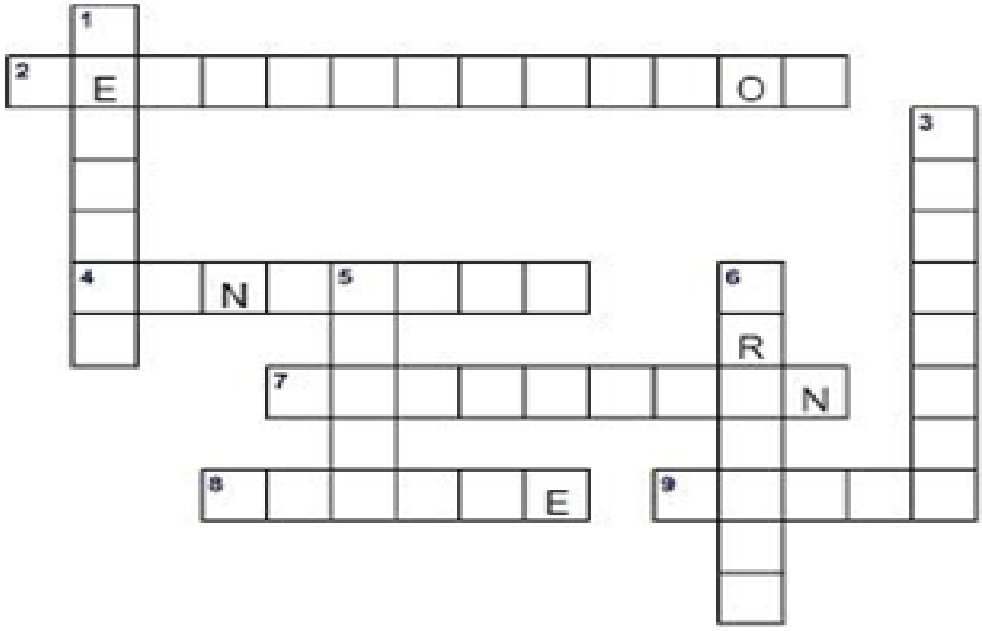



**Figure 15.4** *Diagram showing flow of energy in an ecosystem*

# Environment Puzzle

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




ACROSS

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

DOWN

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

| | | | |
|---|---|---|---|
| LANDFILL | RECYCLE | PROTECT | PRESERVE |
| POLLUTION | FLOOD | REDUCE | REUSE |
| DEFORESTATION | | | |

# EnvironmEnt PuzzlE 2

Find the hidden words from the given grid. Words can go across or down

Related to the Environment.

| M | S | C | W | R | I | L | T | C | B | O | O | S | N | M | S | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | T | H | R | S | E | O | P | A | E | C | O | M | P | O | S | T |
| V | E | S | E | H | O | F | O | A | A | E | N | X | T | U | R | T |
| T | R | P | Q | P | E | R | D | T | E | A | B | N | U | N | C | N |
| I | E | N | V | I | R | O | N | M | E | N | T | R | A | T | A | H |
| A | C | N | U | X | E | G | Y | O | G | T | R | B | Y | A | G | T |
| G | Y | K | I | J | C | S | Z | S | W | D | V | G | Y | I | O | K |
| O | C | Q | A | Z | L | B | V | P | A | S | C | I | E | N | C | E |
| L | L | Y | S | R | A | G | T | H | H | A | A | R | N | S | C | N |
| A | I | B | U | G | K | T | H | E | G | U | K | U | O | I | B | G |
| T | N | T | S | R | E | E | F | R | B | S | J | S | Y | O | I | B |
| A | G | G | F | T | S | E | G | E | A | R | T | H | R | S | Y | A |
| H | X | V | N | L | J | G | D | A | W | R | Y | I | P | L | I | J |

## Our Environment--- Question Bank

**Q. 1 Using Kulhads as disposable cups to serve tea in trains, proved to be a bad idea. Why?**

Ans. Making Kulhads on large scales leads to the loss of top soil.

**Q. 2 Why is plastic not degraded by bacteria?**

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

**Q. 3 DDT has entered food chain. Which food habit is safer- vegetarian or nonvegetarian?**

Ans. Vegetarian habit is safer. Being closer to producers, less DDT will accumulate in our body. Bio magnification leads to higher level of DDT in higher trophic levels.

**Q. 4 Aquarium requires regular cleaning whereas lakes normally do not. Why?**

Ans. Normally a lake has more diverse forms of life and hence a larger number of food chains. This leads to natural cleaning. Thus, the ecosystem is more stable. The aquarium has a very limited number of food chains and unable to sustain itself. But, sometimes there is excessive growth of algae in lake. Then it also needs to be cleaned.

**Q. 5 How will accumulation of bio degradable waste effect our environment?**

Ans. Accumulation of bio degradable waste will:

(a) Not let minerals return to mineral pool.

(b) Become site of pest breeding.

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

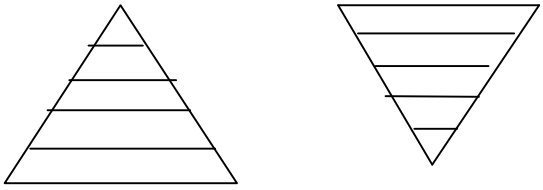


Fig "A" Fig 'B"

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

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

Ans. I do not agree. As an individual, I also have the responsibility and can contribute in the following ways:- (i) Cut down waste generation. (ii)Make compost pit for bio degradable waste. (iii) Recycle non biodegradable waste.

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

1. Which of the following limits the number of trophic levels in a food chain?
(a) Water
(b) Polluted air
(c) Deficient food supply
(d) Decrease in energy at higher trophic levels
ANS- (d)

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

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

4. Flow of energy in an ecosystem is always-
(a) Unidirectional
(b) Bidirectional
(c) Multidirectional
(d) No specific direction.
ANS-(a)

5. In natural ecosystems, decomposers include-
(a) Only bacteria and fungi
(b) Only microscopic animals
(c) Herbivores and carnivores
(d) Both (b) and (c)
ANS-(a)

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

**The following two questions consists of two statements-ASSERTION (A) and REASON(R), answer these questions selecting the appropriate option given below**
**a) Both A and R are true and R is the correct explanation for A**
**b) Both A and R are true and R is not the correct explanation for A**
**c) A is true but R is false**
**d) A is false but R is true**
6) **ASSERTION (A):** Decomposers act as cleaning agents of environment.
**REASON(R):** The decomposers recycle waste material in hydrosphere.
ANS-(C)
7)**ASSERTION (A):**Garden is an artificial ecosystem.
**REASON(R):** Biotic and abiotic components are manipulated by humans.
ANS-(b)

# CHAPTER 16

# MANAGEMENT OF NATURAL RESOURCES

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

On the basis of abundance and availability, the natural resources are of two types:
(a) Inexhaustible
(b) Exhaustible.
We need to manage our natural resources because of the following reasons:

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

**Conservation of Wildlife**

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

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

**Conservation of water:**
**Advantages of Dams**:

1. Regular and round the year water supply to fields
2. Continuous water supply to nearby human settlements
3. Generation of electricity.

**Disadvantages of Dams:-**

1. Social problems 2. Environmental Problems 3. Economic Problems

**Conservation of Forest:**

1. Afforestation 2. Reforestation 3. Separation of Commercial Forestry 4. Grazing

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

**Deforestation causes**.
1. Soil Erosion. 2. Desertification. 3. Floods 4. Destruction of wildlife 5. Climatic changes.

**Chipko Movement:-**

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

**Rainwater Harvesting:-**

Water harvesting is capturing, collection and storage of rain water and surface run off for filling either small water bodies or recharging ground water so that water continues to be available in non-rainy seasons.

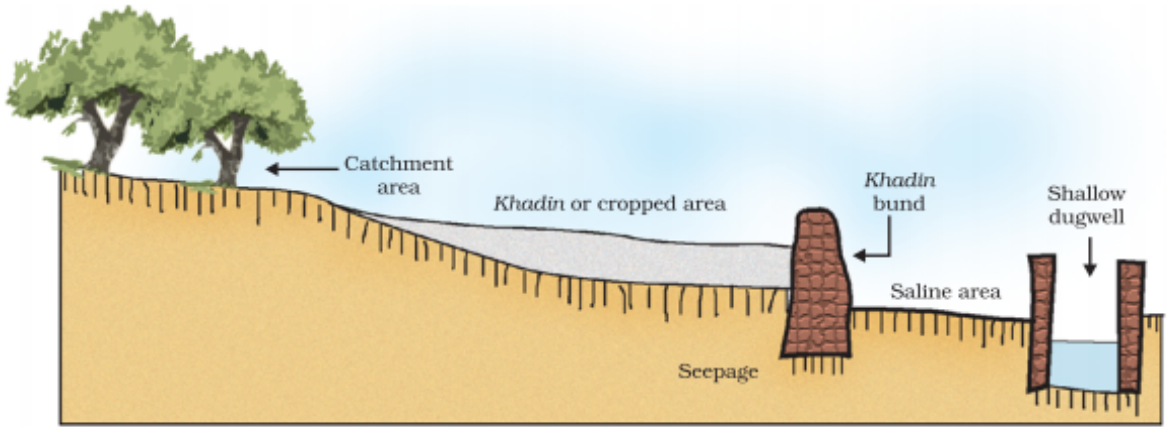
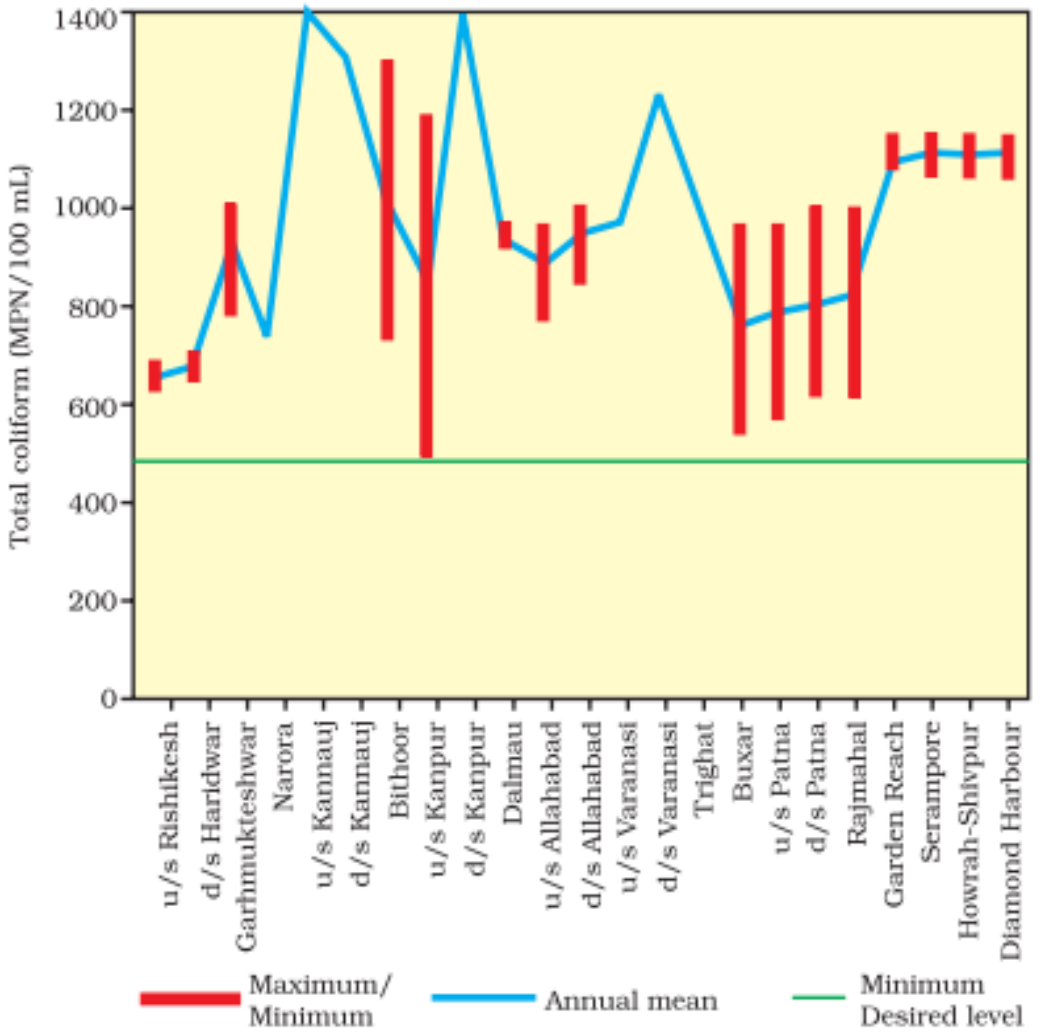



**Figure 16.3** *Traditional water harvesting system — an ideal setting of the khadin system*

The given figure shows the total Colifrom (bacteria) count level in the river Ganga during year 1993-1994.

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



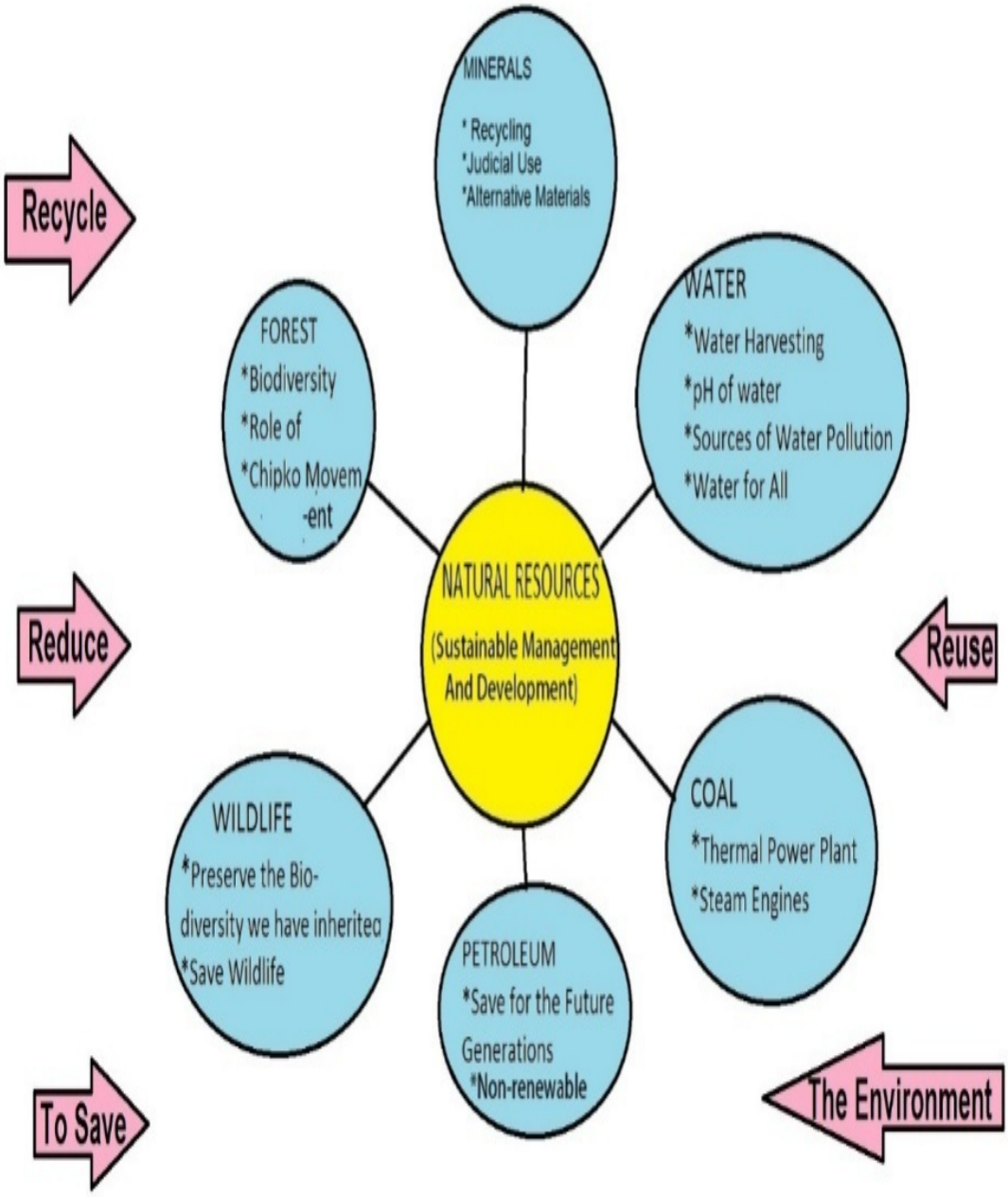

*MPN: most probable number*
*u/s: upstream*
*mL: millilitre*
*d/s: downstream*

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

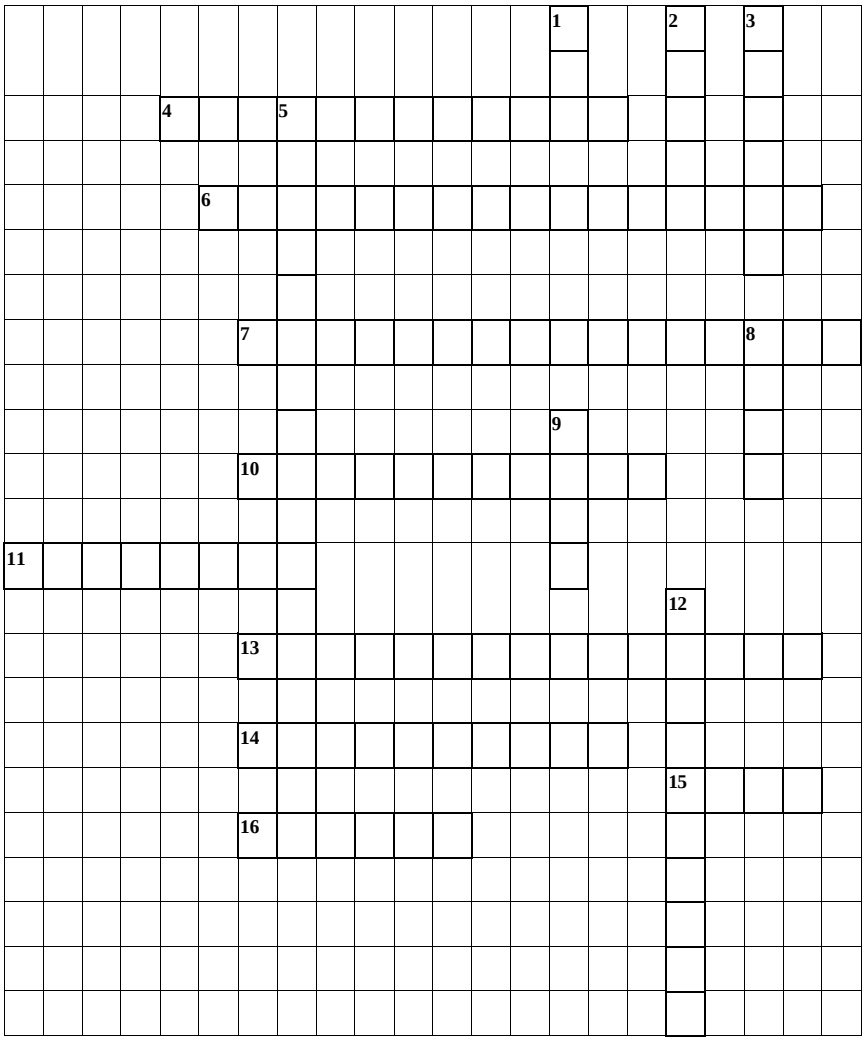
*Source: Anon 1996, Water Quality – Status and Statistics (1993 & 1994), Central Pollution Control Board, Delhi, p.11.*

# MIND MAP

## MANAGEMENT OF NATURAL RESOURCES



## Natural Resources



### Across

4 a resource that cannot be replaced

6 inorganic substance that comes from earth

7 items from nature and of use to humankind

10 material put on soil to improve quality of plant growth

11 an example of a renewable resource

13 timber used for building material or paper

14 land that is suitable for producing crops

15 a mineral that was discovered at Sutter's Mill in California in 1849

16 fur-bearing settlers hunted for this

### Down

1 a common natural resource we use

2 mineral resources such as _____ and oil are extensively used by humans

3 _____ oil, and land was an abundant natural resource for Early Settlers

5 can be used over and over again

8 oil, _____, and natural gas are fossil fuels

9 an example of a non-renewable resource

12 water by artificial means

## QUESTION BANK

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

Q1.What is coliform bacteria?

Q2.What are the twokinds of natural resources?

Q3.What are the 3R's in sustainable development?

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

Q1.List any two common methods by which solid wastes of urban areas are disposed of?

Q2. State an instance where human intervention saved the forest from destruction.

Q3.Name the stakeholders who have their dependence on forests?

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

Q1.How is our holy river Ganga getting polluted? What are its ill effect? What is being done to prevent its pollution?

Q2.With the help of an example show that reuse strategy is better than recycling.

Q3.Why is sustainable management of natural resources necessary?

Q4.Every one of us can do something to reduce our consumption of various natural resources. List 4 activities based on 3-R approach.

**MCQ:**

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

ANS: 1. d) 2. b) 3. b) 4. b) 5. c)

**Reasoning and assertion type questions**

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

a) Both A and R are true and R is correct explanation of A

b) Both A and R are true and R is not correct explanation of A

c) A is true but R is false

d) A is false but R is true

1. Assertion (A) - Natural resources need to be used carefully.

   Reason (R) – Resources are finite in supply and human population is tremendously increasing

2. Assertion (A) – Forest cover balances the temperature level of the area.

   Reason (R) – Forests reduce atmospheric pollution by absorbing carbon dioxide from the atmosphere.

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

# EXAMINATION TIPS

1. Set your goals. **WRITE YOUR TARGET FOR EACH SUBJECT**
2. Prepare a **study time table** of your own and **adhere to it strictly**.
3. If you are not performing up to your level in a particular subject, **do not postpone studying** for this subject at all.
4. Your plan has to **be realistic**. Do not stuff too many things in a day. Set aside some time in the day for relaxation like playing/ watching television/ listening to music.
5. **Avoid watching too much of television/ accessing internet/using mobiles during exams.**
6. **Practice by Writing**
   Practice makes a man perfect. Hence practice writing in all the subjects to score better.
7. **Timing of Studying -** Choose your study timings.
8. **Drawing in Science**
   Good drawings fetch you good marks. Practice drawings.
9. **Health is Wealth**
   Take care of your health. Eat plenty of fruits and vegetables during your exams and drink plenty of water too.
10. **Revision – a Must**
    Revising your lessons will clarify your doubts and boost your confidence.
11. **Prayer/Meditation**
    Do devote at least 10 minutes for prayer/meditation as it helps in improving your confidence and concentration.
12. **Go for short Walks**
    Take a short walk in the evenings to rejuvenate yourself.
13. **On the Exam Day**
    * Do not cram till the last minute.
    * Be ready to go to school well in advance.
    * Check your compass box, pens, pencils, sharpeners, erasers, scales etc.
    * 30 minutes prior to the commencement of the exam, close all your books and relax.
    * While answering the questions, read the questions carefully and attempt the questions that you know first.
    * Attempt all the questions.

**SET-1**

**Series JMS/2**

कोड नं.
Code No. **31/2/1**

रोल नं.
Roll No.

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।

Candidates must write the Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **11** हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **27** प्रश्न हैं ।
- **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें ।**
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains **11** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **27** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

# विज्ञान

# SCIENCE

*निर्धारित समय : 3 घण्टे* *अधिकतम अंक : 80*

*Time allowed : 3 hours* *Maximum Marks : 80*

*सामान्य निर्देश :*

*(i)* *इस प्रश्न-पत्र को **पाँच** भागों, अ, ब, स, द और य में बाँटा गया है । आपको **सभी** भागों के प्रश्नों के उत्तर लिखने हैं ।*

*(ii)* ***सभी** प्रश्न अनिवार्य हैं ।*

*(iii)* *भाग ब, स, द और य के प्रश्नों में आंतरिक चयन दिया गया है ।*

*(iv)* *भाग अ के प्रश्न संख्या **1** और **2** एक-एक अंक के प्रश्न हैं । इनके उत्तर एक शब्द अथवा एक वाक्य में देने हैं ।*

*(v)* *भाग ब के प्रश्न संख्या **3** से **5** दो-दो अंकों के प्रश्न हैं । इनके उत्तर लगभग 30 शब्दों प्रत्येक में देने हैं ।*

*(vi)* *भाग स के प्रश्न संख्या **6** से **15** तीन-तीन अंकों के प्रश्न हैं । इनके उत्तर लगभग 50 शब्दों प्रत्येक में देने हैं ।*

*(vii)* *भाग द के प्रश्न संख्या **16** से **21** पाँच-पाँच अंकों के प्रश्न हैं । इनके उत्तर लगभग 70 शब्दों प्रत्येक में देने हैं ।*

*(viii)* *भाग य के प्रश्न संख्या **22** से **27** प्रयोगात्मक कौशल पर आधारित दो-दो अंकों के प्रश्न हैं । इनके संक्षिप्त उत्तर देने हैं ।*

***General Instructions :***

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

*(ii)* ***All** questions are compulsory.*

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

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

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

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

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

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

## भाग अ

## SECTION A

**1.** वनों के उत्पादों पर आधारित दो उद्योगों के नाम लिखिए । *1*

Name two industries based on forest produce.

**2.** विद्युत् टोस्टरों और विद्युत् इस्तरियों के तापन अवयव शुद्ध धातुओं के न होकर मिश्रातुओं के क्यों बने होते हैं ? *1*

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

## भाग ब

## SECTION B

**3.** एथीन का आण्विक सूत्र लिखिए और इसकी इलेक्ट्रॉन-बिन्दु संरचना खींचिए । *2*

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

**4.** कारण दीजिए :

(a) प्लेटिनम, गोल्ड और सिल्वर का उपयोग आभूषणों को बनाने में किया जाता है ।

(b) सोडियम और पोटैशियम जैसी धातुओं का भण्डारण तेल में डुबोकर किया जाता है । *2*

**अथवा**

कुछ देर तक वायु में खुला रखने पर सिल्वर (चाँदी) की वस्तुएँ काली पड़ जाती हैं जबकि कॉपर (ताँबे) के बर्तनों को खुले में रखने पर उनके चमकीले भूरे पृष्ठों पर हरी परत जम जाती है । वायु में उपस्थित उन पदार्थों के नाम लिखिए जो इन धातुओं से अभिक्रिया करते हैं तथा बनने वाले उत्पादों के नाम लिखिए । *2*

Give reasons :

(a) Platinum, gold and silver are used to make jewellery.

(b) Metals like sodium and potassium are stored under oil.

**OR**

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

**5.** रूबी का निरपेक्ष अपवर्तनांक 1·7 है । रूबी में प्रकाश की चाल ज्ञात कीजिए । निर्वात में प्रकाश की चाल $3 \times 10^8$ m/s है । *2*

The absolute refractive index of Ruby is 1·7. Find the speed of light in Ruby. The speed of light in vacuum is $3 \times 10^8$ m/s.

## भाग स

## SECTION C

**6.** क्वथन नली में कॉपर (II) नाइट्रेट के नीले रंग के चूर्ण को गर्म करने पर काला कॉपर ऑक्साइड, $O_2$ तथा कोई भूरी गैस X बनती है । *3*

(a) इस अभिक्रिया के प्रकार और गैस X को पहचानिए ।

(b) अभिक्रिया का संतुलित रासायनिक समीकरण लिखिए ।

(c) गैस X के जलीय विलयन का pH परास लिखिए ।

On heating blue coloured powder of copper (II) nitrate in a boiling tube, black copper oxide, $O_2$ and a brown gas X is formed.

(a) Identify the type of reaction and the gas X.

(b) Write balanced chemical equation of the reaction.

(c) Write the pH range of aqueous solution of the gas X.

**7.** (a) किसी अम्ल को तनुकृत करते समय यह अनुशंसा क्यों की जाती है कि अम्ल को जल में मिलाना चाहिए न कि जल को अम्ल में ?

(b) शुष्क हाइड्रोजन क्लोराइड गैस शुष्क लिटमस पत्र के रंग में कोई परिवर्तन नहीं करती । क्यों ? *3*

**अथवा**

उद्योगों में सोडियम हाइड्रॉक्साइड किस प्रकार बनाया जाता है ? इस प्रक्रिया का नाम लिखिए । इस प्रक्रिया में उपोत्पाद के रूप में कोई गैस X बनती है । यह गैस चूने के जल से अभिक्रिया करके कोई यौगिक Y बनाती है, जिसका उपयोग रसायन उद्योगों में विरंजन कर्मक के रूप में किया जाता है । X और Y को पहचानिए तथा होने वाली अभिक्रियाओं के रासायनिक समीकरण लिखिए । *3*

(a) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid ?

(b) Dry hydrogen chloride gas does not change the colour of dry litmus paper. Why ?

**OR**

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

**8.** उभयधर्मी ऑक्साइड क्या होते हैं ? एक उदाहरण दीजिए । अपने उत्तर की पुष्टि के लिए संतुलित रासायनिक समीकरण लिखिए । *3*

What are amphoteric oxides ? Give an example. Write balanced chemical equations to justify your answer.

**9.** कार्बन यौगिकों की समजातीय श्रेणी क्या होती है ? एक उदाहरण दीजिए तथा इसके तीन अभिलक्षणों की सूची बनाइए । *3*

What is a homologous series of carbon compounds ? Give an example and list its three characteristics.

**10.** तालिका के रूप में स्वपोषी पोषण और विषमपोषी पोषण के बीच तीन विभेदनकारी अभिलक्षणों की सूची बनाइए । *3*

List in tabular form three distinguishing features between autotrophic nutrition and heterotrophic nutrition.

**11.** वाष्पोत्सर्जन किसे कहते हैं ? इसके दो कार्य लिखिए । *3*

**अथवा**

(a) स्थानान्तरण किसे कहते हैं ? पादपों के लिए यह क्यों आवश्यक है ?

(b) स्थानान्तरण के फलस्वरूप पादपों में पदार्थ कहाँ पहुँचते हैं ? *3*

What is transpiration ? List its two functions.

**OR**

(a) What is translocation ? Why is it essential for plants ?

(b) Where do the substances in plants reach as a result of translocation ?

**12.** स्त्रीकेसर क्या होता है ? इसके विभिन्न भागों के कार्य लिखिए । *3*

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

**13.** कोई छात्र जिसने किसी दर्पण को अपने हाथ में पकड़ा हुआ है, दर्पण के परावर्तक पृष्ठ को सूर्य की ओर मोड़ता है । इसके पश्चात् वह परावर्तित प्रकाश को दर्पण के निकट रखी कागज़ की शीट पर भेजता है । *3*

(a) कागज़ को जलाने के लिए उसे क्या करना चाहिए ?

(b) उसके पास किस प्रकार का दर्पण था ?

(c) क्या वह इस क्रियाकलाप द्वारा इस दर्पण की सन्निकट फोकस दूरी निर्धारित कर सकेगा ? इस प्रकरण में अपने उत्तर की पुष्टि कारण देकर और प्रकाश किरण आरेख खींचकर कीजिए ।

**अथवा**

10 cm ऊँचा कोई बिम्ब 12 cm फोकस दूरी के किसी उत्तल लेंस के मुख्य अक्ष के लम्बवत् रखा है । लेंस से बिम्ब की दूरी 18 cm है । बनने वाले प्रतिबिम्ब की प्रकृति, स्थिति और साइज़ ज्ञात कीजिए । *3*

A student holding a mirror in his hand, directed the reflecting surface of the mirror towards the Sun. He then directed the reflected light on to a sheet of paper held close to the mirror.

(a) What should he do to burn the paper ?

(b) Which type of mirror does he have ?

(c) Will he be able to determine the approximate value of focal length of this mirror from this activity ? Give reason and draw ray diagram to justify your answer in this case.

**OR**

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

14. सौर सेल क्या होते हैं ? सौर पैनल की संरचना की व्याख्या कीजिए । सौर सेलों से संबद्ध दो प्रमुख लाभों की सूची बनाइए । *3*

What are solar cells ? Explain the structure of solar panel. List two principal advantages associated with solar cells.

15. पृथ्वी के वायुमण्डल के ऊपरी स्तरों में ओज़ोन द्वारा संपादित आवश्यक कार्य लिखिए । यह किस प्रकार बनती है ? वायुमण्डल में ओज़ोन की मात्रा में गिरावट के लिए उत्तरदायी संश्लेषित रसायनों का नाम लिखिए । इन रसायनों के उपयोग में किस प्रकार कमी की जा सकती है ? *3*

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

## भाग द
## SECTION D

16. (a) मेंडेलीफ के आवर्त नियम को चुनौती देने वाले किन्हीं तीन प्रेक्षणों की सूची बनाइए ।

(b) आधुनिक आवर्त सारणी में,

(i) किसी आवर्त में बाएँ से दाएँ जाने पर,

(ii) किसी समूह (ग्रुप) में ऊपर से नीचे जाने पर,

तत्त्वों के धात्विक लक्षणों में किस प्रकार विचरण होता है ?

अपने उत्तर के लिए कारण दीजिए । *5*

**अथवा**

चार तत्त्वों A, B, C और D के परमाणुओं में इलेक्ट्रॉनों का तीन कोशों में वितरण इस प्रकार है कि इन तत्त्वों के बाह्यतम कोशों में इलेक्ट्रॉनों की संख्या क्रमश: 1, 3, 5 और 7 है । आधुनिक आवर्त सारणी में इन तत्त्वों की समूह (ग्रुप) संख्या लिखिए । B और D परमाणुओं का इलेक्ट्रॉनिक विन्यास तथा B और D के संयोग से बने यौगिक का आण्विक सूत्र लिखिए । *5*

(a) List any three observations which posed a challenge to Mendeleev's Periodic Law.

(b) How does the metallic character of elements vary on moving from

(i) left to right in a period,

(ii) from top to bottom in a group

of the Modern Periodic Table ?

Give reason for your answer.

**OR**

The electrons in the atoms of four elements A, B, C and D are distributed in three shells having 1, 3, 5 and 7 electrons respectively in their outermost shells. Write the group numbers in which these elements are placed in the Modern Periodic Table. Write the electronic configuration of the atoms of B and D and the molecular formula of the compound formed when B and D combine.

**17.** (a) आयोडीनयुक्त नमक का उपयोग करने की सलाह क्यों दी जाती है ? हमारे भोजन में आयोडीन की कमी के कारण होने वाले रोग का नाम और उसका एक लक्षण लिखिए ।

(b) हमारे शरीर में तंत्रिका आवेग किस प्रकार गमन करते हैं ? व्याख्या कीजिए । *5*

**अथवा**

जलानुवर्तन किसे कहते हैं ? इस परिघटना को निदर्शित करने के लिए किसी प्रयोग की अभिकल्पना कीजिए । *5*

(a) Why is the use of iodised salt advisable ? Name the disease caused due to deficiency of iodine in our diet and state its one symptom.

(b) How do nerve impulses travel in the body ? Explain.

**OR**

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

**18.** (a) समजात संरचनाएँ क्या होती हैं ? एक उदाहरण दीजिए ।

(b) "किसी नवजात शिशु का लिंग मात्र संयोग है और इसके लिए दोनों जनकों में से किसी को भी उत्तरदायी नहीं माना जा सकता ।" मानवों में लिंग निर्धारण को दर्शाने वाले प्रवाह आरेख की सहायता से इस कथन की पुष्टि कीजिए । *5*

(a) What are homologous structures ? Give an example.

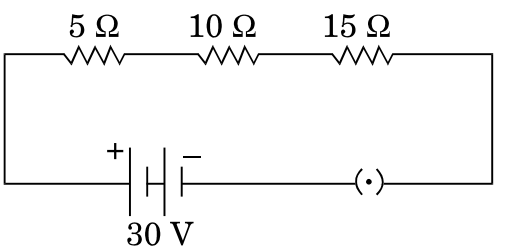
(b) "The sex of a newborn child is a matter of chance and none of the parents may be considered responsible for it." Justify this statement with the help of a flow chart showing sex-determination in human beings.

**19.** हम यह कब मानते हैं कि कोई व्यक्ति निकटदृष्टि दोष अथवा दीर्घदृष्टि दोष से पीड़ित है ? दीर्घदृष्टि दोष के दो कारणों की सूची बनाइए । किरण आरेखों की सहायता से दीर्घदृष्टि दोषयुक्त नेत्र से संबद्ध दोष को संशोधित करने की व्याख्या कीजिए । *5*

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

**20.** (a) किसी प्रयोग की सहायता से आप यह निष्कर्ष किस प्रकार निकालेंगे कि किसी बैटरी से श्रेणीक्रम में संयोजित तीन प्रतिरोधकों के परिपथ के प्रत्येक भाग से समान धारा प्रवाहित होती है ?

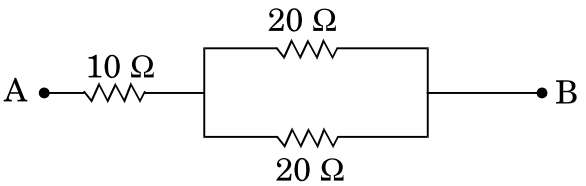
(b) नीचे दिए गए परिपथ पर विचार कीजिए और परिपथ के बन्द होने की स्थिति में परिपथ से प्रवाहित धारा और 15 Ω के प्रतिरोध के सिरों पर विभवान्तर ज्ञात कीजिए । *5*




**अथवा**

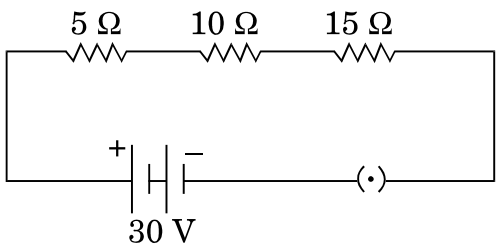
(a) तीन प्रतिरोधक $R_1$, $R_2$ और $R_3$ पार्श्वक्रम में संयोजित हैं तथा यह संयोजन किसी बैटरी, अमीटर, वोल्टमीटर और कुंजी से संयोजित है । उपयुक्त परिपथ आरेख खींचिए और प्रतिरोधकों के संयोजन के तुल्य प्रतिरोध के लिए व्यंजक प्राप्त कीजिए ।

(b) नीचे दिए गए नेटवर्क का तुल्य प्रतिरोध परिकलित कीजिए : *5*




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

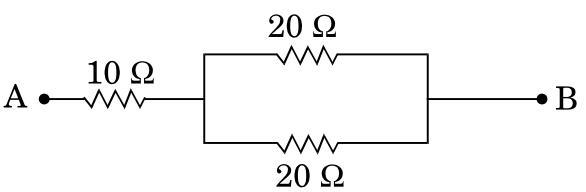
(b) Consider the given circuit and find the current flowing in the circuit and potential difference across the 15 Ω resistor when the circuit is closed.




**OR**

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

(b) Calculate the equivalent resistance of the following network :



21. किसी क्षैतिज कार्डबोर्ड से लम्बवत् गुज़रते किसी सीधे धारावाही चालक के कारण उत्पन्न चुम्बकीय क्षेत्र रेखाओं का पैटर्न खींचिए । दक्षिण-हस्त अंगुष्ठ नियम लिखिए और उसका अनुप्रयोग क्षेत्र रेखाओं की दिशा अंकित करने में कीजिए । इस सीधे चालक से दूर जाने पर किसी बिन्दु पर, जहाँ चुम्बकीय क्षेत्र निर्धारित किया जाना है, चुम्बकीय क्षेत्र की तीव्रता में किस प्रकार परिवर्तन होता है ? अपने उत्तर की पुष्टि के लिए कारण दीजिए । *5*

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

## भाग य

## SECTION E

22. किसी शिक्षक ने विद्यालय की प्रयोगशाला में छात्रों को ऐसीटिक अम्ल, जल, नींबू का रस, सोडियम हाइड्रोजन कार्बोनेट और सोडियम हाइड्रॉक्साइड के जलीय विलयन दिए और pH पत्र द्वारा इन पदार्थों के pH मान ज्ञात करने के लिए कहा । किसी छात्र ने इन पदार्थों के pH मान क्रमशः 3, 12, 4, 8 और 14 लिखे । इनमें से कौन-सा मान सही नहीं है ? कारण देते हुए इसका सही मान लिखिए । *2*

**अथवा**

चार बीकरों में आयरन सल्फेट का ताजा बना विलयन भरा है और इनमें क्रमशः ऐलुमिनियम, कॉपर, आयरन और जिंक की भलीभाँति स्वच्छ की गई पट्टियाँ रखी गई हैं । लगभग 30 मिनट के पश्चात् कोई छात्र अपने क्या प्रेक्षण लिखेगा ? *2*

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

**OR**

What would a student report nearly after 30 minutes of placing duly cleaned strips of aluminium, copper, iron and zinc in freshly prepared iron sulphate solution taken in four beakers ?

**23.** किसी परखनली में 2 mL ऐसीटिक अम्ल लेकर उसमें एक चुटकी सोडियम हाइड्रोजन कार्बोनेट मिलाने पर क्या प्रेक्षण किए जाते हैं ? इस प्रकरण में होने वाली अभिक्रिया का रासायनिक समीकरण लिखिए । *2*

What is observed when a pinch of sodium hydrogen carbonate is added to 2 mL of acetic acid taken in a test tube ? Write chemical equation for the reaction involved in this case.

**24.** द्विबीजपत्री बीजों को अंकुरित करने के चार चरणों की क्रमवार सूची बनाइए । *2*

**अथवा**

संयुक्त सूक्ष्मदर्शी की उच्च शक्ति में किसी तैयार स्लाइड का परीक्षण करने के पश्चात् किसी छात्र ने यह निष्कर्ष निकाला कि दी गई स्लाइड में किसी एककोशिक जीव में द्वि-खण्डन के विभिन्न चरण दर्शाए गए हैं । उन दो प्रेक्षणों को लिखिए जिनके आधार पर ऐसा निष्कर्ष निकाला जा सकता है । *2*

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

**OR**

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

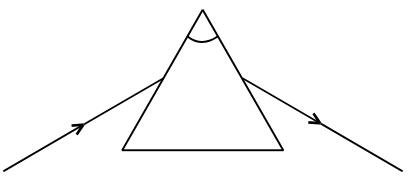
**25.** अपने विद्यालय की प्रयोगशाला में रंध्रों का प्रेक्षण करने के लिए किसी पत्ती के छिलके का अस्थायी आरोपण तैयार करते समय किसी छात्र द्वारा बरती जाने वाली चार सावधानियों की सूची बनाइए । *2*

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

**26.** काँच की आयताकार पट्टिका (स्लैब) के किसी एक फलक से लगभग 45° के कोण पर प्रवेश करने वाली प्रकाश किरण का पथ आरेखित कीजिए । इस आरेख पर (i) अपवर्तन कोण, (ii) निर्गत कोण और (iii) पार्श्विक विस्थापन अंकित कीजिए । *2*

**अथवा**

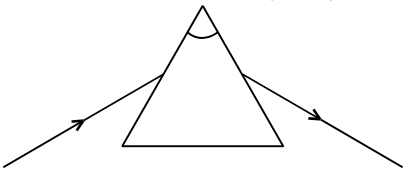
कोई छात्र आरेख में दर्शाए अनुसार किसी काँच के प्रिज़्म से गुज़रने वाली प्रकाश किरण का पथ आरेखित करता है, परन्तु इस आरेख को अधूरा छोड़ देता है और इसे नामांकित भी नहीं करता । इस आरेख को दुबारा खींचकर पूरा कीजिए तथा इस पर $\angle i$, $\angle e$, $\angle r$ और $\angle D$ भी अंकित कीजिए । *2*



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

**OR**

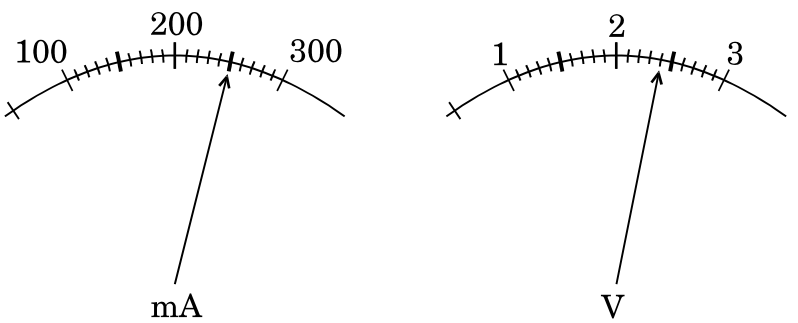
A student traces the path of a ray of light through a glass prism as shown in the diagram, but leaves it incomplete and unlabelled. Redraw and complete the diagram. Also label on it ∠i, ∠e, ∠r and ∠D.



**27.** किसी परिपथ में जुड़े प्रतिरोधक से प्रवाहित धारा और उसके सिरों पर विभवान्तर आरेख में क्रमशः मिलीअमीटर और वोल्टमीटर द्वारा दर्शाए गए पाठ्यांकों के अनुसार हैं : *2*

(a) इन मीटरों के अल्पतमांक क्या हैं ?

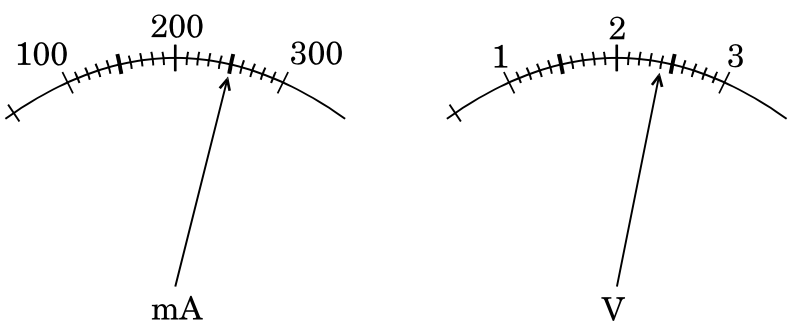
(b) प्रतिरोधक का प्रतिरोध कितना है ?




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

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

(b) What is the resistance of the resistor ?

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