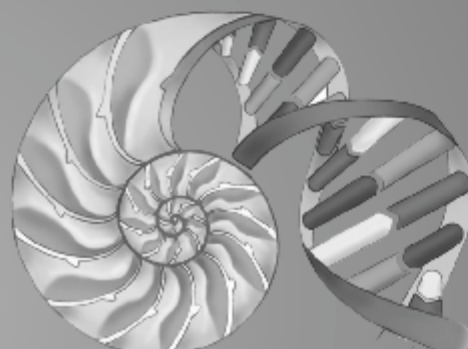
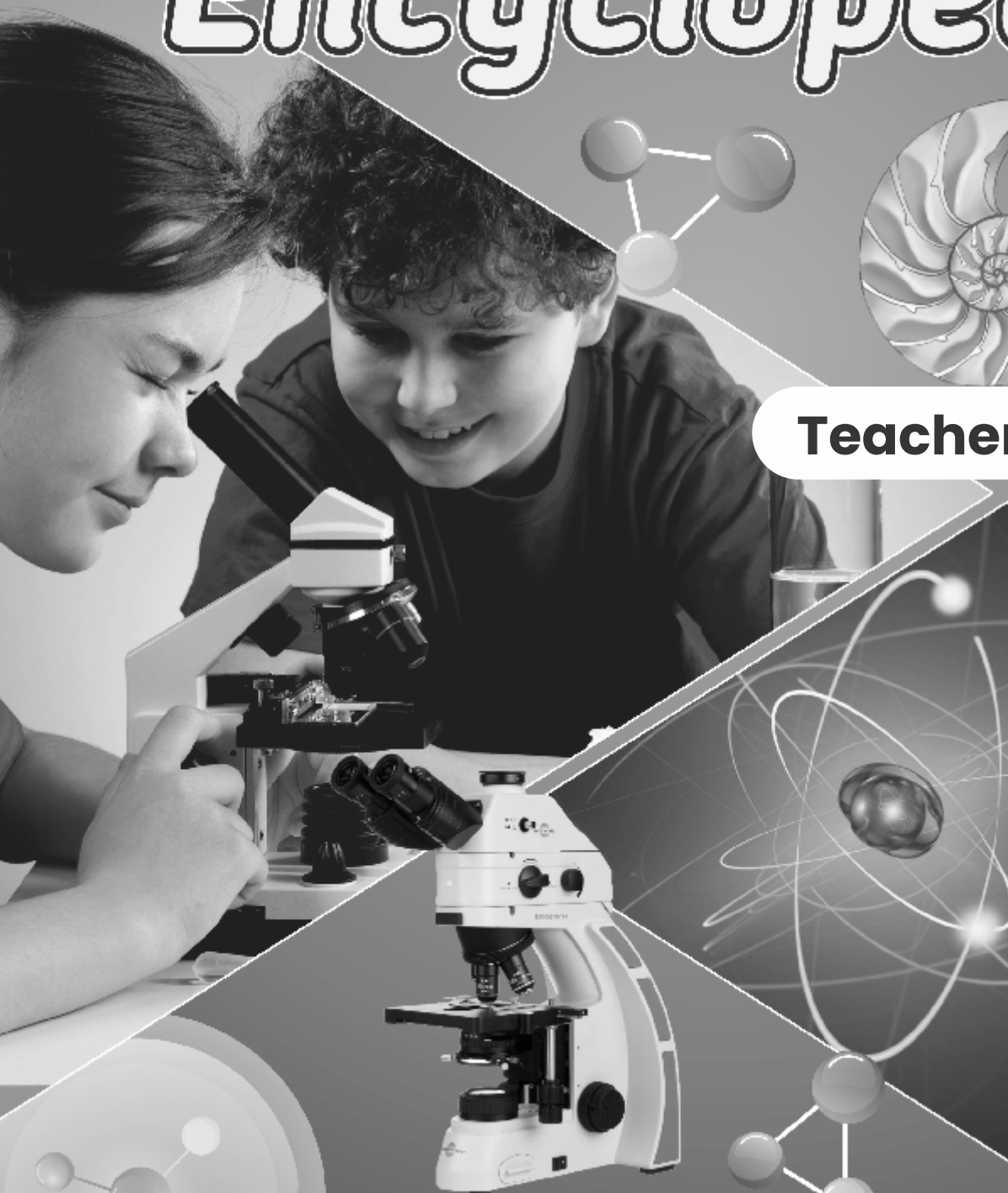


Based on the Guidelines of National Education Policy (NEP)-2020 and
Syllabus prescribed by N.C.E.R.T.

Science Encyclopedia

Teacher's Manual

6 to 8



Chapter - 1

Components of Food

A. Tick (✓) the correct option :

- Ans** 1. (b) Nutrients 2. (c) Protein 3. (c) Fibre 4. (b) Fats
5. (d) Balanced diet provides all essential nutrients in right proportion.

B. Fill in the blanks:

- Carbohydrates are the **Energy-giving** components of food.
- Some protien work as **antibiotics**.
- Calcium** and **phosphorus** are needed for the development of healthy bones and teeth.
- Vitamin-E** helps in body function and develops resistance against infections.
- The **food pyramid** was designed by the U.S. Department of Agriculture.

C. Match the following :

- Ans.**
- | | | |
|---------------------|---|----------------------------|
| 1. Roughage | → | (a) Protein |
| 2. Dehydration | → | (b) Roughage |
| 3. Marasmus | → | (c) ORS |
| 4. Fruits with skin | → | (d) Fibre content |
| 5. Iron | → | (e) Deficiency of vitamins |
| 6. Avitaminosis | → | (f) Haemoglobin |

D. Write 'T' for true and 'F' for false statements:

- Ans** 1. True 2. False 3. True 4. False 5. True

E. Answer the following questions in brief:

- Ans.** 1. We eat fats because they are also energy giving foods and gives more energy than carbohydrates.
- Ans.** 2. The important minerals that are required why are body includes calcium, phosphorus, iron, iodine and sodium.
- Ans.** 3. Vitamins are those components of food that are required for carrying out various biochemical reactions in the body. They are essential part of our balance diet which are required in small quantities but their deficiency may lead to diseases.
- Ans.** 4. Roughage is considered helpful in food because it is the fibre content off the food that helps in preventing constipation.
- Ans.** 5. We need to eat a balanced diet because it contains all the nutrients in the right proportion required by our body.

F. Answer the following questions in detail:

- Ans.** 1. 1. The food we eat consists of different parts or components. These food components which are needed by a body for growth and maintenance are called nutrients. These components are grouped into 3 kinds according to their importance:
- Energy yielding: carbohydrates and fats, which produce energy in our body
 - Bodybuilding proteins which are required for growth and repairing body
 - Protective: vitamins and minerals which help to perform necessary activities in life and fight diseases.
- Ans.** 2. Minerals are chemical compounds required for growth as well as carrying out certain bodily functions. The important minerals required by the body are calcium phosphorus iron iodine and sodium. You may be aware that calcium and phosphorus are needed for the development of healthy bones and teeth. Vegetables like spinach, pulses, eggs, milk and

fruits contain minerals.

Ans. 3. Balance diet is a diet in which the food on which a person depends contains all the nutrients in sufficient quantity. It includes energy food bodybuilding food minerals, vegetables, vitamins, roughage and water. A balanced diet is beneficial to us for the following reasons:

- It contains all the essential nutrients
- Carbohydrates and fats present in it provides us with energy
- Proteins help in the growth and development of our body
- Minerals for blood, bones teeth and regulate our body functions
- Vitamins help in maintaining good health and growth
- Refacz keeps our digestion and bowel movement proper

Ans. 4. It can be seen that many children, specially living in urban areas gain abnormally more weight even during young age. This condition is called obesity. Obesity is mainly caused due to overeating and lack of exercise. The school going children eat a lot of junk food such as burgers potato chips and soft drinks. All these food items contain large amount of fats and sugar. Due to lack of physical activity, the fat gets accumulated in the body leading to obesity. Most of obese children are sluggish and lazy and it often affects their overall health. Very rarely obesity can be caused due to defective glands and hereditary reasons. The obese children accumulate lot of unsaturated fat in their body which leads to various health problems during later years.

Ans. 5. Deficiency diseases are those diseases that are caused by lack of any nutrients or are less than the amount required by a body, causes abnormalities and diseases. Such diseases are known as deficiency diseases as they are caused by the lack of balanced diet. Deficiency of carbohydrates lack engraving energy to the body. The consequences are weakness in the body, lack of stamina to perform daily activities, tiredness and lethargy. Deficiency of protein results in protein calorie malnutrition or protein energy malnutrition. The consequences are the diseases like kwashiorkor and marasmus. Deficiency of fat in the body means less release of energy. Similar to carbohydrate deficiency, lack of fat also results in tiredness, Dadaji and reduces stamina of the body. Deficiency of vitamins can cause deficiency diseases and affect different body parts and causes their malfunctioning. The lack or deficiency of vitamins in human body is known as avitaminosis. Deficiency of minerals causes poor development, impaired metabolism and general weakness in the body.

G. 1. Proteins 2. Vitamin D 3. Vitamin A 4. Iodine

Chapter - 2

Cleaning of Food

A. Tick (✓) the correct option :

Ans 1. (a) threshing 2. (b) sediments 3. (c) wind 4. (c) wheat grains
5. (a) filtration

B. Write 'T' for true and 'F' for false statements:

Ans 1. False 2. False 3. True 4. False 5. True

C. Match the following :

C. Match the following

- Ans.**
- | | | |
|-----------------------|---|--|
| 1. Sickle | → | (a) Salt |
| 2. Winnowing | → | (b) Muslin cloth |
| 3. Evaporation | → | (c) Decantation |
| 4. Supernatant liquid | → | (d) An equipment for manual harvesting |
| 5. Filtration | → | (e) Wind |

D. Fill in the blanks:

1. The process of **Winnowing** is used by flour mills.
2. In _____ crops, mechanised threshing gives less amount of fodder.
3. Hand-picking is used only when one of the components is in **large** quantity.
4. The solid components, which settle down at the bottom of a liquid are **sediments**.
5. The best filter paper is the one which has very fine **pores**.

E. Do yourself.

F. Answer the following questions in brief:

- Ans.**
1. Harvesting is a method of removal, collection and gathering of mature crops from the fields. It is done by the farmers both manually as well as by machines.
 2. Difference between a thresher and combine is that a thresher is a small machine in which the harvested crop is put and rolled under rollers, while combine is a large machine and its wheels are rolled directly over the crop to separate the grains from the harvested crop.
 3. Farmers use winnowing in separating the husk from grains as they take the mixture in the basket tray, standing on the high platform allowing it to fall from a high by shaking the basket. In this way, the wind carries lighter husk with it which falls at a short distance away from the place.
 4. Some examples of cleaning the food by the help of sieving are weight grains are separated from harmful and unwanted substances like stones in the flour mills and at home we clean rice grains, wheat flour and pulses by using sieves which have holes of suitable sizes.
 5. The process of filtration can be used to clean the food as a filter contains pores and the size of these pores depends upon the size of the particles to be filtrated.

G. Answer the following questions in detail:

- Ans.**
1. Harvesting is the first method that includes removal, collection and gathering of mature crops from the fields. Harvesting is done by farmers both manually as well as by machines. Manual harvesting is done by farmers by using a special equipment called sequel to remove or cut the crops. This is generally used for crops which are close to the ground for example wheat Paddy. Mechanical harvesting includes new technologies that are developed several machines are designed for harvesting purposes. These are driven by big tractors in the field and are also known as harvesters.
Threshing is the process of separating grains from the chaff of the crops by various method by the farmers.
 - The harvested crops are spread on the ground and the farmers walk over them carefully and press them hard which separates the grain.
 - Various animals like the oxen, buffaloes and camels are used to press the crops by heavy trampling of their feet to separate the grains
 - Enlarge farms mechanical harvesters are used which helps both in harvesting and threshing
 2. Sieving is a method used to clean the food material from the impurities which are of a size different from that of the food component. By this method, the grains are separated from

unwanted substances by using a sieve. The sieve has holes through which the smaller particles pass and gets separated from the bigger components. The size of the host depends upon the size of the particles to be separated. Another method is of filtration that requires a filter containing holes of the size of these holes depends on the size of the particles to be filtered. We can use various substances such as a piece of cotton a layer of sand glass wool filter paper, net a muslin cloth or a strainer as filter depending upon the material to be filtered. The process of filtration cannot be used to separate the soluble components from liquids. But insoluble substances can easily be removed by it.

Ans. 3. When we keep a ball filled with salt solution in the sun what we will observe we will see that what are gradually turns into vapours and disappears leaving behind the common salt in the bowl. This process in which water or any liquid turns into vapour is called evaporation. Take some water. Put some salt in it and stir for some time in a china dish that then heat it on a burner. You will see that gradually water turns into vapour and disappears. In a few minutes all the water will be evaporated and common salt will be left behind in a dish as a solid residue. This process is used on a large scale to obtain common salt from sea water containing salts.

Ans. 4. The process of filtration cannot be used to separate column components from liquids. But insoluble substances can be easily removed by it for example if we want to remove common salt which is soluble in water, we have to use another method. On the other hand, various small insoluble particles which cannot be separated by sedimentation due to lightweight or other reasons can be easily separated by filtration.

Ans. 5. Food grains, which are insoluble in liquids can be cleaned by the method of sedimentation. The process involves the settling down of insoluble solid food components in a liquid. The solid components, with central down at the bottom are known as sediments a common example of cleaning food by sedimentation as that of rice and pulses. We clean these grains by soaking them in water for some time period the dust or other light impurities either dissolve or float in the water the grains are insoluble and heavier, settle down at the bottom. The Dirty water is thrown away and the grains are cleaned.

G. Do yourself.

Chapter - 3

Diffeernt Kinds of Materials

A. Tick (✓) the correct option :

Ans 1. (c) Definite mass and volume 2. (a) Solid 3. (c) Iron
4. (c) wheat Air 5. (d) Feelings

B. Fill in the blanks:

1. **Molecules** is basicaly the arrangement between solids, liquids and gases on the bassi of their shape and volume.
2. The arrangement of space occupied by an object is called its **volume**.
3. Metals are **good** conductors of heat.
4. We can feel the presence of **heat** in several materials.
5. Rough materials have **no shine** or **lustre** on their surface.
6. The intermixing of one substance into another is called **diffusion**.
7. Metals generally have more **good conductors** than non-metals.
8. **Water** is a universal solvent.

C. Write 'T' for true and 'F' for false statements:

- Ans.** 1. True 2. True 3. False 4. False 5. True 6. True
7. True 8. True

D. Answer the following questions in brief:

- Ans.** 1. Grouping is basically the arrangement of things and objects according to their common features.
2. Classification of different things can be done on the basis of some similarities and dissimilarities they share.
3. The floating and sinking property of a substance depends upon its density.
4. Gases are the state of matter that can easily change their shape and volume.
5. We can look through glass but not through wood because wood is an opaque object and the light cannot pass through it.
6. We should never touch an electric switch with wet hands because water is a good conductor of electricity and we can get an electricity shock.
7. Metals are the good conductor of heat as they allow heat to pass through them easily.

G. Answer the following questions in detail:

- Ans.** 1. The process of sorting out of grouping things according to the basis or some criteria is called classification. Classification of different things can be done on the basis of some similarities and dissimilarities. Although living or living things share some common properties, they differ from each other in several ways. They are further classified into 2 subgroups that is plants and animals. Each of these groups of animals share certain common properties but each group also differs from the other group in some way or the other. View group materials for our own convenience. This kind of arrangement helps us to locate the objects easily and also the study of the properties of various substances become simplified. This also helps us to make observations regarding the pattern in the properties of the various things or objects. An example for this is take your school bag and classify your notebooks on the basis of their subjects. You have 2 notebooks notebooks of each for Hindi English mathematics and social sciences. Next classify them on the basis of homework and classwork notes. The 2 types of classification can be done by making 2 different tables, one for the classification of notebooks according to the homework and classwork, and the other one is on the basis of classification of notebooks on the basis of subject.
- Ans.** 2. Weekend classify matter on the basis of its solubility in water. The substances that dissolve in water completely are called soluble or miscible substances, while substances that do not dissolve in water are called insoluble or immiscible substances. A liquid containing a dissolved material is called as solution. For example, take some crystal of sugar in one test tube and some chalk powder another test tube. Half fill each one of them with water. Shake them well. A clear solution is obtained in the test tube containing sugar. Though the material is still there, but we cannot see it any longer period the material has been spread evenly in the water. The particles of the evenly spread material are too small to be seen with the naked eyes. It means that sugar has dissolved in water. But the chopped powder in the other test tube remains as such. It means that chalk powder is insoluble in water.
- Ans.** 3. Pure water is a bad conductor of electricity as it lacks in free conducting ions in comparison to acidified water. It is necessary to have free conducting charges in form of ions in order to conduct electricity in any medium.

Experiment to prove that water is a bad conductor of heat energy

- (i) Take a hard glass test tube and drop a piece of ice wrapped up in copper wire gauze.
 - (ii) Fill 3/4th of the test tube with ice-cold water and clamp it in an iron stand.
 - (iii) Heat the test tube near its mouth with the help of a burner.
 - (iv) After a few moments, we can observe that water near the top starts boiling and steam is given off freely.
 - (v) The ice placed at the bottom does not melt because the heat supplied to the water is unable to melt the ice.
 - (vi) This shows that water is a bad conductor of heat.
- Ans. 4. Various objects can be classified into the following 3 categories on the basis of transparency:
- Transparent objects: objects through which we can see clearly are called transparent objects for example, a clean glass window, air, water, etc. This is because light can pass through them.
 - Opaque objects: objects through which we cannot see at all are called opaque objects, for example, wall, metal sheet, muddy water, etc. This is because light cannot pass through them.
 - Translucent objects: objects through which we can see partially are called translucent objects. The things lying on the other side of the translucent objects cannot be seen clearly, for example, butter paper, frosted glass, etc. This is because light can pass through them partially.
- Ans. 5. Solid state of matter occupies a definite space or volume and has a definite shape. In solids, molecules are tightly packed as they are very close to each other. You can move a box from one place to another but its shape and volume will not change.
- Liquid state of matter occupies space but has no definite shape. In liquids, the molecules are less tightly packed as they are far away from each other than in solids. Pouring milk from a round flask to a beaker causes milk to take the shape of the beaker but the amount of milk remains the same. Its volume does not change.
- Gaseous state of matter neither occupies a definite space nor has a definite shape. Gases can easily change their shape and volume. In gases, the molecules are so far apart that there is hardly any attraction between them. If you pump air into a football, the air takes the shape of a football and its volume changes. As compared to outside air, it takes up less space than the football.

A. Fill in the blanks:

1. All things around us are made up of **matter**.
2. **Growth** is an irreversible increase in height, size or volume.
3. Sunflower changes its position to face the **sun**.
4. We take in oxygen and give out carbon-dioxide during **day time**.
5. All living organisms respond to various kinds of **stimuli**
6. **Oxygen** is required for respiration.
7. Temperature affects the **Distribution** of plants and animals.

B. Write 'T' for true and 'F' for false statements:

- Ans 1. True 2. False 3. True 4. True 5. True

C. Match the following:

- | | | |
|---------------------|---|------------------------|
| 1. Animate things | → | (a) Birds, bats |
| 2. Inanimate things | → | (b) Plants, animals |
| 3. Paramecium | → | (c) Change in position |
| 4. Movement | → | (d) Water |
| 5. Air | → | (e) One cell |
| 6. Lotus | → | (f) Shoes, furniture |

D. Write short notes on:

- Ans. 1. Excretion in living things means that living things need to remove different kinds of waste and harmful products from their body.
- Ans. 2. Temperature is one of the factors affecting the distribution of plants and animals, their growth and other activities required for them to survive.
- Ans. 3. Abiotic animals are also known as non-living things such as air, water, soil and climatic factors including light and temperature.

E. Answer the following questions in brief:

- Ans. 1. Weekend classify things around us according to their activities into living or animate things and non-living or inanimate things.
- Ans. 2. Animate things exhibit and perform various life activities. For example, plants animals and human beings.
- Ans. 3. Cell is a basic unit from which all living things are made up of. These cells may be of different shapes and size, and perform different functions.
- Ans. 4. Growth is an irreversible increase in height commerce size or volume during the life of an Organism. For example, animals grow up to a certain age whereas plants growth throughout their life.
- Ans. 5. All living things breathe and respire to survive as they take in oxygen and give out carbon dioxide during respiration to complete various life processes.
- Ans. 6. Habitat is a place where the living organisms live with plenty of food commerce shelter and protection from adverse climatic conditions.

F. Answer the following questions in detail:

- Ans. 1. We use and see innumerable things in our daily life. We wear clothes and shoes, eat food right with pen or pencil travel in cars or buses play with toys enjoy with friends, sit under the trees, etc. We know all these things are not alike, but are completely different from each

other period gripping or categorising things makes it easier to work period for convenience in life grouping of things helps to keep them in the assigned places. The process of categorization and sorting of objects is known as classification.

- Diversity in shape: vca variety of plants animals and objects around us. Some of these are round, some are rectangular, some are square, where some are elongated, elliptical or Oval in shape.
- diversity in size: everyday, we see plants and animals of different sizes like rats are very small wear as a few like cows and elephants are comparatively much bigger
- diversity in colour: classification of things can easily be done according to their colour. All fruits and vegetables have their specific colours. The students of different schools are recognised by the colours of their uniform. Whenever we think of plants, only green colour comes to our mind. Colour is always easier to visualise and remember than the size and shape.

Ans. 2. There are many characteristic features, which make living things different from non living things. These include their composition and their life processes performed by them.

- Made up of cells: all living things are made up of the basic unit called cells. These cells may be different shapes and sizes. They also perform different functions. A few organisms consists of just one cell for example amoeba. But most of the organisms are made up of millions of cells.
- Definite shape: each Organism has a definite shape and size. For example all of us has 2 legs, 2 years, 2 eyes, 2 hands and one nose any living organism can be recognised by it's typical shape which cannot be changed.
- Growth: all living Organism show growth during some period of their life various some grow continuously throughout their life.
- Definite lifespan: we know that all organisms live for some time and then die. Each individual Organism has a definite lifespan during which it performs various life activities.
- Need for food: all living organisms require food for their survival. Plants are the only living things, which can prepare their own food by the process of photosynthesis. Therefore, there also known as autotrophs. Animals however, cannot synthesise their food error dependent on plants, directly or indirectly for their food requirements.
- Movement: movement is any change brought about in the orientation or position of the body of an Organism or any part of it animals move from one place to another for food and shelter.
- Respiration: all living organisms breathe and respire to survive. You know very well that we take in oxygen and give out carbon dioxide during respiration.
- Excretion: all living things need to remove different kinds of waste and harmful products from their body.
- Reproduction: every living Organism produces its next generation of its own kind. Human beings produce babies which grow into adults.
- Response to stimuli: any change in the external or internal environment is called stimulus. All living organisms response to various kinds of stimuli such as temperature, light, chemicals, sound and touch.

Ans. 3.

Ans. 4. The living world is surrounded by innumerable live non living things. These continuously interact with living organisms and make their existence possible. Biotic components are all living organisms, plants, animals and human beings constitute the biotic components.

Abiotic components are the non living things such as air water soil and climatic factors such as light and temperature constitute abiotic components.

- Air is a mixture of gases, which covers the whole earth like a thick blanket. It is essential for the survival of lawn living organisms
- Water is another essential requirement for life. We find innumerable and events in plants around the areas where there is abundance of water.
- Soil is an important abiotic factor as all living Organism depend on it directly or indirectly. Soil is the main source of nutrients and water for the plants. It supports plant life which in turn provides food for living beings
- Light: on earth life exists, directly or indirectly, due to the light of the sun. Plants require sunlight to carry out the process of photosynthesis without which life is impossible. Light also determines the growth and development of Plants.
- Temperature: is another important factor affecting the distribution of plants and animals. Living organisms depend on it for their growth.

Ans. 5. Hey air is a mixture of gases which covers the whole earth like a thick blanket. It is essential for the survival of all living organisms. Oxygen is required for respiration by the whole living world. Also, plants use carbon dioxide for photosynthesis and manufacturing of food. Air current helps in the disposal of fruits and seeds and causes pollination in some plants. Moreover, some arrangements such as birds and bats live in air another factor Accenture for the sustainment of life is water. We find innumerable element animals and plants around areas where there is abundance of water. In deserts and dry conditions organisms face a lot of difficulties. Therefore they adapt themselves according to the condition to survive.

Ans. 6. On earth the life exists, directly or indirectly, due to the light of the sun. Plants require sunlight to carry out the process of photosynthesis without which life is impossible. Light determines the growth and development of plants. Different varieties of plant require different amount of light for their growth. For example, plants like sunflower and gulmohar require more sunlight various plants like money plant grow well and shady areas. Light affects not only the plants but also the growth, colour and reproduction of animals. Another important factor is temperature that affects distribution of plants and animals. Living organisms depend on it for their growth period most organisms cannot adapt themselves to the extreme temperatures and underground reduce activities. As the optimum temperature return they resume their normal activities.

Chapter - 5

The Habitat of the Living

A. Tick (✓) the correct option :

Ans 1. (b) Mesophyte 2. (c) Xerophytes 3. (c) succulents 4. (b) Mangroves

B. Fill in the blanks:

1. The roots are entirely absent in **hydrophytes**.
2. The **alfalfa** has more than 30 feet long roots.
3. Special appendages in aquatic animals are called **fins**.
4. The storage cells of camel are present in **stomach**.
5. **Yaks** have long hair for keeping their body warm.

C. Match the following:

- | | | |
|----------------|---|---------------------------------------|
| 1. Hydrocoles | → | (a) Mangroves |
| 2. Mesophytes | → | (b) Fish, octopus |
| 3. Xerophytes | → | (c) Wolffia, hydrilla |
| 4. Halophytes | → | (d) Neem, peepal |
| 5. Tendrils | → | (e) Opuntia, acacia |
| 6. Hydrophytes | → | (f) Thin, wire-like coiled sturcture. |

D. Write short notes on:

- Ans. 1. The animals living in water are known as aquatic animals or hydrocoles.
- Ans. 2. Mesophytes are the land plants which grow in moist habitats and needs a well-aerated soi.
- Ans. 3. Drought evaders are those animals that appear only during rain while rest of the time they remain dormant, for example grasshopper and moth.

E. Answer the following questions in brief:

- Ans. 1. Adaptation refers to the change in the structure or behaviour often Organism that helps in aid to survive in a particular habitat.
- Ans. 2. Aquatic plants have absented or poorly developed roots because of the abundance of water that makes their roots secondary in importance and less significant.
- Ans. 3. The stems of xerophyte plants are photosynthetic in nature because they are fleshy, green and leaf like. The green stems carry out photosynthesis in the absence of leaves and make food available for the plant.
- Ans. 4. The difference between floating and submerged leaves of hydrophytes is that in floating forms the leaves are flat broad and curved with waxy coating to avoid decay. On the other hand, the submerged plants have to deal with the water currents and in order to avoid any damage they have fine, thin, ribbon or finger like leaves which allow water currents to pass through them without damaging the leaves.
- Ans. 5. Ephemerals are the plants that avoid dry seasons by completing their life cycle in 6 to 8 weeks.
- Ans. 6. Plants that have weak stems need support for standing upright. Therefore, different parts of these plants are modified into small thread-like growths called tendrils. They are helpful in providing support to the plants, for example, gourd, grapevine and pea.
- Ans. 7. The importance of gills for aquatic animals is that it helps in maintaining the balance of the body and helps in movement inside water.

F. Answer the following questions in detail:

- Ans. 1. Living organisms are present everywhere around us For their survival they occupy a range

of habitats. They can live on land, mountains, in water and in air. According to their surrounding environment and habitat, they adapt themselves for their survival. Our earth is inhabited by an enormous variety of organisms. Plants range in size from microorganism microscopic to large trees. Similarly all animals differ from each other in size, colour and external features. If we visit desert area you will come across different kind of vegetation and animals. Similarly in water you can observe many living organisms which have different kinds of structure.

Ans. 2. For survival and existence all living organisms need to be adjusted and well fitted to their habitat and surroundings. Any characteristics, internal or external, that helps in the survival of living organisms is called an adaptation. This weekend define adaptation as a process which helps an Organism to survive in an environment and produce its offspring situated to the condition of a particular habitat. Different habitats lead to the development of different kind of adaptive features in a living Organism.

Ans. 3. Based on the variety of habitats and the development of adaptive features, there are 4 major groups of plant:

- Hydrophytes: plants growing in water
- Mesophytes: terrestrial plants growing in moist habitats
- Xerophytes: terrestrial plants growing in water scarce habitats
- Halophytes: plants growing in marshy area

Hydrophytes are the plant which grow in water. Due to abundant water, the roots of aquatic plants become secondary in importance and less significant. Therefore, roots are either absent or poorly developed. The stems of aquatic plants are long commerce slender, weak spongy and flexible. This reduces the weight of the plants and help them in floating.

Mesophytes are the plants of land which grow in moist habitats and needs a well aerated soil. The root system is well developed to absorb water from the soil. The stems of mesophytic plants are aerial solid and well branched. The leaves of these plants are large broad and thin. These are generally oriented horizontally to get maximum sunlight for photosynthesis. Xerophytes are the land plants which survive in conditions of water scarcity are known as xerophytes for examples, the plants living in deserts these plants have developed several adaptive features such as: they have an extensive root system which grows as deep as possible in search of water leaves of these plants are small reduced and sometimes absent. Leaves are also covered with dense hair for protection. The waxy coating on leaves helps them to retain moisture. In a few plants, the leaves are folded and rolled in such a manner that the stomata is hidden inside the leaves. As a result, the rate of respiration is reduced.

Halophytes are the plants grow in saline marshy soils and can tolerate high contents of salts. They are also known as mangroves. They have branch roots which come out of the soil surface to allow the entry of air. Their leaves are green commerce more and leathery with water storage tissues.

Ans. 4. The drought resistant animal remain active throughout the year as they face dry and hot conditions comfortably. The examples are kangaroo rat and camel. Due to the lack of water in their surroundings, they utilise water from every available source like water holes, dew drops. These animals have thick skinned which prevent water loss by sweating. In camels the body temperature changes with the atmospheric temperature and thus reduces the loss of water. The desert animal excrete concentrated urine and faecal matter in the body. Most of them are burrowing and nocturnal. It protects them against the scorching sun and prevents excess water loss period the skin is provided with the protective armour of scales

and spines. Their legs are long which lift their body above the ground and helps them in walking on the sand. Their feet are padded to have thick sole to walk comfortably on sand. The nostrils are reduced pinholes or are protective with the walls that protects them from sand. Burger transparent eyelids spread over their eyes, protects them from sun and at the same time permit clear vision. Animals like camel have a spacious stomach to store water.

- Ans. 5. The animals living in water are known as aquatic animals or hydrocoles. These animals are not adapted to live on land. These animals show the following adaptation for living in water:
- The head body and tail are compressed to give an elongated and streamlined body
 - Their body is devoid of any outgrowth or protuberances, which can interfere with their movement in water
 - Special appendages called fins are present on the body. They maintain the balance
 - Aquatic animals have air filled organs and swim bladders of the body and helps in movement inside the water.
 - The head is sub conical in shape which makes an easy passage in water
 - Their body is covered with scales which protects them from decaying
 - Special respiratory organs for gills are available for extracting oxygen in water are present in the body.
- Ans. 6. Many animals are capable of living both on land and in water. These are called amphibians or secondary hydro pools for example, frogs, toads and turtles. Generally these animals use water as a habitat for reproduction only; They passed the rest of their life on land. For surviving in both condition and living in dual mode of life these animals have developed a number of adaptive features, which are as follows:
- The body is streamlined with an enlarged tail
 - The neck is shortened and without any power of mobility
 - The skin of amphibians smooth and dry and without any scales or hair. It is rich in mucus which keeps the skin moist and helps in respiration.
 - The hindlimbs are longer than 4 limbs. Their digits are webbed for moving on the surface of water
 - The bones of these animals are light and spongy. This reduces their body weight and makes them light in weight.
- The eyes and nostrils are on the apex of the face of the amphibians. This protects these openings from water as well as from soil.
- G. Do yourself.

A. Tick (✓) the correct option :

- Ans** 1. (a) beet and turnip 2. (b) underground stems 3. (d) photosynthesis
4. (a) nodes

B. Write 'T' for true and 'F' for false statements:

- Ans** 1. True 2. True 3. False 4. False 5. True

C. Fill in the blanks:

- The male part of the flower is called the **stamens**.
- Stems of **grapevine** and **gourd** modify into tendrils.
- The exchange of gases in leaves occurs through **stomata**.
- The whorl formed by sepals is called **calyx** and that by petals is called **corolla**.

D. Match the following :

- Ans.**
- | | |
|--------------|---------------------|
| 1. Pericarps | → (a) Transpiration |
| 2. Banyan | → (b) Glory lily |
| 3. Stomata | → (c) Prop roots |
| 4. Pedicel | → (d) Fruit |
| 5. Tendrils | → (e) Flower |

E. Answer the following questions in brief:

- Ans.** 1. The plant body can be divided into two parts- the root system and the shoot system.

- Ans.** 2. The main function of the stem are:

- The stem bears branches, leaves, flowers and fruits.
- It holds the leaves in such a way that they get plenty of sunlight.

- Ans.** 3. Leaves have tiny pores called stomata. They help in the exchange of gases (oxygen and carbon dioxide) during respiration.

The excess of water present in the plants is lost through stomata present in the leaves by the process of transpiration.

- Ans.** 4. (a) The stems of these plants need support to stand and receive sunlight for manufacturing of food. Their stems modify themselves into small thread-like outgrowths called tendrils. They help the plants to climb the coiling around any neighbouring object for support.

- (b) Leaves or leaf tips are also modify into soft, coiled or wire-like structures called tendrils. They give support to the plants with weak stems. A few examples are grape-plant and glory lily.

- Ans.** 5. (a) The outermost whorl of a flower is green in colour and is formed by sepals. The whorl formed by sepals is called calyx.

- (b) The petals form the second whorl of the flower.

- (c) They make the third whorls. They are the male reproductive organs of the flower.

- (c) The whorl formed by all stamens is called androecium.

- (d) The carpel is the female reproductive part of the flower.

- (e) The whorl that constitutes female reproductive system is called gynoecium.

- Ans.** 6. The fertilised ovule, which is found inside a fruit is called the seed. A baby plant, called the embryo, remains safe inside the seed.

F. Answer the following questions in details:

1. It consists of a main root which grows vertically downwards into soil. It is also known as the primary root and gives out lateral branches called secondary roots. These are further divide into smaller teritary roots. This kind of root is seen in carrot, beans, peas and radish.
- Ans. 2. The stem works as the main eaxis of the shoot system.It is the link between the roots and rest of the parts of the plant. This is the strongest part of the tree, known as the trunk. It holds the plant upright. However, stems of a few plants are weak and are, therefore, unable to keep the plants erect. Most trunks are covered with ad ead covering called the bark.This covering protects the inner parts of the tree from injuries or infections.
The main functions of the stem are:
 - (a) The stem bears branches, leaves, flowers and fruits.
 - (b) It holds the leaves in such a way that they get plenty of sunlight.
 - (c) Stems carry water and minerals from the roots to the leaves and flowers, while transporting food from the leaves to other parts of the plant.
 - (d) These are also modified to perform special functions.
- Ans. 3. Based on the special needs of a plant, roots may perform special functions other than absorbing water and minerals.These roots are called modified roots. The following is a list of various functions of modified roots.

Storage of Food

Roots of radish, sweet potato, carrot, etc. are swollen as they store food in them. This food is utilize by the plants for their growth and development. We eat these swollen roots, for example, sweet potato, carrot, radis, turnip, etc.

Provides Support

In plants, like the banyan tree, a number of roots arises from the horizontal branches of the tree. Some of these penetrate into the soil, while some become as thick as the tree. In both cases, they support the tree and are, therefore, known as supporting or prop roots.

Nitrogen Fixation

The leguminous plants like peas and groundnuts have nodules, small knob-like outgrowths, on their roots. These nodules contain special bacteria, rhizobium, which can fix nitrogen from the atmosphere and provide it to the plants.
- Ans. 4. **Modification of Stems**
We alreay know that stems of many plants are modified to perform some other specific functions. Let us knwn them.
Storage: some plants have stems that grow underground and store food, for example, potato, onion, and ginger. As they are underground, they look like roots, but they are actually stems. These are able to produce new plants like any other stem. If you observe a potato carefully, you can see small structure called eyes on them. Each eye has buds surrounded by scaly leaves. Each bud can give rise to a new plant.
Support: Many plants have very waek stems, which cannot support the weight of the plant, for example, grapevine, gourd and passion flowers. The stems of these plants need support to stand and receive sunligh for manufacturing of food. Their stems modify themselves into small thread-like outgrowths called tendrils.They help the plants to climb by coiling around any neighbouring object for support.
Making of Food: As you have studied, that the stems of desert plants like cacti are thick, fleshy and green. These are modified to store water and perform photosynthesis to manufacture food for the plant.
- Ans. 5. **Functions of a Leaf**

Some of the main functions of leaves are:

- (i) The primary function of leaves is to manufacture food by the process of photosynthesis. They contain a green pigment called chlorophyll, which traps sunlight, which is the source of energy for the plant.
- (ii) Leaves have tiny pores called stomata. They help in the exchange of gases (oxygen and carbon dioxide) during respiration.
- (iii) The excess of water present in the plants is lost through stomata present in the leaves by the process of transpiration.

Ans. 6. **Studying a Flower**

Each flower consists of same parts. A flower is attached to the branch of a plant by a stalk called pedicel. This pedicel swells up at its tip to form a platform-like structure called thalamus. The thalamus bears the parts of the flowers in four circles. These circles are called whorls. Each whorl consists of sepals, petals, stamens and carpels. Let us study about them one-by-one.

Ans. 7. **Functions of Seeds**

Given below are the main functions of seeds:

- (i) They protect the embryos and provide nourishment for their growth and development.
- (ii) A few seeds are light in weight and can be dispersed easily by wind, water or animals. Seed dispersal helps in the distribution of species and better growth, due to decreased competition in the fertile land.

H. Do yourself.

Chapter - 7

Structures And Functions of Animals

A. Tick (✓) the correct option :

Ans 1. (b) tendons 2. (a) rabbit 3. (c) incisors 4. (b) arteries

B. Fill in the blanks:

1. In the mouth, food gets mixed with **saliva**.
2. Excessive secretion by liver is stored in **gall bladder**.
3. Air enters our lungs through **nostrils**.
4. **Capillaries** connect arteries to veins.
5. Kidneys maintain **water** and **mineral** balance in the body.
6. Shoulder joint is an example of a **ball and socket joints**.

C. Write 'T' for true and 'F' for false statements:

Ans 1. True 2. False 3. True 4. True
5. True 6. True

D. Match the following :

Ans. 1. Pseudopodia → (a) Transpiration
2. Cockroach → (b) Glory lily
3. Diaphragm → (c) Prop roots
4. Rabbit → (d) Fruit
5. Muscular foot → (e) Flower
6. Pivot joint → (f) Breathing

E. Draw diagrams of:

F. Answer the following questions in brief:

Ans. 1. Digestive, respiratory, circulatory, nervous and excretory system.

Ans. 2. **Heart**

It is one of the most important organs of our body. It is located in the middle of the chest cavity, but is tilted slightly towards the left. The size of our heart is almost the size of our fist. It beats 70-72 times per minute and supplies blood to the body through blood vessels.

Ans. 3. **Brain**

This important organ is locked inside our skull. On receiving a message, the brain decides the reaction of the body towards the environmental changes. Immediately, it sends out commands to different parts of the body for action through nerves.

Ans. 4. **MUSCULAR SYSTEM**

Different muscles of our body make the muscular system. There are more than 600 in our body. These muscles help in the movement and locomotion. Our body organs also contain different kinds of muscles. These muscles contract and expand, which help the body and its organs in carrying out their movements and functions. For example, heart muscles help the heart to beat. Leg muscles help us to move and muscles of the hands help us to hold the things, in writing etc.

Ans. 5. The bones are joined together by elastic strands called ligaments whereas muscles are attached to the bones by inelastic tissues called tendons. Locomotion is the result of a co-ordinated action of these muscles with the limb bones. Our muscles contract and relax, which helps the bones to move.

Ans. 6. The conversion of insoluble food into soluble food is known as digestion. This digested food

is absorbed and used by our body. For carrying out this complete process, several organs of our body are involved. These are mouth, oesophagus, stomach, small intestine, large intestine, anus, gall bladder, liver and pancreas. All these organs collectively constitute the digestive system.

An earthworm has strong muscles which help it to move, whereas leech has suckers for movement. During movement, the body of an earthworm alternately expands and contracts with the help of muscles. It moves very short distances in one stroke and therefore, requires repeated movements.

G. Answer the following questions in details:

Ans. 1. **Mouth**

The process of digestion starts in our mouth. It contains tongue, teeth and salivary glands. The food is mixed with the saliva secreted by our salivary glands. This mixing helps our food to break down into smaller pieces with the help of 2. The second set of teeth grows after the Humans have four types of teeth, i.e., incisors, canines, premolars and molars. Incisors are used for biting the food, whereas premolars and molars help in grinding the food.

Tongue

It is an important part of the mouth. Let us learn its functions:

1. Mixing the food with saliva.
2. Swallowing of food.
3. Sensing the taste of food items.
4. Speaking

Oesophagus

It is also called the food pipe, which acts as a passage or tube. It takes the food from mouth to stomach.

Stomach

A bag-like structure where food gets stored for digestion is called the stomach. The food gets churned in the stomach into a semi-solid paste. This semi-solid food then passes into the small intestine for further digestion.

Small Intestine

This organ is arranged in the form of a coil. Digestion of food is completed here. Liver and pancreas pour their digestive secretions in the small intestine to digest the food. Excessive secretion from the liver is stored in the gall bladder. The digested food is also absorbed by the small intestine.

Large Intestine.

The large intestine is responsible for the absorption of water and removal of the undigested solid wastes from the body. The part where absorption of water occurs is known as colon, while excretion takes place through anus.

Ans. 2. **RESPIRATORY SYSTEM**

All living beings breathe in oxygen. It helps to break down the absorbed food in the body to release energy, required for our growth and survival. This process is called respiration. During the process, we inhale oxygen from the air and produce carbon dioxide as a waste product. The breathing is the process of inhalation of carbon dioxide.

It is an important part of the respiration process. When we breathe in air, it reaches our lungs. From there, oxygen enters our blood. The blood, in turn, releases carbon dioxide and water vapours into the lungs. These are then removed from the lungs with the exhaled air.

Ans. 3. **Blood Vessels**

There are three types of blood vessels in our body, i.e., arteries, veins and capillaries. Arteries carry blood from our heart to different parts of the body. Veins transport blood towards the heart coming from different body parts, while capillaries are thin vessels connecting arteries to the veins. Thus, in our body, blood flows through the following path:
Heart → Arteries → Capillaries → Veins

Ans. 4. **EXCRETORY SYSTEM**

The excretory system helps us to remove the waste materials from our blood in the form of urine. It is made up of kidneys, ureters, urinary bladder and urethra.

Kidneys

Kidneys are bean-shaped and reddish-brown in colour. They filter the urea as waste from the blood, and maintain water and mineral balance in our body.

Ureters

These are small tubes or ducts, which carry wastes from the kidneys to the urinary bladder.

Urinary Bladder

Urinary bladder is a sac or bag-like structure, which stores urine.

Urethra

This is a small duct, which opens to the outside and excretes the urine from our body.

Ans. 5. **MOVEMENT IN ANIMALS**

All living organisms show some kind of movement. It is a change only in the position of a part of the body, while locomotion involves movement of the whole body from one place to another, like in walking, running, swimming or flying. The movement in the animals occurs for search of food or protection from place-to-place.

Different animals have developed different organs to move. Given below are a few examples.

- (i) An earthworm has strong muscles which help it to move, whereas leech has suckers for movement. During movement, the body of an earthworm alternately expands and contracts with the help of muscles. It moves very short distances in one stroke and therefore, requires repeated movements.
- (ii) Amoeba moves by extending its pseudopodia and paramecium moves with the help of cilia.
- (iii) Most of the insects, like cockroaches, have two pairs of wings along with three pairs of walking appendages. Both these structures help them in movement. The wings help them to fly in the air, while legs are used for walking. Their outer exo-skeleton is also made up of joined parts which helps them in movement.
- (iv) Prawns and crabs have variable number of walking appendages for movement.
- (v) Snails are provided with a muscular foot to slide over the surface.
- (vi) Starfish have tube feet on their arms, which assist them in moving on the surface.
- (vii) Fishes have fins and tail on their body, which helps them to move in water. You have learnt about the adaptations of fishes, which help them to move in water in the earlier chapters.
- (viii) In frogs, hind limbs with webbed feet help in locomotion.
- (ix) Birds use their muscles to move their feathered wings and fly. Their bones are hollow and light for helping them to fly in the air. The bones of their forelimbs are modified as wings, while that of hind limbs are adapted for walking and perching.
- (x) Man uses his hind limbs, while a few animals such as cow, elephant and tiger use

both forelimbs and hind limbs for locomotion.

Ans. 6. **Joints**

Our bones are joined to each other at various places. These places are called joints, just like the pipes are attached to each other at the hinges. The surface of the bones forming the joint is lined with a soft cushion called the cartilage so that the bones do not rub against each other and damage themselves.

Fibrous Joints

They connect the bones without allowing any movement. These are also known as fixed joints; for example, bones of the skull, pelvis and upper jaw. You must have noticed that while eating or yawning, only our lower jaw moves whereas the upper jaw is unable to move.

Synovial Joints

They allow much more movement than cartilaginous joints. These are called so because the cavities between joints are filled with the synovial fluid, which helps to lubricate and protect the bones. There are several types of synovial joints. Let us learn about a few of them.

Hinge Joints :

Hinge joints allow our appendages to move only back and forth; for example, the joints of elbow, knee, etc. These work like the hinges of a door which allow it to move back and forth only.

Ball and Socket Joints :

They allow movement in any direction. Here, the rounded end of one bone fits into the cavity of the other bone; for example, joints of hips and shoulders.

Pivot Joint :

It allows rotation around an axis. For example, the joint found in our neck is a pivot joint. It permits our head to bend forward and backward, and turn to our right or left. Similarly, the joints of forearms where the two bones, radius and ulna, twist around each other are pivotal joints.

H. Do yourself.

A. Tick (✓) the correct option :

- Ans** 1. (a) Translatory motion 2. (b) both translatory and rotatory motion
3. (a) an oscillatory motion

B. Fill in the blanks:

1. An object has to be in **motion** in order to move from one position to another.
2. The metre scale is the simplest device for measuring **lengths** and **distances**.
3. The needle of a sewing machine executes a **oscillatory** and a **translatory** motion.
4. The invention of the **wheel** proved to be a revolution in our means of transportation.
5. An object having **translatory** motion does not necessarily move along straight path.

C. Write 'T' for true and 'F' for false statements:

- Ans** 1. False 2. False 3. True 4. True 5. True

D. Answer the following questions in brief:

- Ans.** 1. State in which a given object keeps on changing its position with time and with respect to its surroundings.
- Ans.** 2. It is said that the invention of wheel created a revolution in the transport.
- Ans.** 3. State in which a given object keeps on changing its position with time and with respect to its surroundings.
State in which a given object does not change its position with time and with respect to its surroundings.
- Ans.** 4. Each centimetre is further subdivided into 10 equal parts or 10 millimetres.

E. Answer the following questions in detail:

- Ans.** 1. A body is said to be at rest, if it does not change its position with time and with respect to a fixed point in its immediate surroundings.
- Ans.** 2. An object keeps on changing its position with respect to its surroundings. This (quite often) causes it to move through some distance. Therefore, we may say:
An object has to be in motion in order to move from one position to another.
- Ans.** 3. **Translatory Motion**
A coconut falling from a tree moves down in a straight line. A child is walking along a road. His head, body, arms, legs and feet are all moving along the same path. An almirah is pushed from one corner of the room to the other. All its sides as well as the top of the box exhibit similar motion and have similar and equal displacements.
An object is said to have translatory motion if all its parts exhibit similar motion and have similar and equal displacement.
An object having a translatory motion does not necessarily move along a straight path. When we draw a line on the black board with a chalk, the chalk has a translatory motion, but the line drawn may be either straight or curved. If the path followed by a moving body is straight, the motion is said to be **rectilinear** and if it is curved, the motion is said to be **curvilinear**.
- Ans.** 4. An object is said to be in rotatory motion if it moves about a fixed axis without changing its position. A familiar example of rotatory motion is that of the blades of a moving fan. The motions of a gramophone record, a spinning top and a potter's wheel are all examples of rotatory motion.

- Ans. 5. When an object keeps on moving along a circular path it is said to be in circulatory motion. When a body is in circular motion, its position changes with time.
- A water ball tied to its elastic string and whirled round in a circle is in circular motion. Its distance from the hand does not change as it moves round and round. This is because this distance is nothing but the (constant) length of the string used. The moon, moving round the earth, and the earth, in turn, moving round the sun are in (nearly) circular motion. In these cases, the distance of the moon from the earth, or of the earth from the sun remains (nearly) constant.
- F. Do yourself.

A. Tick (✓) the correct option :

- Ans** 1. (a) a zinc container and a carbon rod. 2. (a) Voltaic cell
 3. (d) Brass 4. (a) both conductors and insulators

B. Fill in the blanks:

1. The first electric cell was invented by **Vatta**.
2. In a dry cell, the top of the **zinc** container is suitably sealed.
3. Electric **circuit** is a complete closed setup in which the electric current can flow.
4. LEDs are used as an **indicator** in many toys.
5. Metallic wires, graphite, mercury and salt solutions are some of the **conductors**.
6. **insulators** save us from electric shocks and help in preventing electric fires.

C. Write 'T' for true and 'F' for false statements:

- Ans** 1. False 2. False 3. True 4. False
 5. True 6. True

D. Answer the following questions in brief:

- Ans.** 1. The first of these were made by two Italian, Galvani and Volta.
Ans. 2. Electric current is a form of electrical energy which gets converted into heat and light energy when it flows through an electric bulb.
Ans. 3. When there is no current flow in the circuit, we call it an open circuit.
Ans. 4. Save us from electric shocks and help in preventing electric fires. All the electric wires (usually) have a plastic coating on them

E. Answer the following questions in detail:

- Ans.** 1. The torch is an object used when we move on a dark road at night. Its light helps us to find our way. Two cells are used to make a torch work.
 How is it that the torch cells help its bulb to glow? The cells pass an electric current through the torch bulb. This, in turn, heats up its filament and makes the bulb glow.
- Ans.** 2. A dry or Leclanche cell, as shown in figure given below is a zinc container having a moist paste of ammonium chloride. It has a carbon rod fitted with a metal cap and wrapped in a muslin cloth bag, kept in its centre. This muslin cloth bag contains a mixture of powdered coke, graphite, zinc chloride and manganese dioxide. The top of the zinc container is suitably sealed. Metal wires or metal contacts are used to join the carbon rod and the zinc container of the dry cell to the torch bulb or the toy. When the contacts are completed, the bulb glows or the toy starts working.
- Ans.** 3. A dry cell (Leclanche cell) Diagram.
- Ans.** 4. It is necessary to have a setup in which the current flow can be started or stopped as per our requirements. Switches play an important role in such a situation. We use switches to put the bulb or fan 'on' or 'off'. Switches, therefore, are an essential part of an electric circuit. A switch that helps to start and stop the current as per requirement.
- Ans.** 5. A complete electric circuit, therefore, has the following important parts:
1. The source for electric current such as the dry cell.
 2. Connecting electric (metal) wires that carry an electric current from the source (like a dry cell) to the bulb or any other appliance such as a toy.
 3. A switch that helps to start and stop the current as per requirement.

- When there is no current flow in the circuit, we call it an open circuit.
- Ans. 6. Tiny devices known as LEDs (Light Emitting Diodes) which glow when an electric current flows through them. They are widely used in many electronic and electric circuits. Their power consumption is very less and are usually available in red, green and yellow colours.
- Ans. 7.
- Ans. 8. **Conductors** are those materials that (easily) let electric current to flow through them. Metallic wires, graphite, mercury and salt solutions are some of the conduction materials. **Insulators** are those materials that do not let electric current to flow through them. Wood, plastic, rubber, mica, ebonite, bakelite, pure distilled water and air are some of the insulating materials.
- F. Do yourself.

A. Tick (✓) the correct option :

- Ans** 1. (a) the iron clips 2. ()
3. (b) poles 4. (c) Y may either be a magnet or an unmagnetised iron piece.

B. Fill in the blanks:

1. A freely suspended magnet points in **north** direction.
2. **Repulsion** is the only sure test of magnetism.
3. **opposite** poles of a magnet always **attract** each other.
4. The **south** of a freely suspended magnet always points along the north.
5. Usually magnets are available in the shape of a **bar**.

C. Write 'T' for true and 'F' for false statements:

- Ans** 1. False 2. False 3. True 4. True 5. False

D. Answer the following questions in brief:

- Ans.** 1. A bar of iron that (i) attracts small pieces of iron, and (ii) points along north-south direction when suspended freely.
- Ans.** 2. A magnet, as we understand, is a bar of iron possessing the following two properties:
1. It attracts small pieces of iron towards it.
2. It always points in the north-south direction when it is suspended freely.
- Ans.** 3. If a magnet is freely suspended, it always comes to rest with its poles pointing towards the north and the south. One end is the north-seeking pole or the N-pole and the other is the south-seeking pole or the S-pole. We distinguish between the two ends by putting N or a red-coloured dot on the north-seeking pole.
- Ans.** 4. The Earth, behaves like a huge bar magnet. The magnetic south pole of the Earth points towards the geographical north pole of the Earth. Similarly, the magnetic north pole of the Earth points towards the geographical south pole of the Earth. We also know that unlike poles attract each other while like poles repel each other. Therefore, when a bar magnet is suspended freely on Earth, its north pole gets attracted towards the magnetic south pole of the Earth which itself is pointing towards the geographical north pole. Hence, the north pole of a bar magnet points towards the geographical north pole of the Earth and its south pole points towards the geographical south pole of the Earth.
- Ans.** 5. The materials that are easily attracted by a magnet are known as magnetic substances. Materials that are not attracted by a magnet are usually known as non-magnetic substances.

E. Answer the following questions in detail:

- Ans.** 1.

Ans. 2. **POLES OF A MAGNET**

Let us perform an activity to understand about the poles of a magnet.

If a magnet is freely suspended, it always comes to rest with its poles pointing towards the north and the south. One end is the north-seeking pole or the N-pole and the other is the south-seeking pole or the S-pole. We distinguish between the two ends by putting N or a red-coloured dot on the north-seeking pole.

we can conclude that the like poles of two magnets repel each other whereas their unlike poles attract each other.

We may summarise the properties of the magnetic poles as given below:

1. The magnetic poles are two ends of a magnet where its 'power' is the greatest.
 2. The pole of a magnet that always points towards north is its N-pole, while the other pole that always points towards south is its S-pole.
 3. Like poles of two magnets repel whereas their unlike poles attract each other.
- Ans. 3. In a magnetic compass, we use a magnetic needle supported in such a way that it can rotate freely. Its free end that points towards north is marked red. The other directions are marked on a dial kept under the needle.
- Magnetic compasses are of great use to travellers and navigators as they tell them about the direction. The design of a pocket compass and the compass of a ship are shown in the pictures before.
- Ans. 4. A magnet, as we understand, is a bar of iron possessing the following two properties:
1. It attracts small pieces of iron towards it.
 2. It always points in the north-south direction when it is suspended freely
- F. Do yourself.

Chapter - 11

Rain, Thunder And Lightning

A. Tick (✓) the correct option :

- Ans. 1. (a) condensation 2. (d) (a) , (b) and (c)
3. (c) poles 4. (c) Y may either be a magnet or an unmagnetised iron piece.

B. Write 'T' for true and 'F' for false statements:

- Ans. 1. True 2. False 3. True 4. True 5. True

C. Fill in the blanks:

1. Solid ice liquefies to form water when it is **malted**.
2. **Clouds** are accumulation of water vapours in the atmosphere.
3. The water **cycle** in nature helps to maintain the balance of water.
4. Melting and **freezing** can be regarded as the reverse of each other.
5. Safety devices on tall buildings and other structures are called **lightning conductors**.

D. Define the following:

- Ans. 1. Evaporation is the process of conversion of a liquid into its vapour state. It occurs slowly at all times and at all temperatures.
- Ans. 2. Under suitable conditions of atmospheric pressure and temperature, the tiny water droplets of the clouds can combine to form drops. These big water drops fall back on the earth as rain drops.
- Ans. 3. Condensation is the process of conversion of a vapour (or gas) into its liquid state.

E. Match the following:

- | | | |
|---------------|---|---------------------------|
| 1. Boiling | → | (a) Ice to water |
| 2. Melting | → | (b) Water to ice |
| 3. Freezing | → | (c) Water vapour to water |
| 4. Condensing | → | (d) Water to vapours |

F. Answer the following questions in brief:

- Ans. 1. Water exists in three forms— ice, water and water vapour or steam. These are also known as the three states of matter.
- Ans. 2. The process of conversion of a liquid into its solid state is called freezing.
- Ans. 3. A continuous and constant exchange of water between the oceans (and other water bodies), the land and the atmosphere of the earth. This 'to and fro' cyclic exchange is called the water cycle in nature.

G. Answer the following questions in detail:

- Ans. 1. The ice-cube kept in a plate at a room temperature will start melting slowly until it melts completely.
- Ans. 2. It proves that water is getting (slowly) converted into its vapour state all the time. The same is true for other liquids also. This process of (continuous) conversion of a liquid into its vapour state is called evaporation.
- Evaporation depends on the following factors:
- (i) The condition of atmosphere; evaporation is faster in a windy atmosphere.
 - (ii) The temperature of the surroundings; evaporation is faster in hot and warm surroundings.
 - (iii) The dryness of the air; dry air helps in evaporation.
 - (iv) The exposed surface of the wet objects; a larger exposed area enables faster evaporation.
- Ans. 3. The sequence of changes resulting in the formation of clouds broadly occurs as follows:
The water, on and below the surface of the earth, moves into the atmosphere through the process of evaporation and transpiration. A variety of natural mechanisms cool down these water vapours. These cooled down water vapours then condense on dust particles and form very tiny water droplets. Millions and millions of such tiny water droplets suspended in the sky, taken together, form clouds.
Wide variety of factors determine the size of the clouds. Among these, the presence of mountain ranges, rivers, lakes, plants and trees and the season are most important.
- Ans. 4.
1. Water of the oceans, rivers, lakes and other water bodies evaporates under the heat of the sun and moves into the atmosphere. Plants and trees take in water from the soil. The excess water evaporates through their leaves, i.e., through the process of transpiration. We, thus, get water of the oceans (and other water bodies) and land moving into the atmosphere through the processes of evaporation and transpiration.
 2. The water vapours cool down as they move up into tiny water droplets on dust particles and form clouds.
 3. As the conditions suit, these tiny droplets combine to form larger water drops. These larger water drops then fall back onto the earth as rain and snow. We call this process precipitation.
- This process or cycle continues and maintains the balance of water in the oceans, land and

atmosphere. It controls weather patterns, helps the crops to grow and sustains life on our planet.

Ans. 5 The sequence of changes resulting in the formation of clouds broadly occurs as follows:

- (i) The water, on and below the surface of the earth, moves into the atmosphere through the process of evaporation and transpiration. A variety of natural mechanisms cool down these water vapours.
- (ii) These cooled down water vapours then condense on dust particles and form very tiny water droplets. Millions and millions of such tiny water droplets suspended in the sky, taken together, form clouds.

Wide variety of factors determine the size of the clouds. Among these, the presence of mountain ranges, rivers, lakes, plants and trees and the season are most important.

Ans. 6. Most of this water is in the liquid state. In fact, it is the presence of water in liquid form that has played a significant role in the existence and sustenance of life on our planet.

As we know that it is possible to convert water (liquid state) into its solid as well as gaseous state.

When we put water (liquid) in the freezer compartment of a refrigerator, we get ice (solid) after some time. The water of oceans, rivers and lakes gets frozen at places with very cold climates. We also get snowfall and hailstorms (usually) over the mountains, and over the plains during the winter season.

The water also changes its state into steam (gaseous state) when a container of water (liquid) is placed over the flame. Water is also getting converted slowly into vapours (gaseous state) all the time and at all the places.

It shows that water is present not only in its liquid form but also in its solid (ice) as well as its gaseous (vapour) form.

H. Do yourself.

A. Tick (✓) the correct option :

- Ans 1. (c) the colour of the object 2. (a) transparent 3. (d) a piece of wood
 4. (a) a polished surface 5. (d) shows all the three characteristics listed above

B. Write 'T' for true and 'F' for false statements:

- Ans 1. True 2. False 3. True 4. False 5. False

C. Fill in the blanks:

1. Clear glass is a **transparent** material.
2. The shadow region is a region of **no-light**.
3. The image of an object as seen in a **plane mirror** cannot be obtained on a screen.
4. The shadow of an object does not show the details of the **colours** present in the object.
5. The image of an object formed on the screen of a pinhole camera is a **upside down** image.

D. Answer the following questions in brief:

- Ans. 1. Something that enables us to see things around us.
 Ans. 2. A material or an object that allows only some of the light falling on it to pass through it.
 Ans. 3. A material or an object that allows almost all the light falling on it to pass through it.
 Ans. 4. A plane mirror is used in a number of instruments; for example, in a periscope, a kaleidoscope, etc.

E. Answer the following questions in detail:

- Ans. 1. All bodies through which light can pass easily are known as transparent bodies. Glass and air are two well-known transparent bodies.
 Some of substances, which allow a small amount of light to pass through them but we cannot see through them clearly. Such bodies are known as translucent bodies. Frosted glass and waxed paper are simple examples of translucent bodies.
 Substances which do not allow light to pass through them are called opaque. Wood, metals and black paper are some examples of opaque bodies around us.
- Ans. 2. When light falls on a smooth polished surface, it bounces back. This bouncing back of light is called reflection of light.
 All of us know about regular and diffused reflections. Regular reflection is produced by a smooth and well polished surface like a plane mirror. When a parallel beam of light falls on a smooth surface, the reflected rays are received by the eye producing a strong glare.
- Ans. 3. (i) Size can be more or less than that of the object.
 (ii) Does not show any details of the colours present in the objects. It is always black.
 (iii) Does not show any interchange of right and left between the object and its image.
 (iv) Can be obtained on a 'screen', such as a floor, a wall or any other suitable screen.
- Ans. 4. We often see light coming from a source of light. We find that in most of the ordinary situations, light travels in straight lines.
 We have seen above that light travels in straight lines. The phenomenon of light 'travelling in a straight line' is called rectilinear propagation of light. It is interesting, however, to note that light, under special conditions, can bend round the corners or spread out through an opening. We call this property of light diffraction. We observe the 'bending' of light.

Ans. 5. A pinhole camera is a device which forms a photograph-like image of a bright object on a screen. To get an image with this camera, we point the pinhole towards the object. An inverted image of the object is seen on the tracing paper. The object must, of course, be well illuminated. The image formed here is turned upside down because light travels in straight lines. Light from the upper point A of the object passes through the pinhole and strikes at point A' on the screen of the tracing paper. Similarly, light from the lower point B of the object strikes the screen at point B'. The image formed is, therefore, upside down.

Ans. 6. **Image-**

1. Size is same as that of the object.
2. Shows all the details of the colours present in the object.
3. Shows an interchange of right and left (lateral inversion) between the object and its image.
4. Cannot be obtained on a screen. It can only be seen.

Shadow-

1. Size can be more or less than that of the object.
2. Does not show any details of the colours present in the objects. It is always black.
3. Does not show any interchange of right and left between the object and its image.
4. Can be obtained on a 'screen', such as a floor, a wall or any other suitable screen.

F. Do yourself.

Chapter - 13

Importance of Air

A. Tick (✓) the correct option :

Ans 1. (c) atmosphere 2. (a) it has weight and occupies space
3. (a) 480 km. 4. (a) breathing 5. (d) ozone.

B. Write 'T' for true and 'F' for false statements:

Ans 1. True 2. True 3. True 4. False 5. False
6. False 7. True

C. Write the percentage of the following present in the air:

1. 78% 2. 21% 3. 0.9% 4. 0.03%

D. Fill in the blanks:

1. The thickest atmosphere is present upto a height of **16 kms**.
2. Air is a mixture of **gases**.
3. Air occupies **space** and has mass.
4. Two organisms present in the soil are **earthworms and termites**.
5. Air filled tyres make our transport **smoother** and **easy**.
6. We breathe in **oxygen** from the atmosphere.

E. Answer the following questions in brief:

- Ans. 1. There are five layers of our atmosphere.
- Ans. 2. Air is a medium for communication. We hear each other only in the presence of air, as sound waves need air as a medium to travel.
- Ans. 3. Plants take in CO_2 present in the air and release O_2 into the atmosphere. This is used by them to manufacture food by the process of photosynthesis.
- Ans. 4. The remaining 0.03% are the other trace gases.

F. Answer the following questions in detail:

- Ans. 1. Air is a mixture of gases.
- Ans. 2. Living beings need air for breathing.
- (i) All human beings and animals take in oxygen from the atmosphere and release carbon-dioxide (CO_2) during breathing. The presence of oxygen is necessary for our survival. It breaks down food in our body and provides us energy.
 - (ii) On the other hand, plants take in CO_2 present in the air and release O_2 into the atmosphere. This is used by them to manufacture food by the process of photosynthesis.
 - (iii) Organisms that use water as habitat also need O_2 for their survival. In water, O_2 is present in the dissolved form. The animals living in water take up this dissolved oxygen for their sustenance.
 - (iv) Some organisms live in the soil; for example, ants, earthworms, termites, etc. These organisms also require air for their survival. The air trapped between the soil particles is used by them for breathing.
 - (v) We already know that air gets thinner at high altitudes; for example in hill stations, mountains, etc. This causes a difficulty in breathing. Therefore, mountaineers carry cylinders filled with O_2 along with them.
 - (vi) Deep sea divers also carry oxygen cylinders when they go deep into the sea. This is because man cannot breathe O_2 dissolved in the water.
 - (vii) Oxygen is also required and supplied to the patients during operations or breathing problem.
 - (viii) The presence of oxygen is must to burn anything.
- Ans. 3. The envelope of air which surrounds earth is known as atmosphere. The atmosphere of the earth extends, approximately upto 480 km. But the thickest atmosphere is present only upto a height of 16 kms where one can find snow, clouds, rain, etc. As we go higher, the atmosphere gets thinner and thinner, until it merges with the outer space. There are five layers of our atmosphere.
- Ans. 4. 1. Air is a medium for communication. We hear each other only in the presence of air, as sound waves need air as a medium to travel.
2. Wet clothes, food grains, dry fruits and other moist items are dried in the presence

of air. Moving air evaporate the water faster and makes things dry. For example, drying of mopped floor is always faster under a circulating fan.

3. Air gives a cooling effect. It evaporates sweat during summers.
4. Air can be compressed easily. This compressed air is filled in the tyres of our vehicles such as bicycles, scooters, cars, trucks, aeroplanes, etc. The air-filled tyres make our journey smoother and easier.
5. Children love to play with balloons and balls. Can you play with them without inflating them with air? Try it out and give reasons.
6. The brake system of trains also uses compressed air for stopping the train.
7. We burn many things for various purposes. Without air, burning is not possible. The oxygen present in the air supports burning.
8. Air helps in the movement of aircrafts, gliders, parachutes, sailboats, etc.
9. Air acts as a habitat for many animals like birds, bats, insects, etc.
10. Air is used to generate electricity by moving windmills. The windmills are also used to draw water from tubewells and to run flour mills.
11. Air works as a medium in the dispersal of seeds and pollination of flowers.
12. Air filters the sunlight reaching the earth and protects us from heat and harmful radiations.

Ans. 5. **Nitrogen (N_2)**

We have studied that nitrogen (N_2) constitutes 4/5th of the air around us. It does not support burning. Nitrogen is very important for the existence of life on earth as proteins, which are essential for life are made up of nitrogen.

Trace Gases

Some gases like argon and neon are present in the air in trace amounts. Argon is used in electric bulbs, while neon is filled in tubelights. It is also used in display boards for writing.

Water Vapours

They, although present in low concentration, have a big role in our life. Some of them are given below:

1. The growth of plants and animals depends on water vapours.
2. They are an important part of water cycle, which is responsible for producing rain, dew, mist, frost and snow.

Dust and Smoke

Air also contains fine dust particles and smoke released by the burning of fuel. These are harmful for living organisms. They put adverse effect on their well-being.

Ans. 6. Take a glass tumbler. Fill about half of it with water. Add a few cubes of ice to it. Observe the glass. What do you see?

Tiny drops of water appear on the outer surface of the glass.

Why?

Because air contains water vapours, which condense and form water droplets.

G. Do yourself.

(A) Tick (✓) the correct option:

Ans. 1. (d) 2. (d) 3. (c) 4. (d)

(B) Fill in the blanks :

Ans. 1. Green plants
2. Starch
3. Stomata
4. Saprophytic
5. haustorium
6. Lichens mycorrhiza
7. Light, dark
8. Nepenthes

(C) Answer the following questions in brief :

Ans. 1. Chlorophyll is the green pigment present in green leaves which takes part in the process of photosynthesis.

2. There are two reactions are involved in the process of photosynthesis, the first one is light reaction in which light plays an important role, on the other hand second stage is light independent and hence called dark reaction.

3. The phenomenon of providing nutrients to the body is called nutrition.

4. Micro elements are those elements which a plant requires in a large amount such as carbon dioxide, hydrogen, oxygen, sodium, etc., while micro elements are those elements which are needed by plants in small quantities such as zinc, manganese, copper, etc.

5. Blue and red region of visible light are most effective for photosynthesis.

6. Various requirements of green plants during photosynthesis includes the presence of green pigment called chlorophyll, presence of sunlight, carbon dioxide obtained from environment through the stomata in their leaves, and water and minerals obtained or absorbed through their roots

7. Role of leaf in photosynthesis is very important as the green pigment chlorophyll is present mainly in the cell organelles, known as plastids. Leaves also contains small core like structures called stomata present on lower surface of the leaves from where carbon dioxide enters.

8. Autotrophic nutrition or holophytic nutrition is a type of nutrition where organisms are capable of synthesising their own food from simple inorganic raw materials known as autotrophs.

(D) Answer the following questions in detail :

- Ans. 1. Heterotrophic nutrition as carried out by those organisms who cannot make their own food and are dependent on autotrophs for their nutrition. Certain non-green plants for such as fungi, bacteria and some other plants failed to synthesise their own food. These plants are thus dependent on some of other external sources for their nutrition. There are 4 types of heterotrophic nutrition plants:
- Parasites: the plants which obtain their nutrition from other living plants are known as parasites. They derive their nutrition from other plants called course by means of special roads called haustorium. Hey it enters the host cells and absorbed food, water minerals from then. For example mistletoe, rafflesia, etc.
 - Saprophytic plants: are those plants which grow and live on dead and decaying organic matter of animals and plants. Many bacteria and Fungi have this mode of nutrition. They do not contain pigment name chlorophyll, so cannot obtain their nutrition from photosynthesis.
 - Symbionts: hey refers to a partnership of 2 dissimilar or different organisms in which both are mutually benefited each partner in a symbiotic association is called a symbiosis for example lichens and rhizobium.
 - Insectivorous plants: most of the green plants derived their nitrogen from the soil. In certain areas where soil is deficient inserted nutrients common plants obtain their nutrients from outside sources. The plants which obtain their nutrients by capturing other insects are called insectivorous or carnivorous plants. These plants usually grow in water logged and swampy soils which are deficient in nitrogenous compounds. They overcome deficiency by catching small insects and digesting them. Their leaves are specially modified for this purpose. For example, Venus fly trap, bladderwort, etc.
2. a) Symbionts: one example of this category is lichens which are an association of algae and fungi which left together. In this stage elgi partner manufactures food and acts as autotroph. The food supplied to fungal partner, which intern absorbs water and minerals from the soil for the autotrophs. Another common example is an association between leguminous plants like trees and nitrogen fixing bacteria Rhizobium. The

bacteria convert atmospheric nitrogen into usable forms, that is ammonia, which is used by plants.

b) insectivorous plant includes pitcher plant where the leaf is modified to form a picture. The apex form lid and patios become like tendering. The mouth of picture contains nectar secreting glands to attract insects. The picture has here inside it, directed downwards. Another example is sundew or drosera which contains tentacles on leaves that secrets us sticky fluid. The drops of fluid shine in sun like dew drops hence named Sundew. Insects are attracted towards these drops. 3rd example is bladderwort hey that helps lender leaves which contains pear shaped bladder. Organisms move close to bladder and stimulate air around its entrance. Another example of insectivorous plant is Venus flytrap that also traps insects from its body fied leaves. The trap of the Venus fly trap is a highly modified leaf on the inner surface there are short commerce stiff hair. When anything touches this hair enough to bend them, the 2 loads of the leaves snapchat in less than a second.

c) some examples of parasites include rafflesia, cuscutta, mistletoe, etc.

d) some examples of saprophytic plants include Indian pie, bird nest orchid, coral roots, mushrooms, etc.

3. If we cover the leaves of green plants with oil, the pores of the stomata which are useful for the exchange of gases from the atmosphere are covered with oil. When the pores of the leaves are covered by oil medallist failed to carry out photosynthesis. The plant therefore cannot prepare its own food through leaves.
4. The saprophytic are the organisms which feed on the dead and decaying matter in the ecosystem. These organisms along with the microbes help in the decomposition of the dead plants and the animals. This decomposition is necessary as it is one of the paths of the recycling of the nutrients. These nutrients which are recycled enter the ecosystem and can be used by the plants and the animals again. Thereby, the activity of the saprophytes and the decomposers help to maintain the ecological balance.
5. If the plant sheds its leaves when it was kept in a dark room for 2 long that is because due to the absence of light, plant is unable to carry out photosynthesis and chlorophyll present in their leaves get destroyed that gives a peel colour to the leaves. Due to the absence of nutrition, it will gradually become week leading to shedding of leaves and ultimately death of the plant.

2.

Nutrition in Animals

(A) Tick (✓) the correct option :

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

(B) Fill in the blanks :

Ans. 1. Mouth
2. Milk teeth and permanent teeth
3. Liver
4. Plaque
5. Peristalsis
6. Gastric juice, digestive juice, mucus and acid
7. Fatty acids and glycerol
8. Abomasum

(C) Match the following :

Ans.	Column 'A'	Column 'B'
1.	Liver	a. Omasum
2.	Small intestine	b. Pseudopodia
3.	Stomach	c. Bile juice secretion
4.	Salivary gland	d. Release of faeces
5.	Rectum	e. Absorption
6.	Large intestine	f. Secretion of saliva
7.	Amoeba	g. Tongue
8.	Buffalo	h. Digestion is completed
9.	Taste	i. Food vacuole
10.	Villi	j. Absorption of water and salts.

(D) Write 'T' for true and 'F' for false statement :

Ans. 1. True 2. True 3. False 4. False 5. False 6. False 7. False
8. True

(E) Answer the following questions in brief :

Ans. 1. Holozoic nutrition is the process of obtaining nutrition by taking in complex food matter.
2. Tongue helps to turn the food inside the mouth so as to facilitate mastication or chewing.

3. Digestive glands are liver, gallbladder and pancreas. Liver secretes bile juice stored in gall bladder. Role of gallbladder is that when food reaches the small intestine the gallbladder releases the bile juice. Pancreas secretes pancreatic juice to act upon carbohydrates, proteins and fats.
4. When we do not clean our teeth regularly and consume sweets and chocolates, the food particles, saliva and bacteria deposit on our teeth forming a yellowish film known as plaque. To maintain oral hygiene we should brush our teeth regularly twice a day with fluoride toothbrush, avoid eating too much sweets, chocolates and ice creams, do not try to break hard materials with teeth, avoid drinking too much hot or cold drinks and we should eat a lot of vegetables and fruits rich in minerals and vitamins.
5. Milk teeth or the temporary teeth set as found in the children of the age group of 6 months to 8 years, they are 20 in number, 10 in upper jaw and 10 in lower jaw. Permanent teeth grow after the shedding of milk teeth and they are 32 in number, they cannot be replaced by new natural teeth and they also shed but in old age or due to some dental disease.
6. Bile juice has 3 main functions:
 - It emulsifies fat into smaller ones and makes their digestion easier.
 - It makes the medium in the stomach alkaline as pancreatic enzymes can act only in alkaline medium.
 - It prevents the drawing up of the food.
7. The inner wall of the small intestine has millions of small finger-like projections called the villi, which are very thin walls and are ideal structure for absorption. They're ideal structure because they increase the surface area for absorption of the digested food.
8. Phagocytosis is a complete enclosure and ingestion of food through food vacuole, while exocytosis is the fusion of secretory vesicles with the plasma membrane and results in the discharge of vesicle content into the extra cellular space and the incorporation of new proteins and lipids into the plasma membrane.

(F) Answer the following questions in detail :

- Ans. 1. There are various steps that are involved in the process of nutrition:
- Ingestion: the act of getting and eating food collectively is called ingestion.
 - Digestion: the breakdown of food into simple and soluble molecules inside the body is called digestion.
 - Absorption: the process by which soluble molecules present in the digested food pass into the body fluid like blood is called absorption.
 - Assimilation: the process in which absorbed food is used for producing energy and growth is called assimilation.

- Egestion: the process by which the undigested food materials are removed from the body is called egestion.
- 2. We have 32 teeth in our mouth that are permanent. There are 4 types of teeth in our mouth:
 - Incisors: they are present in the front part of both the jaws. They are used for biting and cutting down food. They are 8 number, 4 in each jaw.
 - Canines: they are present on either side of the incisors period they are sharp and pointed and thus help in tearing the food period they are four in number.
 - Premolars: these teeth are present at the back of the mouth and are used for crushing and grinding the food. There are 8 premolars in the human mouth.
 - Molars: molars are large back teeth having a wide grinding surface and are used primarily to chew food. Humans have 12 molars.
- 3. in the book
- 4. There are different parts in the Alimentary canal:
 - Mouth: is the first organ of the alimentary canal. We enjoyed food with the help of the mouth. Digestion, the second step of nutrition begins in the mouth only. The opening of the mouth is bounded by 2 fleshy structures called lips.
 - Tongue: helps to turn the food inside the mouth so as to facilitate mastication or chewing. It is a muscular organ. That term was so has taste buds which helps to sense the taste.
 - Teeth: plays an important role in starting the process of digestion. They help us to cut and chew the food. There are 4 different types of teeth comb different in number and different in animals.
 - Salivary glands: are oral cavity receives secretion from 3 pairs of salivary gland called parotid gland, sub mandibular gland and sublingual gland. They produce a watery secretion called saliva. The saliva helps in mixing the food with the help of tongue.
 - Oesophagus: is also known as food pipe, is a hollow tube made up of muscles. It connects the mouth cavity to stomach. It uses rhythmic wavelike movements called peristalsis to move the food from mouth to stomach. This movement takes place throughout the Alimentary canal.
 - Stomach: is a thick walled, muscular bag located in the upper abdomen. It is the widest part of Alimentary canal. It is C shaped and is connected to one end to oesophagus and other end to the small intestine. Its secrets gastric juice that consists of digestive juice, mucus and acid.

- Small intestine: is highly coiled and is about 7.5 metre in length. It is the most important part of alimentary canal as the process of digestion is completed in it. The small intestine receives secretion from liver and pancreas as well as food from stomach.
 - Liver: is the largest, reddish-brown gland situated in the upper part of the abdomen on the right side. It secretes bile juice that is stored in a sac like structure called the gall bladder.
 - Pancreas: is a large, cream coloured gland located just below the stomach. It secretes pancreatic juice and releases it into intestine. Pancreatic juice contains all the 3 types of enzymes that can act upon carbohydrates, proteins and fats, respectively.
 - Large intestine: is an approximately 1.5-metre-long tube that has no digestive function. The undigested food known as waste, moves from the small intestine to the large intestine. The large intestine removes most of the water from the waste by absorption.
5. The process of absorption in the small intestine takes place as the inner wall of the small intestine has millions of finger-like projections called the villi. The villi have very thin walls and have ideal structure for absorption. The villi increase the surface area for absorption of the digested food. The villi have a network of very fine, thin and small blood vessels called capillaries. It absorbs digested soluble food products through their wall and passes them to the capillaries. The blood vessel distributes these food materials to different organs of the body. Organs use the substances to build the complex substances such as protein required by the body. This is called assimilation. Another important process that takes place in our body is in the large intestine when the almost solid wet waste is sent to the rectum after absorption. The wet solid waste called faeces leaves the body through anus. The process of throwing the solid waste out of the body is called egestion or defecation.
6. Amoeba are unicellular and live in water. They still contain cytoplasm and nucleus. Amoeba obtains nutrition like any other animal. Nutrition involving engulfment of the whole or part of the plant or an animal is called holozoic nutrition. In amoeba digestion is very simple and direct. When prey is engulfed, enzymes are released into the food vacuole. Enzymes come along with digestive juices break down the food forming a solution.

7. Ruminants are herbivorous animals that eat grass. Grass-eating animals include cows, goats, and buffaloes. These animals swiftly consume grass and store it in a rumen-like structure. Rumen is a four-chambered stomach that forms the first stomach. Food is largely digested in this area, which is referred to as the cud. Cellulose is a complex structure that the rumen breaks down into smaller pieces. Rumination is the process of cud returning to the mouth in little lumps for ruminants to eat. Some of the ruminants are as follows:

1. Deer
2. Goat
3. Zebra
4. Sheep
5. Horse
6. Buffalo

Ruminants, like humans, have a well-developed digestive system. The parts of a grass-eating animal's digestive tract are as follows:

Mouth

Ruminants' mouths are designed for grazing. Ruminants have 32 teeth as adults. There are eight incisors in the lower jaw, three premolars on both sides of the upper and lower jaw (12). Ruminants have a powerful tongue that makes it easier to tear grasses from the ground.

Oesophagus

It's a muscular tube that's usually separated into three sections: cervical, thoracic, and abdominal. In ruminants, the oesophagus is made up of striated muscles that allow food to travel in both directions.

Stomach

The stomach of a ruminant is separated into four parts: the Rumen, Reticulum, Omasum, and Abomasum.

- The rumen, which is made up of numerous sacs, is the largest section of the stomach. Ruminants use it as a food source as well
- Closer to the heart is the reticulum, which is a bag-like structure
- Omasum is a globe-shaped structure that is responsible for food absorption
- The digestive glands line the abomasum, which is the last section of the stomach. The abomasum is similar to a human stomach.

Small intestine

The duodenum, jejunum, and ileum are the three sections of this long, highly coiled tubular structure. It is the location where food is digested and absorbed. The small intestine's inner wall is comparable to that of humans. It has many inward foldings called villi that help with food absorption

By spilling their secretions into the small intestine, the pancreas and gallbladder aid in the digestion of food within the small intestine.

The caecum is the point where the small and big intestines meet.

Large intestine

It is the section of the digestive tract at the conclusion of which undigested food is passed for evacuation. The absorption of water from undigested food is the focus of this section.

The grass that animals eat contains cellulose, which is a sort of carbohydrate, and the grass is abundant with cellulose, thus the animals employ the rumination process to digest it. Grass-eating animals have microorganisms that break down and digest the cellulose. Many animals are unable to digest cellulose because their digestive systems are incapable of doing so.

3

Heat

(A) Tick (✓) the correct option :

- Ans. 1. (a) 2. (d) 3. (c) 4. (d) 5. (d) 6. (a)
7. (a) 8. (a) 9. (b) 10. (b)

(B) Fill in the blanks :

- Ans. 1. Temperature
2. Dull and black
3. Insulators
4. Mercury
5. Higher temperature, lower temperature
6. Convection
7. Best, good
8. White

(C) Match the following :

Ans.	Column 'A'		Column 'B'
1.	Temperature	→	a. Clinical thermometer
2.	Metals	→	b. During winter
3.	Mercury	→	c. During summer
4.	Dark clothes are preferred	→	d. Ideal liquid for thermometer
5.	White clothes are preferred	→	e. Temperature scale
6.	Kink	→	f. During day
7.	Celsius	→	g. Conductors
8.	Land breeze blows	→	h. During night
9.	Sea breeze blows	→	i. Degree of hotness and coldness.

(D) Write 'T' for true and 'F' for false statement :

- | | | | | | |
|------|----------|----------|----------|----------|---------|
| Ans. | 1. False | 2. False | 3. True | 4. true | 5. True |
| | 6. True | 7. true | 8. false | 9. False | |

(E) Answer the following questions in brief :

- Ans.
- Heat is a form of energy that gives us the sensation of warmth.
 - Clinical thermometer is an instrument that is used by doctors to measure the temperature of human body.
 - Mercury is an ideal liquid for thermometer because it is a shiny liquid metal that can be easily seen it does not stick to the glass, it expands and contracts uniformly, and has a wide temperature range between -39 degrees Celsius to 357 degrees Celsius.
 - A kink in a clinical thermometer prevents the mercury level from falling. In the absence of kink, the mercury level would fall when we take the thermometer out of the mouth.
 - Thermal equilibrium is a process when a warm object is placed close to a cooler body thermal energy moves from hotter objects to the cooler one until both the objects reach the same temperature. This is known as thermal equilibrium.
 - The conditions that are required for the process of conduction are:
 - The two objects should be in direct contact
 - Temperature difference should be there.
 - We wear woollen clothes that are dark or black in colour so that they can absorb more heat and keep us warm during winters. Woollen clothes keeps us warm during winter as they contain tiny pockets of trapped air to

prevent transfer of heat. Due to this trapped air the woollen clothes do not allow our body heat to escape to the surroundings during winters. Wool is a poor conductor of heat.

(F) Answer the following questions in detail :

- Ans. 1. Thermometer is an instrument used for measuring temperature. The most familiar and commonly used thermometers are mercury thermometers. There are 2 types of thermometers, the mercury thermometer and clinical thermometer. The mercury thermometer is a glass tube of narrow bore with a wider bulb like portion containing mercury at the bottom. It is used to measure temperature of our body. On the other hand, clinical thermometer has a narrow construction of the capillary tube just above the bulb. When the mercury expands, it pushes through the construction, but when it is taken out of the patient's mouth, mercury does not go back to the bulb. In this thermometer we use Celsius scale indicated by degree C. A clinical thermometer reads temperature from 35 degrees Celsius to 42 degrees Celsius.
2. The temperature of every person may not be 37 degrees Celsius. It could be slightly higher or slightly lower. Actually, normal temperature is the average body temperature of a large number of healthy persons. There are several precautions that need to be taken while reading a clinical thermometer:
- Thermometer should be washed before and after use, with an antiseptic solution.
 - Check that mercury level is below 35 degrees C before using.
 - Handle the thermometer carefully.
 - Read the thermometer by keeping mercury level along the line of sight.
 - Bulb is delicate, so don't hold the thermometer by the bulb while reading it.
3. There are different processes that are involved in the transfer of heat. They are:
- Conduction: it is the process of heat transfer from one end (hotter end) to the other end which is cold without actual displacement of the atoms or particles. Similarly, heat is passed from atom to atom in solids. Solids the constituent particle molecules are very closely packed and vibrate at their mean position and start vibrating faster when the flame or the heat source comes in contact. Day in turn, pass the vibration on to their neighbouring molecules even farther away from the flames and so on in this manner heat energy is passed from one molecule to the next, without its actual displacement.

- Convection: is a mode of heat transfer in which heat energy is carried from one part to the other by the actual movement of molecules or the atoms of the medium. Convection takes place in liquids and gases, because the atoms are particles are more loosely packed than those in solids.

Radiation: is a phenomenon of heat transfer that does not involve any contact between the heat source and the heated object. The transfer from the hot body to a cold body having no contact between them and without the help of any medium is called radiation. The rate at which an object radiates or absorbs heat by radiation depends on its temperature and nature of its surface.

4. All metals do not allow heat to pass through them with equal ease. The materials which allow heat to flow through them easily are called good conductors of heat all metals and alloys are good conductors of heat for example silver copper, iron brass, and aluminium. The materials which do not allow heat to flow through them easily are called poor conductors of heat, for example, water, air and glass. They are called insulators wood, straw, clay, rubber and Bakelite.

- Good conductors of heat like metals and their alloys are used for making cooking utensils to conduct heat.
- Bad conductors of heat are used for making handles of the cooking utensils, so that hot utensils can be lifted easily.
- Poor conductors or insulators of heat such as bricks, asbestos, sheets, mud, EC. Are used in house building, as they do not allow heat from outside to enter the house during summer. In winters, these materials do not allow heat from inside to go out.
- Insulator suggest big light dry wood, EC. Used for making handles of electric iron and cookware.

Woollen clothes keeps us warm during winter as they contain tiny pockets of trapped air to prevent transfer of heat. Due to this trapped air the woollen clothes do not allow our body heat to escape to the surroundings during winters. Wool is a poor conductor of heat.

5. Convection current in coastal areas means that during the daytime wind blows from sea to land but while during the night wind blows from land to sea. During the daytime the sun shines equally over land and sea. But the land gets heated up quickly in comparison to sea water, as the land is a better conductor air above the land also gets heated and rises up as a result, the pressure above the land surface decreases in comparison to the

pressure over sea water surface period since the air blows from the higher pressure to the lower pressure, the heavier cold air from the sea blows towards the land and causes the sea breeze. After sunset, land loses heat faster than the sea water. So, air over the sea is warmer at night. The air over the sea being warmer rises up to takes its place, cooler air from the land starts moving towards the sea. The convection current from the land to the sea is called land breeze. The above phenomenon takes place due to the process of convection.

6. A thermos flask is used to keep hot or cold liquid in it without any transfer of heat energy. A thermos flask is made up of glass. This flask is doubled layered with vacuum between the 2 layers. The shiny commerce silvered and smooth glass walls reduce heat energy by radiation. The container is kept in an outer case of insulating material. The vacuum restricts the heat transfer due to convection and conduction. The shiny surface reduces energy gain or loss by radiation and the outer insulation prevents the conduction of heat further. The cork or plastic stopper is a poor conductor of heat and it prevents loss by convection and evaporation in the air above the surface of liquid.

4

Acids, Basesb and Salts

(A) Tick (✓) the correct option :

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

(B) Write 'T' for true and 'F' for false statements :

- Ans. 1. False 2. True 3. True 4. True 5. False
6. True 7. False 8. True 9. True 10. False

(C) Fill in the blanks :

- Ans. 1. Corrosive
2. Tartaric acid, Malic
3. Hydrofluoric acids
4. Acetic acid
5. Alkalis
6. Sodium hydroxide
7. Acidity control
8. Calamine

(D) Match the following :

Ans.	Column 'A'		Column 'B'
1.	Critic acid	→	a. Vinegar
2.	Lactic acid	→	b. Ant sing
3.	Formic acid	→	c. Grapes
4.	Tartaric acid	→	d. Lemon juice
5.	Acetic acid	→	e. Sour milk

(E) Classify the following substances as acids, bases and / or neutrals.

Ans. **Acids:** orange juice, lemon juice, sour milk, wine

Base: milk of magnesia, toothpaste,

Neutral: Common salt, pure water,

(F) Answer the following questions in brief :

- Ans.
1. Acids are the naturally occurring or artificially prepared substance that tastes sour, why basis are the substances that have bitter taste and are soapy to touch.
 2. The litmus paper is obtained by lichens and when the litmus paper is added to an acidic solution it turns red, while added to a basic solution, it turns blue.
 3. Distilled water is neutral, which means it is neither acidic nor basic. By using blue and red litmus paper, the neutral nature of distilled water can be confirmed. Since the distilled water is neutral, it won't have any effect on the colour of the litmus paper, whether it is blue or red.
 4. Neutralization is a process when the substance is are neither acidic nor basic in nature for stop a neutral substance does not change the colour of any indicator 4 stop the reaction between an acid and a base to form salts and water with evolution of heat is called neutralization reaction 4 stop for example when an aunt or a bee stinks we use a neutralised solution known as calamine solution containing zinc carbonate to minimise the effect of the sting.
 5. If a stripe of blue litmus paper dipped in a solution remains blue it needs at the solution is neutral in nature as it do not change the colour of the blue litmus paper.
 6. Calcium hydroxide or slaked lime s added to the soil to reduce its acidity

7. Milkman add baking soda to fresh milk because baking soda is basic in nature and neutralises the lactic acid that is produced by the bacteria and thus prevents curdling of milk.
8. A Calamine solution is applied on the skin when a bee or an ant stings in order to neutralise the acetic liquid injected by the insect into the skin known as the formic acid.

(G) Answer the following questions in detail :

- Ans. 1. Acids are the naturally occurring or artificially prepared substances that taste sour for example, vinegar, curd, lemon mangoes, apple, and tamarind. There are two types of acids:
- Organic acids or natural acids: the acids present in the organic matter that is in animal and plant materials are organic acids. These acids are weak acids. For example hydrochloric acid is found in our stomach, tartaric acid is found in grapes and tamarind and citric acid is found in lemons and oranges.
 - Mineral acids: some acids are prepared from the minerals present in the earth's crust. For example, sulfuric acid, hydrochloric acid common nitric acid and phosphoric acid. Mineral acids are highly corrosive in nature and may cause severe burns on the skin if handled carelessly with bare hands or tasted. These acids are stored in glass bottles as they do not cause any damage to them.
2. There are different types of uses of acid in our daily life:
- Sulfuric acid: is used in car batteries preparation of paints drugs, dyes and artificial silk, and is also used to produce fertilizers and petroleum refining industries.
 - Hydrochloric acid: is used in purification of common salt, textile industries as bleaching agent, to clean stains from sanitary wares, and also used for removing deposits from inside boilers.
 - Nitric acid: is used in the manufacturing of explosives such as TNT and nitroglycerin, in preparing fertilizers such as ammonium nitrate, also used in making drugs, dyes and paints, and also by goldsmiths for cleaning gold and silver ornaments.
 - Acetic acid: is used in vinegar as a flavouring agent of certain food, as a preservative in pickles, used as a cleansing agent in products men for cleaning windows floors, utensils, and also used to stop the development of and to fix the image of photographic films.

3. Bases are the substances that have bitter taste and are soapy to touch. There are several uses of bases in our daily life:
 - Calcium hydroxide or slaked lime: is used as an ingredient in white wash and mortar, in the tanning industries for neutralization of extra acid, in the improvement of acidic soil, and is used in the preparation of dry mixes for painting and decorating
 - Magnesium hydroxide: also known as milk of magnesia, is an acid and helps in controlling excess acidity in the stomach.
 - Sodium hydroxide: is commonly known as caustic soda, is used in the manufacturing of soaps, to unblock drains at homes, manufacturing of paper textiles and detergents, and is also used in soft drink processing and technique of ice cream.
4. An indicator is a substance that is mainly extracted from the plants. They are special type of substances used to test whether a substance is acidic or basic. Indicators change their colour when added to a solution of an acid or a base. There are natural indicators that are used for the process of testing, such as:
 - Litmus: is the most common indicator and is extracted from lichens. It has a mauve colour in distilled water, when added to an acidic solution it turns red and when added to a basic solution it turns blue. Litmus can be used either in the form of a solution or in the form of paper. It is available in blue and red forms. The blue form of litmus turns red in acidic solution while the red form of litmus turns blue in basic solutions and when the litmus doesn't change their colour in solution they are known as neutral substances.
 - Turmeric: is a rhizome of the ginger family commonly used as a spice in curries and for dyeing. When we wash a turmeric stain on a piece of cloth it turns reddish brown when it is washed with soap because soap is basic in nature and bases turn turmeric solution from yellow to reddish brown.
 - China rose is another natural indicator found commonly in gardens and is also known as garden rose. The colour of China rose indicator turns from pink to dark pink or magenta in acidic, and from pink to green in basic solution.
5. The substances which are neither acidic nor basic are called neutral substances as they do not change the colour of any indicator. When an acidic solution is mixed with basic solution both the solutions neutralise the effect of each other. For example when sodium hydroxide is added to hydrochloric acid sodium chloride and water are obtained.



6. The process of neutralization is used in everyday life:
- In digestion: the stomach wall secretes gastric juice having hydrochloric acid as it helps in digestion of food. When we eat irregularly and skip meals, hydrochloric acid present in the stomach causes indigestion which is sometimes very painful and can cause ulcers in stomach. To relieve indigestion we take entire acid such as milk of magnesia which contains magnesium hydroxide for example Eno salt.
 - Ant bite: When an ant or a beast stings it injects the acidic liquid into the skin named as formic acid. Lasting effect is neutralised by rubbing calamine solution containing zinc carbonate or moist baking soda.
 - Soil treatment: as most plants grow best in neutral solution excessive use of chemical fertilizers makes the soil acidic. If the soil is too acidic or too basic the plants grow badly or not at all. Usually, bases like quick lime, slaked lime, or shock are added. If the soil is too basic, organic matter is added to it.
 - Factory waste: liquid waste from factories often contains acid and if it reaches water bodies the acids will kill aquatic lives. These wastes are neutralised by adding basic substances like slaked lime.
 - Tooth decay: as we know that tooth enamel is the hardest substance present in the body which is made up of calcium phosphate. It does not dissolve in water but gets decayed in the presence of acid. The bacteria in the mouth acts on sugar to produce acids which soften the enamel. This can be overcome by brushing teeth regularly with toothpaste which are acidic or basic in nature. Toothpaste neutralises excess of acid and thus prevents tooth decay.
 - Milk preservation: as in summers if milk is not refrigerated it becomes sour due to the presence of bacteria in the milk. This bacterium produces lactic acid, which curdles the milk. To prevent the milk from spoiling milkmen add a very small amount of baking soda to the fresh milk, as the baking soda is basic in nature it neutralises the lactic acid and thus prevents the curdling of milk.

5. Physical & Chemical Changes

(A) Tick (✓) the correct option :

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

(B) Fill in the blanks:

- Ans. 1. Sodium hydrogen carbonate
2. Chromium zinc or iron
3. Chemical
4. Rust
5. Reversible, permanent
6. Calcium carbonate
7. Galvanization, electroplating
8. Iron, chromium, nickel
9. Sulfuric acid

(C) Write 'T' for true and 'F' for false statements :

- Ans. 1. False 2. True 3. False 4. False 5. True 6. False
7. False

(D) Answer the following questions in brief :

- Ans. 1. Physical changes change in the physical properties of a substance. It is a reversible change.
2. Rusting is a process in which a layer of reddish brown (hydrated iron oxide) is formed on iron articles when exposed to moist air.
3. Chemical change is an irreversible change in which the physical properties as well as the composition of a substance changes.
4. Ozone layer is present in the upper part of the atmosphere, and protects us from the potentially damaging ultraviolet rays which comes from the sun. Ozone layer is present in regions ranging from 10 kilometres to 50 kilometre above the earth surface. Ozone is produced from ultraviolet radiations in the following manner:
$$O_2 \xrightarrow{\text{UV Rays}} 2O$$
5. Physical changes: melting of wax,
Chemical changes: digestion, charring of sugar, photosynthesis, burning of coal, setting of curd
6. Stainless steel is used to make cooking wear because it is an alloy of iron, nickel and chromium that do not stain, corrode, or rust as easily as steel. It is also known as corrosion resistance steel
7. Salt is obtained from sea water because the sea water is salty and when the water from the seas evaporates, the salts are left behind. The easiest and cheapest source of sodium chloride is seawater. Along coastal areas, large and shallow pits are dug and sea water is collected in them. The heat of the sun evaporates the water and the salts remain behind gets crystallised. These crystals are recovered redissolved in water and filtered to remove the impurities.

8. The 2 essential conditions for rusting of iron includes direct contact with moist air of iron particles and not mixing the iron particles with corrosion resistant materials also known as alloys.
9. When the magnesium metal burns it reacts with oxygen found in the air to form Magnesium Oxide. A compound is a material in which atoms of different elements are bonded to one another. Oxygen and magnesium combine in a chemical reaction to form this compound.
10. An alloy is a homogeneous mixture of 2 or more elements out of which one is a metal.

(E) Answer the following questions in detail :

- Ans.
1. Displacement reaction is a type of a chemical reaction in which more the reactive metal displaces the less reactive metal from its solution. For example, if an object moves relative to a reference frame—for example, if a professor moves to the right relative to a whiteboard, or a passenger moves toward the rear of an airplane—then the object's position changes. This change in position is known as displacement.
 2. Rusting of iron is a process in which a layer of reddish-brown hydrated iron oxide is formed on iron articles when exposed to moist air. The rusting of iron is a chemical change because it is two substances reacting together to make a new substance. When iron rusts, iron molecules react with oxygen molecules to make a compound called iron oxide. The rusting of iron is an example of a redox or oxidation-reduction reaction. In the rusting process, iron is used to combine with oxygen in the presence of water. It is an example of an oxidation reaction where oxygen acts as an oxidising agent.
 3. Some characteristics of physical changes are:
 - During the physical change, only physical properties of the substance changes, such as colour, shape, size, taste and smell.
 - In case of physical changes, the composition of the substance remains unchanged that is no new substances with different set of properties are formed.
 - Physical changes are temporary and reversible that is a physical change can be reversed.
 - No or very small amount of energy is either absorbed or evolved during a physical change.

Some characteristics of chemical change are:

- Involve changes in physical properties as well as in the composition of the substances that is new substances with new properties are formed.
- Colour change in smell change is produced.
- They are permanent in irreversible changes.
- These changes may be accompanied by the evolution or absorption of heat and light. Also, sometimes hissing sound may be heard.
- These changes also involve the evolution of a gas or formation of a solid precipitate along with colour change, smell and physical state change.

4. There are 2 different methods that can be helpful in preventing the iron articles from rusting:

a. avoiding direct contact with air and moisture:

- Applying Greece an oil on the exposed parts of iron articles.
- Painting the surface of an iron article.
- Depositing a layer of a metal like chromium zinc or iron. This process of depositing a layer of zinc on iron is called galvanization.
- The iron pipes supplying water are coated with zinc are called GI pipe for galvanised iron pipes to protect iron from rusting.
- Electroplating the surface of iron articles with metals which are not attacked by atmospheric moisture for example, the bicycle shining parts are coated with chromium.

b. By alloying:

- Iron when mixed with certain corrosion resistant materials and metals, forms alloys which are resistant to rusting.
- Stainless steel is an alloy of iron nickel and chromium and do not stain crore or rust as easily as steel. It is also known as corrosion resistance steal.

5.	Physical Change	Chemical Change
	1. When a substance undergoes a physical change, its composition remains the same despite its molecules being rearranged.	When a substance undergoes a chemical change, its molecular composition is changed entirely. Thus, chemical changes involve the formation of new substances.
	2. Physical change is a temporary change.	A chemical change is a permanent change

3. A Physical change affects only physical properties i.e. shape, size, etc.	Chemical change both physical and chemical properties of the substance including its composition
4. A physical change involves very little to no absorption of energy.	During a chemical reaction, absorption and evolution of energy take place.
5. Some examples of physical change are freezing of water, melting of wax, boiling of water, etc.	A few examples of chemical change are digestion of food, burning of coal, rusting, etc.
6. Generally, physical changes do not involve the production of energy.	Chemical changes usually involve the production of energy (which can be in the form of heat, light, sound, etc.)
7. In a physical change, no new substance is formed.	A chemical change is always accompanied by one or more new substance(s).
8. Physical change is easily reversible i.e original substance can be recovered.	Chemical changes are irreversible i.e. original substance cannot be recovered.

6. When baking soda (Sodium bicarbonate) is mixed with lemon juice(citric acid), bubbles are formed. These bubbles are formed due to the evolution of carbon dioxide gas. This is a chemical change.
7. Crystallization is a process of obtaining pure crystals of a substance from its saturated solution. In order to obtain pure crystals of copper sulphate take a cup of water in a beaker and add a few drops of dilute sulphuric acid. Heat the water. When it starts boiling, add copper sulphate powder slowly while stirring continuously. Dissolve more copper sulphate till it attains the saturation point so that no more copper sulphate can be added to the water. Filter the solution and allow it to cool. Do not touch the solution when it is cooling. You will observe that the crystal of copper sulphate are formed.

8. Physical methods to regulate enzymatic browning include thermal treatment, prevention of oxygen exposure, use of low temperature, and irradiation. Heat treatment, such as blanching, can easily inhibit the enzymatic activity because enzymes, which are composed of proteins, are denatured.

(A) Tick (✓) the correct option :

Ans: 1. (b) 2. (a) 3. (a) 4. (c) 5. (d) 6. (c)
7. (d) 8. (a) 9. (d) 10. (b)

(B) Fill in the blanks :

Ans: 1. functions
2. Oxygen
3. Physical , chemical
4. Capillaries .
5. The rib cage .
6. Skin .
7. Gills .
8. Tracheae

(C) Match the following columns :

Ans.	Column 'A'		Column 'B'
1.	Aerobic respiration	→	a. Diffusion
2.	Anaerobic respiration	→	b. Tracheal system
3.	Fermentation	→	c. Leaves
4.	Lungs covering	→	d. Pleura
5.	Lenticles	→	e. Presence of oxygen
6.	Stomata	→	f. Absence of oxygen
7.	Amoeba	→	g. Yeast
8.	Earthworm	→	h. Stem
9.	Insects	→	i. Skin

(D) Write 'T' for true and 'F' for false statement :

Ans. 1. False 2. True 3. False 4. True 5. False .
6. False 7. False 8. False 9. True 10. False .

(E) Answer the following questions :

Ans. 1. The reaction of combining sugars with oxygen, called oxidation, releases energy.
2. The aerobic respiration releases much more energy than anaerobic respiration .
3. Pleura.
4. Sac like structure formed by division of bronchioles .
6. Root hairs on roots help the plant in oxygen intake.

7. $C_6H_{12}O_6 + O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy (Sugar)}$
 $C_6H_{12}O_6 \longrightarrow CO_2 + \text{Alcohol} + \text{Energy (sugar)}$
8. Respiration is carries out in the muscles. In the less availability of oxygen (such as in extensive exercise, etc .), our muscles carry out anaerobic respiration . They respire very fast because they do not get sufficient oxygen.

(F) Answer the following questions in detail :

- Ans. 1.** i. Brewing and Wine Making = Alcohol production by yeast is used in making beer from barely grains. Similary, yeasts are also in volved in formation of wine from grapes. This proicess is also called fermentation
 ii. Bread Making Industry = Yeasts release carbon dioxide during respiration. This carbon dioxide is used for making bread.

Ans. 2. (a)

Aerobic Respiration	Anaerobic Respiration
1. It utilises oxygen. 2. Its end products are carbon dioxide and water. 3. In this process, considerable energy is released. 4. For example plavts and animals including humans..	1. It takes place in absence of oxygen. 2. Its end products can be alcohol or lactic acid . 3. In this, much less energy is released . 4. For example, yeast and bacteria.

(b)

Breathing	Respiration
1. It is a physical process, exchange of gases takes place, and chemical reactions not involved. 2. It occurs out side the cells. 3. Enzymes are not involved in this process. 4. Energy is not released in this process.	1. It is a chemical process. A series of chemical reactions is involved. 2. It occurs inside cells. 3. Enzymes are involved in this process. 4. Energy is released during this process .

- (c) Respiration in plants differ from animals in following three aspects :
1. All parts of plant like the root, stem and leaves perform respiration individually.
 2. There is a little transfer of gases from one part to another, like in animals .
 3. Plant respiration rate is slower than animal respiration.
3. Breathing in the body is accomplished through following steps :
- Inhalation
- ... It is the process of taking in oxygen from the external environment into the body through nostrils.
 - ... The chest cavity increases in size and ribs move upward and onward, in addition to diaphragm which descends down.
 - ... Air from surroundings enters the lungs.
 - ... In the alveoli, exchange of gases takes place. From the alveoli, oxygen diffuses into blood and is supplied to tissues .
- Exhalation
- ... Breathing out carbon dioxide from the nostrils is known as exhalation.
 - ... The ribs move downward and inward, and diaphragm moves upwards .
 - ... This reduces chest cavity and air is forced out of lungs .
 - ... Carbon dioxide from the tissues is carried to the lungs and through alveoli, carbon dioxide is expelled out.
4. Respiration in plants also involves exchange of oxygen and carbon dioxide. However, respiration in plants differ from animals in following three aspects:
1. All parts of plant like the root, stem and leaves perform respiration individually.
 2. There is a little transfer of gases from one part to another, like in animals .
 3. Plant respiration rate is slower than animal respiration.
5. Amoeba = In amoeba, diffusion is the main process for exchange of gases, i.e., taking up of oxygen and carbon dioxide removal.
- Earthworm = Skin functions as respiratory organ. It is permeable to gases. Skin is thin, moist soil and exchange of gases takes place through their skin.
- Insects = Insects have a system of tubes called tracheae. Tracheae communicates with the outside air through small holes called spiracles. Spiracles are found on each side of the insect's body.

Fishes	=	In fishes, gaseous exchange takes place through gills which are covered by an operculum,. The water enters through the mouth, passes through the operculum. The water gives oxygen to tissues and in return, takes carbon dioxide from tissues.
Frog	=	Frogs have dual mode of breathing. They have him permeable skin and lungs. On land, they respire through lungs, while in water they respire through skin by tyhe diffussion of oxygen.
Birds	=	Birds breathe with the help of the lungs present in the chest cavity. They also have air filled sacs near the lungs. The sacs make their body light to fly and also aids in respiration.

7

Movement of Substances in Plants

(A) Tick (✓) the correct option :

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

(B) Match the following columns :

Ans.	Column 'A'		Column 'B'
1.	Phloem	→	a. Osmosis
2.	Mineral	→	b. Root hairs
3.	Semi-permeable	→	c. Active transport
4.	Transportation	→	d. Food
5.	Water	→	e. Vascular

(C) Fill in the blanks :

Ans. 1. Upward
 2. Hot, dry and windy
 3. Phloem
 4. Stomata
 5. Active absorption
 6. Phloem

(D) Write 'T' for true and 'F' for false statement :

Ans. 1. False 2. True 3. True 4. False 5. False 6. True

(E) Answer the following question in brief :

- Ans:
2. Ascent of sap - Upward movement of water and minerals in a plant .
 3. Translocation - Transport of food materials from the leaves to the other parts of the plant.
 4. Plants are classified as trees, shrubs and herbs, based on their size and structure.
 5. Transpiration - Loss of water vapours by evaporation in the atmosphere by plant leaves .
 6. Vascular system - The system through which substances are transported from one part to other. It consists of xylem and phloem.
 - Xylem - Conducting tubes that transport water and dissolved minerals.
 - Phloem - Conducting tubes that transport food .
 7. Plants absorb water from the soil through root hairs present on the roots.
 8. Minerals are also present as dissolved salts in the soil unlike water molecules. The molecules of mineral salt are less in number outside the root hairs as compared to inside, so these are absorbed by the process called as active transport. In this, energy needs to be spent for absorption of material. The upward movement of water and minerals in a plant through xylem is called ascent of sap.
 9. Phloem are living tubes that conduct food downward and xylem are dead tubes that help in transportation of water and minerals from the roots.

(F) Answer the following questions in detail :

- Ans:
1. It is the process of evaporation of water from the plants. Major part of evaporation takes place through the leaves. Land plants absorb large quantities of water from the soil but most of the water escapes from the leaves through transpiration as water vapours. Some amount is used in photosynthesis. It is a continuous process.
 - Light = Light increases the rate of transpiration, as it causes the stomata to open.
 - Temperature = Increased temperature increases the rate of transpiration.
 - Wind = Wind removes the water vapour immediately from above the leaf and this increases the rate of transpiration.
 - Humidity = If humidity is more, it will reduce the rate of transpiration.

Number of Stomata = The number of stomata increase the rate of transpiration.

Soil Water Availability = The availability of soil water affects transpiration.
If soil water is more, transpiration will be more.

Importance of Transpiration

... It will provide cooling effect to plant.

... It helps in the movement of water from roots upwards.

2. Xylem = It transports water and dissolved minerals upwards from the roots. These are made up of dead cells and transport dissolved minerals in an upward direction only.

Phloem = These are made of living cells which transport food prepared by the leaves downwards to the other parts of the plant. In some plants, however, the materials made in the roots are transported by phloem upwards to the leaves. Both the xylem and phloem, are arranged together in compact masses, called vascular bundles.

3. To show the movement of food through phloem is in downward direction.

Materials required :

A potted plant.

Procedure :

Take a potted plant with a thick stem. Remove the bark of stem. Observe the plant after a few days.

Observation :

The stem in the upper portion shows swelling. This is because after the removal of phloem tissue, the downward movement of food is blocked and it gets accumulated there.

Conclusion :

The food prepared in leaves moves in downward direction through phloem.

4. To demonstrate that translocation of water takes place through xylem.

Materials required :

A twig, an empty jam jar, red food colour and water.

Procedure :

We know that phloem is present near the bark of the trunk, remove the bark all round. Do it carefully so that it would not cause any harm to xylem.

Fill the jar with $\frac{3}{4}$ th water. Add few drops of red food colouring to the water. Place the twig in this water.

After five days, observe it.

Observation :

The portion towards the centre of the stem is red coloured, that is the

place where xylem is present.

Conclusion :

Water is conducted through xylem .

8

Circulatory System in Animals

(A) Tick (✓) the correct option :

Ans. 1. (c) 2. (d) 3. (c) 4. (b) 5. (b) 6. (b) 7. (c) 8. (b) 9. (b).

(B) Fill in the blanks :

Ans. 1. Veins
2. Capillaries
3. 72%, and 8%
4. Oxyhaemoglobin
5. Atrias
6. White blood cells
7. Middleman
8. Plasma

(C) Write 'T' for true and 'F' for false statements :

Ans. 1. True 2. True 3. True 4. True 5. False 6. False 7. False
8. False 9. False .

(D) Answer the following questions in brief :

Ans. 1. Transport of materials in higher animals takes place through blood.
2. Circulatory system in humans consists of heart, blood vessels and blood.
3.

Artery	Vein
1. Thick walled .	1. Thin walled.
2. Carries oxygen rich blood.	2. Carries carbon dioxide rich blood.
3. Carries blood away from the heart.	3. Carries blood from different organs to the heart .
4. They are deep seated under the skin.	4. They are situated just under the skin .
5. Valves are absent.	5. Valves are present .
6. They are narrow blood vessels.	6. They are wider blood vessels .

4. This pigment is red in colour and provides red colour to blood. In adults, RBCs formation occurs in bone marrows. Oxyhaemoglobin on reaching cells and tissues releases oxygen. This oxygen is used by the cells for getting energy from food and liberated free haemoglobin.
5. Blood groups - Three blood groups present in humans are : A, B, AB and O.
 Blood transfusion - Supply of blood to meet the loss of blood during an accident or injury.
6. Blood is a vital component of our body. In cases like an operation, serious injury or accident, one may lose lot of blood from the body. To compensate this one needs extra blood to be supplied externally to the one's body. This is done by the process of blood transfusion. In this process, blood from a healthy person called donor, is transferred to the persons who needs it. The person who receives blood is called recipient.
 The blood is transfused only if blood group of donor matches with that of recipient. There are 4 blood group in humans:
 Blood groups- A, B, AB, and O.
 The blood group 'O' persons can donate blood to any person without any complication and hence, are known as " UNIVERSAL DONOR ". The blood group 'AB' persons can receive blood from any of the four groups. They are known as 'UNIVERSAL RECIPIENT'. If blood groups are not checked before transfusion, mismatching would result in clotting of blood.

(E) Answer the following question

- Ans. 1. Heart is a conical structure located in the chest cavity slightly towards the left. The size of our heart is nearly equal to our fist. The heart is covered with two membranes, known as pericardium. In between the two membranes, there is a fluid present which acts as a shock absorber.
- ... The heart is four chambered with two atria and two ventricles.
 - ... The upper two chambers (right and left) are called atria.
 - ... The lower two chambers (right and left) are called ventricles
 - ... Atria receive blood from all the parts of body and ventricles pump blood to all parts of the body
 - ... The two left chambers are separated from the two right chambers through a muscular wall, so that blood does not move from one atrium to other and from one ventricle to other.
 - ... The blood flow of heart is maintained through valves. Blood flows from atria to ventricles. It is in the right direction which is maintained by the presence of:

Tricuspid valve - Valve between right atrium and right ventricle.

Bicuspid valve - Valve between left atrium and left ventricle.

2. Blood is connective tissue that is circulated in the entire body by pumping action of heart.

An average adult has 5-6 litres of blood.

Blood consists of the following two components :

Fluid Component - Blood Plasma

Solid Component - Blood Cells

Blood Plasma

Blood plasma is yellowish in colour and constitute 55% of the total blood. In plasma, 92% is water, while remaining 8% consists of various proteins, food salts, minerals, enzymes, hormones and waste. Plasma also has some proteins that help in clotting of blood. Plasma also contains globulins which are antibodies and provides defence against infection.

Blood Cells

These are the cells which are suspended in the plasma. There are three kinds of blood cells which are as follows.

Red Blood Cells (RBCs) :

They are biconcave in shape and have no nucleus. There are about 5 million RBCs per cubic mm of blood of man, while 4.5 million per cubic mm of blood in Woman. The RBCs contain a red pigment called haemoglobin.

White Blood Cells (WBCs):

They are larger and fewer than red blood cells and have large, often irregularly shaped nuclei. They are 8000 in 1 cubic mm. They are colourless and have pseudopodia like amoeba to move around. This also helps them to cross the blood vessels, wall and reach the site of infection. White blood cells protect the body against an infection. They fight against disease and hence, are an important part of our immune system.

Blood Platelets

They are small and irregular in shape. They are about 2.5 lakhs in a cubic mm of blood. They are colourless, but help in the formation of a plug at the site of injury. This is known as clotting of blood.

3. The blood is circulated by the pumping action of the heart.
 - ... The impure blood is collected from different parts of body by the veins and enters the right atrium of heart.
 - ... From right atrium, blood passes to the right ventricle which pumps the blood to the lungs.
 - ... The blood in the lungs gets purified and reoxygenated.
 - ... The oxygen rich blood enters the left atrium.
 - ... From left atrium, the blood passes to left ventricle.
 - ... The left ventricle propels oxygen rich blood to all the parts of body through arteries.
 - ... During its circulation, blood collects carbons dioxide produced due to metabolism. This carbon dioxide rich blood is returned to the light atrium of the heart.
 - ... The cycle is repeated.
4. It is formed by clear fluid called lymph, lymph capillaries, lymph vessels and lymph glands. It acts as a middleman between the blood and the tissues for nutrients and waste materials. Lymph is light yellow fluid containing lymphocyte cells (while blood cells). Lymph flows only from tissues to the heart in lymphatic system. Lymph drains into lymphatic capillaries, which joins to form a large lymph nodes and lymph glands are associated with lymph vessels.

Fundction of Lymph:

 1. It provides immunity to body.
 2. Lymph serves to equalise the body temperature by distributing the body that heat.
 3. Lymph carries the digested fat.
 4. It acts as a middle man between blood and the tissues, transporting nutrients, hormones to the tissues, collecting the waste materials from tissue and returning them into blood.
5. In animals, other than humas, transportation of blood differs. Lets us see a few example-

Amoeba

In amoeba and paramecium, no special tranport system is required. They lack organ system. Every part of the organism gets nutrients and oxygen directly through cell diffusion.

Sponges

Like amoeba, they also do not have any circulatory system. Water transports food and oxygen to all parts of the body and takes body wastes away from the body.

Earthworm

These organism have a developed circulatory system. However, they have four pairs of one as in humans. Their blood contains haemoglobin, which provide red colour and carries oxygen.

insects

In cochroches, ants etc., the circulating fluid flows in open spaces as they lack blood vessels. this circulating fluid is called haemolymph. it does not contains haemoglobin, due to lack of oxygen carrying pigment. This particular function is taken over by respiratory tubes called tracheae.

6. **(a) Pulse** = When the human heart beats, the ventricles pump blood into the arteries. The arteries already contain some amount of blood. The further flow of blood into these arteries exerts a pressure on their walls. As a result, the arteries distend. When the arteries give away the blood to the body organs, they ease their pressure and relax. This distension and relaxation of the arteries can be felt as a throbbing sensation called pulse.
- (b) Heart rate** = In normal adult, it is 72 per minute. The rate of heart beat increase during stress, anxiety and physical exercise. Doctors use an instrument called 'stethoscope' to measure number of heart beats.
- (c) Cardiac Cycle** = The heart muscles are also called cardiac muscles. They are special as they do not get tired. The heart contracts and relaxes rhythmically in a cyclic manner. The cycle is called a cardiac cycle.
- (d) Oxyhaemoglobin** = Oxygen is carried by haemoglobin present in the red blood cells to form oxyhaemoglobin.
- (e) Pericardium** = The pericardium is a fibrous sac that encloses the heart and great vessels.

9

Excretion in Animals

(A) Tick (✓) the correct option:

- Ans. 1. (c) 2. (b) 3. (c) 4. (b) 5. (c)
6. (d) 7. (a) 8. (a) 9. (d)

(B) Fill in the blanks:

- Ans. 1. Excretion
2. Area, water and dissolved salts
3. Toxic
4. Yellow
5. Nephrons
6. Urinary Bladder

(C) Match the following columns:

Ans. **Column 'A'**

1. Nephridia
2. Contractile vacuole
3. Urine
4. Malpighian tubule
5. Cellophane tube
6. Exhalation

Column 'B'

- a. Cockroach
- b. Dialysis
- c. Amoeba
- d. Earthworm
- e. Yellow colour
- f. Integument

(D) Write the 'T' for true and 'F' for false statement:

- Ans. 1. False 2. False 3. True 4. False
5. True 6. True .

(E) Answer the following questions in brief :

Ans. 1. Excretion - It is the elimination of waste products from the body of an organism.

Defaecation - Elimination of undigested food residue from the alimentary canal.

2. Human skin has numerous sweat glands which secrete a watery fluid called sweat. It helps in removing the products like urea, water and dissolved salts from the skin surface.
3. The waste can be produced during digestion , respiration, protein and fat metabolism.
4. The various steps involved in excretion in human beings are following :
 1. The waste material along with blood is brought to the nephrons of the kidneys.
 2. The nephrons filter the waste products from the blood into the tubules of the nephrons.
 3. The filtrate that is free of blood cells and proteins, moves into the tubules.
 4. During filtration, some of the useful products such as glucose and amino acids are also filtered. These are absorbed back into the blood through the walls of the tubules.
 5. Now, the filtrate passes into the ureters in the form of a yellow-coloured liquid, called urine.
 6. Urine enter the urinary bladder and is stored there till it is expelled out.
5. These are two bean shaped structure. Each measures 4.5 inch in length, 2 inch in width, and 1.5 inch in thickness. They are dark red in colour, placed on both the sides of 'vertebral' column. Right kidney, usually shorter and thicker than the left, probably due to downward extension of liver. Each kidney consists of a larger number of coiled tubes (about a million), called nephrons. Nephrons are the structural and functional units of kidney.

6. Ammonotelism - Elimination of nitrogenous wastes in the form of ammonia.
 Ureotelism - Elimination of nitrogenous wastes in the form of urea.
 Uricotelism - Elimination of nitrogenous wastes in the form of uric acid.

(F) Answer the following questions in detail:

- Ans. 1. Excretory system consists of the various organs associated with the excretion of wastes. The excretory organs present in human beings are the :
 Kidneys - These are two bean seeds shaped structure. Each measures 4.5 inch in length, 2 inch in width, and 1.5 inch in thickness. They are dark red in colour, placed on both the sides of 'vertebral' column. Right kidney, usually shorter and thicker than the left, probably due to downward extension of liver. Each kidney consists of a larger number of coiled tubes (about a million), called nephrons. Nephrons are the structural and functional units of kidney.
 Ureters - The ureters arises from the inner side of kidneys and is known as excretory duct.
 Urinary bladder - Ureter of each kidney opens into muscular bag like structure called urinary bladder.
 Urethra - Urinary bladder opens outside through a tube called urethra. This tube is small and its opening is regulated by sphincter muscles.
2. Different animals produce different types of waste products. The major types of excretory products are ammonia (NH_3), urea and uric acid. Based on the types of major excretory product eliminated by animals, they can be categorised into three types.

Ammonotelic organisms

It is the elimination of nitrogenous wastes mainly in the form of ammonia as a waste product are called ammonotelic organisms. Ammonia is highly toxic and water soluble. It requires a lot of water for elimination of ammonia as it cannot be concentrated due to its toxicity; for example, fishes, salamander.

Ureotelic organisms

It is the elimination of nitrogenous wastes mainly in the form of urea. The organism which produced urea as a waste product are called ureotelic organisms. Urea is less toxic than ammonia. It is water soluble but can be concentrated to some extent. It requires less water for its excretion, hence help in conserving water. For example: human helps in conserving water. For example: humans, camels, sharks, lion, dog and horse.

Uricotelic Organism

It is the elimination of nitrogenous wastes mainly in the form of uric acid. The organisms, which produces uric acid as waste products are called uricotelic organisms. Uric acid is less toxic and least soluble in water. Minimum amount of

water is required for the elimination of uric acid, .e.g., lizards, birds, snakes, land snails and insects.

3. In humans, when kidneys get damaged or inflected, waste productstend to accumulated accumulate in the blood itself. This accumulation is severely harmful and would lead to death. In such conditions, blood is cleared off the metabolic wastes, and the normal levels of water and mineral ions in body fluids are maintained through an artificial kidney . This process is known as dialysis, and the machine is known as dialysis machine. In the process of dialysis, blood from the arm of the patient is allowed to flow into the dialysis machine. The machine is made up of a long cellophane tube coiled in a chamber with a dialysis solution. The waste substances diffuse from the blood into the tank. The cleansed blood is then pumped back into the patient.

In other cases, kidneys are transplanted if matching takes place with the compatible donor. A single kidney is sufficient to take care of the excretory needs of the body.

4. The animals living in different habitats excrete different types of excreta. Therefore, these animals have different mechanism and organs of excretion in their bodies. Lets us study about few of them.

Amoeba

Amoeba is a single-celled organism. It gives out ammonia as waste product. The excretion occurs through body surface by the simple process of diffusion.

Earthworm

They have nephridia as excretory organs. Nephridia are coiled tubes surrounded by blood capillaries that discharge wastes into intestine or directly to the outside in the form of ammonia.

Fishes

Fishes excrete ammonia as the major waste from their kidneys.

Insects

Insects like cockroach have malpighian tubules which collect wastes, mainly uric acid, from the body and expel it through faeces.

Birds

They have a pair of kidneys for carrying out the excretory function. Since bird's water intake is less, so they excrete uric acid.

(A) Tick (✓) the correct option:

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

(B) Fill in the blanks:

Ans. 1. Reproduction
 2. Budding
 3. Gametes
 4. Vegetative propagation
 5. Fertilization
 6. Ornithophily
 7. Bats , chiropterophily
 8. Two polar , One man gamete nuclei

(C) Match in the following columns:

Ans.	Column 'A'		Column 'B'
1.	Yeast	→ a.	Water
2.	Leaves	→ b.	Animals
3.	Lotus	→ c.	Bryophyllum
4.	Xanthium	→ d.	Budding
5.	Sepals	→ e.	Banana
6.	Parthenocarpic fruit	→ f.	Shoot system
7.	Fruit	→ g.	Banana
8.	Plumule	→ h.	Ripened ovary
9.	Insect	→ i.	Fruit wall
10.	Pericarp	→ j.	Sweet pea

(D) Write 'T' for true and 'F' for false statement:

Ans. 1. False 2. True 3. False 4. True
 5. True 6. False 7. True 8. True

(E) Answer the following questions in brief:

Ans. 1. The production of new individual from the parents of same species.
 2. Different methods of asexual reproduction are -binary fission, budding, fragmentation, spore, formation and vegetative propagation.
 3. There are following two methods of vegetative propagation:
 Natural vegetative propagation and
 Vegetative Propagation by Root.

4. A spore is a microscopic, spherical structure, covered by a hard protective coat. This coat (a protective layer) helps it to survive under unfavourable, conditions such as high temperature, lack of food and water, etc. When conditions become favourable, the coat breaks and spores are liberated. These spores grow into new individuals. Spores are very light, so they easily get dispersed by wind currents to distant places. When they fall at suitable place, they germinated and develop into new organisms.
5. There are many artificial methods by which plants multiply. They include cutting, grafting , layering and tissue culture.
6. Dispersal of seeds occurs with the help of wind, water, animals or via explosion of fruits.
7. Banana do not have seeds. Such fruits are called parthenocarpic fruits.

(F) Answer the following questions in detail:

Ans. 1. There are various ways by which organism reproduce asexually. Some of these methods are discussed below.

Binary Fission

It is the simplest method of asexual reproduction. Unicellular Organism, such as amoeba, paramecium, bacteria, etc. reproduce by binary fission.

In binary fission, there is a splitting of mature cell into two. Firstly, the nucleus divided into two nuclei (karyokinesis). This is followed by the division of cytoplasm into two parts, each containing a nucleus (cytokinesis). Further stretching leads to the formation of two daughter cells. These cells after getting nutrition grow into mature cells and the process is repeated.

Budding

In multicellular organisms like yeast (a non green plant), asexual reproduction takes place by budding. In this, a bulb like projection on the body appears, known as bud. Nucleus of parents body divided into two and moving of one nucleus to the bud take place. The bud grows in size and eventually separates from the parent cell. Sometimes, buds do not drop-off and keep producing more buds. This leads to the chain of buds formation.

Fragmentation

In few lower plants like algae (spirogyra), the long ribbon-like (filamentous) body breaks up into two parts called fragments.

The breaking of body into one or more parts is called fragmentation. Each fragment, after a certain period of growth, grows into a new adult individual. These individuals then produce new plants by further fragmentation. The ability of living organisms to repair themselves or grow the damaged part back is called regeneration.

Spore Formation

A spore is a microscopic, spherical structure, covered by a hard protective coat. This coat (a protective layer) helps it to survive under unfavourable, conditions such as high temperature, lack of food and water, etc. When conditions become favourable, the coat breaks and spores are liberated. These spores grow into new individuals. Spores are very light, so they easily get dispersed by wind currents to distant places. When they fall at suitable place, they germinated and develop into new organisms. For example, mucor, fern, moss, bread, mould (Rhizopus), bacteria and penicillium.

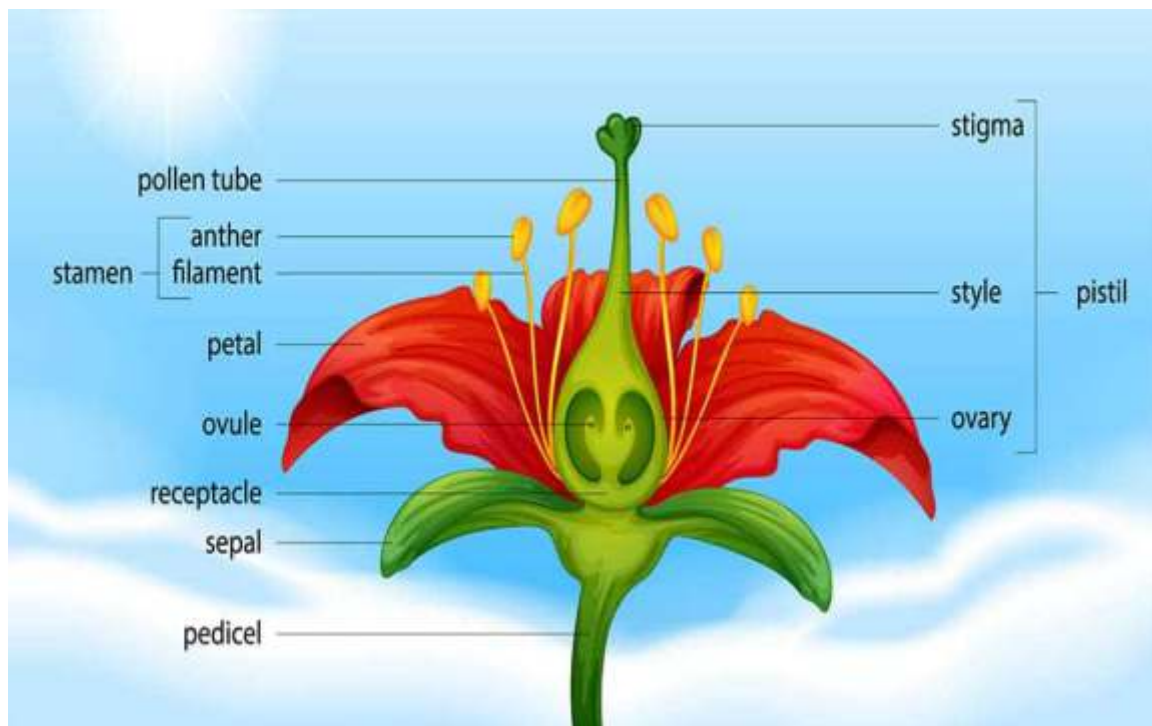
2. Rhizomes: These are the underground stems that have scaled leaves and buds, which can grow into new plants, e.g., ginger, turmeric, banana, etc.

Bulbs: Bulbs are very short underground stem having thick leaves known as bulb scales (which are the modified leaves). The scales serve as site of food accumulation. This bulb is capable of producing new bulbs with the help of buds. For e.g, onion, tulips and lilies.

Tubers: Tubers are underground stem. It has buds called eyes. They are swollen due to the food stored in them. The buds give rise to new plants. These new plants use up the food stored in the underground stem to grow, e.g, potato, etc.

Suckers: In mint and chrysanthemum, horizontal stems arise from the based of erect shoot, grow horizontally in the soil, and then come out to form new aerial shoots, These shoots become independent plants when suckers move away from the parent plant.

3. Structure of Flower and labelled of flower showing its various parts.



4. There are three methods of artificial vegetative propagation which are described below.

Cutting

Cutting is done may be on a portion of stem or root, that is planted in the moist soil. It then grows into a new plant. For e.g., grape, china rose, crotons, bougainvillea, etc.

Layering

In layering, a part of the stem of a plant is pulled and buried in the soil, while it is attached and supported by parent plant. Soon the layered plant develops its roots is cutted from the parent plant and it grows as an independent plant; e.g., jasmine, rose, strawberry, etc.

Grafting

Grafting is a method in which two parts of different plants are joined with each other, which is then allowed to grow as a one plant. The portion that is placed on the other part is called scion and the plant in which grafting takes place is used in ornamental and fruits plants.

5. Sexual reproduction is the characteristic feature of higher plants. In this type of reproduction, specialized sex cells called gametes from male and female individuals fuse, forming a zygote. The process of fusion is known as fertilization, which has the potential to produce a new individual. The flower with only one reproductive organ, either male or female organ, is called a unisexual flower, e.g., cucurbita and papaya. The flower which contains both male and female reproductive organ is called bisexual or hermaphrodite, e.g. apple, rose, pea, china rose, etc. Flower that contains both male and female gametes in it is called complete flower. Complete flowers have all the four whorls.

Sepals

Sepals, the leaf of all the flower parts, are usually green. They protect the petals in the budding stage.

Petals

When the flower opens, there are four whorls of sepals and inner leaf-like structure called petals. Their colours account for attractiveness to flowers.

Pistil (female organ)

It has vase-like appearance and situated at the very centre of a flower. Its single reproductive unit called carpel. A carpel usually has three parts: stigma, style and ovary. Ovary contains a number of ovules which play a significant role in the production of seed.

Stamens (male organ)

It has three parts: filament, anther and connective. Anther contains pollen grains having male gametes in them.

6. It is a state of rest for the seeds. The delay in growth is usually due to the unfavourable environmental conditions. Most plants delay germination, in spite of favourable condition to allow the chances of a seedling growing to maturity. A young seedling may freeze to death in winter. Some seeds develop a thick coat that prevents the entry of water or oxygen. In some, germination may take place only after a period of exposure to light.
7. For cross pollination, pollen grains are to be transported from one place to another. External agents such as wind, water, insect, birds and bats that help in dispersal are called the agents of pollination.

Wind

Wind transfers pollen grains from the anthers of one flower to the stigma of another flower. This is also known as anemophily.

The flowers pollinated wind:

1. Are not brightly coloured
2. Are small
3. Have very light pollens.
4. Pollen grains that are dry and unwettable.
5. Are without nectar and scent.

Water

Pollination in aquatic plants is usually carried out by water. Water pollinated flowers release their pollen grains into the water, and are passively carried to other flowers by water currents. This is also known as hydrophily. For example, sea grass.

Insects

Pollination is also brought about through the agents of insects. The important features of these flowers are given here:

1. Flowers are coloured and scanty.
2. Stigmas are sticky.
3. Pollen grains have a sticky surface
4. Flowers are strong enough to bear the weight of visiting insects.
5. Visiting insects are fed by nectar.

Birds

Pollination performed by birds is called ornithophily. Two types of beaked small birds. That take part in pollination are -sun birds and humming birds. Other birds performing pollination are crow, parrot, bulbul, mynah, etc. Birds-pollinated flowers have the following characteristics:

- Flowers are attractive to birds when they have red, orange or yellow coloured sepals.
- The flowers have nectar. For example, red silk cotton, coral tree and bottle brush.

Mammals

Pollination is also performed by mammals such as bats, snail etc. Pollination by bats known as chiropterophily, for example, baobab tree. These flowers have following characteristics:

1. They should have strong scent.
2. They should be strong enough to bear the mammals activity.

8. Dispersal of Seeds by Wind

The seeds which are light, small or have tufts of silky hair on their body are carried away to distant places by the wind. For example, seeds of dandelions, cotton and fruit of acer.

Dispersal of Seeds and Fruits by Water

Seeds and fruits having structure favourable for floating are dispersed by water. For example, seeds or fruits of coconut, lily, lotus, etc.

Dispersal of Seeds and Fruits by Animals

Seeds and fruits which are dispersed by animals are either edible or have hooks, spines, bristle and stiff hair on their surface. Such seeds stick to the skin of the animals or clothes of human beings and are carried to distant places. Human beings and birds eat the carried to distant places. Human beings and birds eat the pulp (edible) portion of the fruit and throw the seeds. Such seeds germinated and develop into new plants, e.g., fruits of xanthium and Tribulus.

11.

Time and Motion

(A). Tick (✓) the correct option:

- Ans: 1. (b) 2. (b) 3. (b) 4. (a) 5. (b) 6. (b)
7. (c) 8. (b)

(B) Write 'T' for true and 'F' for false statement:

- Ans. 1. False 2. False 3. True 4. True
5. True.

(C). Fill ion the blanks:

- Ans. 1. Equal
2. Velocity
3. Meter per second
4. Distance time graph
5. Second
6. Time period
7. Speed
8. Uniform

(D) Answer the following questions in brief:

- Ans. 1. The watches in use nowadays are the digital and electronic watches.
2. Distance travelled per unit time by an object.
3. Speed is distance covered in a unit time. Its S.I. unit is metre per second.
4. (a) Speedometer = The meter fitted on top of a scooter or a motor cycle is called a speedometer.
(b) Odometer = The meter fitted in vehicles used to measure distance.
(d) Stop watch = A device used for measuring small time intervals. It can be started and stopped at will.
5. The distance-time graph for constant speed is a straight line.
6. Uniform motion = If a body travels equal distance in equal interval of time, it is in uniform motion
Non-uniform motion = Unequal distance covered in equal intervals of time is called non-uniform motion.

(E) Answer the following question in detail :

- Ans. 1. Ancient people made devices such as sundial, water clock, sand clock, etc. for measuring time.
The sundial was used for long to measure time in the days of Alexander the Great (300 BC). Sundial is based on the fact that length of the shadow cast by an object changes with the time of the day.
The sundial at the Jantar Mantar in Delhi and at Jaipur were built by Maharaja Jai Singh II.
Its limitation is that it cannot be used at night.
Sand clock or hour glass was also one of the methods used by the Romans for measuring time. It was a dumbbell shaped container held vertically. The upper part was filled with sand and this sand ran through small hole into the lower part.
Water clock is the earliest time piece on record. As we know, equal amounts of water take the same time in flowing through a given opening, the idea was used in designing a water clock and by attaching suitable arrangement of gears, wheels, etc.,
2. Do your self
3. Do your self
4. Do your self
5. Do your self

(A) Tick (✓) the correct option :

- Ans. 1. (b) 2. (a) 3. (a) 4. (b) 5. (d)
 6. (c) 7. (c) 8. (c) 9. (c)

(B) Fill in the blanks:

- Ans. 1. Circuit
 2. Fuse
 3. Coil
 4. 5
 5. Low melting point
 6. Nichrome, resistance
 7. Electromagnet
 8. Electromagnet.

(C) Write 'T' for true and 'F' for false statement.

- Ans. 1. True 2. True 3. True 4. False
 5. False 6. True 7. True 8. True

((D) Answer the following questions in brief :

- Ans. 1. The continuous path of flow from one terminal to the other in a continuous manner.
3. The handle of screw driver is made up of plastic. Plastic is an insulator and doesn't allow electric current to pass through it, hence, the electrician is protected from any electrical shock while working with the live wires.
4. An electric fuse is a safety device which protects electrical appliances from the effects of overheating caused by excessive flow of current. Fuse wire made up of a melting alloy (generally an alloy of about 30% tin and 37% lead). The fuse wire is connected in series with the circuit . If the current in the circuit increase beyond a certain limit, which is the safeguard value for the fuse, the fuse wire melts and the circuit is broken. Hence, the appliance is protected from the hazardous effects of excessive current.
5. In place of electric fuse, miniature circuit breaker can also be used for protecting electrical devices. A miniature circuit braeker is an automatically operated electric switch which turns off whenever current exceeds a safe limit and hence, protects electric devices

The advantage of circuit breaker over electric fuse is that they can be used more than once by re-setting manually or automatically, whereas fuse needs to be replaced after single operation.

6. An electromagnet is based on magnetic effects of current. An electromagnetic magnet is a temporary magnet as it retains its magnetic properties only as long as the current flows through its coil.
7. A simple household device that depends on an electromagnet for its working.

(E) Answer the following questions in detail :

Ans. 1. The generation of heat when electricity flows through a circuit is called heating effects of current.

The heat produced in a resistor depends upon the following:

- ... The current passed through the resistor.
- ... The time for which current is passed.
- ... Nature of the material.

Some Applications based on the Heating Effects of Current.

All electrical heating appliances are based on the heating effect of current. For example, appliances such as electric iron, electric kettle, water heaters, electric stove, toasters and immersion rods have a filament or heating coil. When we pass a current through this heating coil. When we pass a current through this heating coil, it gets heated, and this heat is then put to desired use.

A number of electrical appliances make use of the heating effect of electric current. A heating element is a part of the heating appliance, which is of high resistance and is heated when an electric current flows through it. Higher the resistance, more will be the heat produced. Good conductors like copper, silver and aluminium offer less resistance and do not get heated easily, whereas alloys like nichrome that are commonly used to make heating elements offer very high resistance. Some of these appliances that are based on the heating effect of the current are electrical heaters, toaster, irons, hair-dryer and so on. These appliances have coil of resistance wire inside them, which convert electrical energy to heat energy.

2. Some substances conduct electricity quite readily, while others do not. Those substances in which electricity can flow quite freely are called conductors (or good conductors). For example- silver, copper, aluminium, iron, etc.

To check whether a given material is a conductor or an insulator.

Materials required :

A small piece of each of the following materials-copper, plastic, rubber, wood and graphite.

Procedure:

Connect a circuit as in the above figure.

Leaves a gap AB between the two ends of the wire. In this situation, no current flows through the circuit as the circuit is not closed. Hence, bulb does not glow. Now, place a piece of copper wire in the gap touching the points A and B. The bulb starts glowing. This shows that the copper is a good conductor of electricity.

Now repeat the same experiment with other materials:

S.No	Material	State of the bulb	Conductor or insulator
1.	Plastic		
2.	Copper		
3.	Rubber	Glow	Conductor
4.	Wood	Does not glow	Insulator
5.	Graphite		

3. When an electric current flows through a conductor, it generates a magnetic field around it, which exists as long as the current flows in the conductor. This is called the magnetic effect of electric current. This is called the magnetic effect of electric current. This effect was first observed by Danish scientist Hans Christian Oersted.

Take a cardboard, a dry cell, iron filings, a switch and a compass needle. Set up an arrangement so that the cardboard is placed in horizontal direction and on one side, the wire passes vertically through a hole present in the middle of the cardboard. Sprinkle the iron filings all over the cardboard and pass current through the wire from the dry cell. When the cardboard is gently tapped, the iron filings arrange themselves in circles around the wire. Thus, it is clear that a current-carrying wire behaves like a magnet.

4. Electromagnets are used in a number of machines and appliances. Let us study about few of them.
1. Electromagnets are used in cranes to lift heavy iron and steel scrap.
 2. Electro-magnets are used in the receiver of a telephone handset.
 3. Electro-magnets are also used in loudspeakers.
 4. Electro-magnets are used to separate magnetic substances like iron, steel, etc. from the non-magnetic substances like copper, zinc, etc.
 5. Electro-magnets are used in electric motors.
 6. Electro-magnets are also used in electric bells. Let us now study the working of an electric bell.

13.

Light

(A) Tick (✓) the correct option:

- Ans. 1. (d) 2. (a) 3. (c) 4. (d) 5. (c) 6. (b)
7. (a) 8. (b)

(B) Fill in the blanks :

- Ans. 1. Moon
2. Reflection of the light.
3. Virtual images
4. Plane
5. Lenses
6. Seven
7. Dispersion

(C) Match the following columns :

- | Ans. | Column 'A' | | Column 'B' |
|------|--------------------------------------|---|-----------------------------------|
| 1. | Rectilinear propagation | → | a. Used as magnifying glass |
| 2. | A highly polished reflecting surface | → | b. Used for daily purpose |
| 3. | Virtual image | → | c. Can be obtained on screen |
| 4. | A plane mirror | → | d. Light travels in straight line |
| 5. | Real image | → | e. Mirror (2) |
| 6. | Convex mirror | → | f. Cannot be obtained on screen |

(D) Write 'T' for true and 'F' for false statements :

- Ans. 1. True 2. False 3. True 4. True
5. False 6. True

(E) Answer the following questions in brief :

- Ans. 1. Luminous Objects : The bodies which give out light are called luminous objects. For example: sun, stars, burning candle, hot filament in an electric bulb, etc.
Non-luminous objects: The bodies which do not give out light are called non-luminous objects. For example, table, chairs, moon, earth, etc.
2. Natural = The light sources which are present in nature, for examples, sun, stars, an insect known as jugnu (firefly).
Artificial = The light sources which are man-made, for example, CFLS (compact fluorescent lamps), electric bulbs, tubelight, burning candle, etc.
3. The image which can be seen only in a mirror but cannot be obtained on a screen is called virtual image.
The image which can be seen in the mirror as well as can be obtained on a screen is called a real image.
4. Lenses are very useful. You must have seen your grandfather or grandmother wearing glass spectacles. These spectacles are made of lenses. They are also used in cameras, telescopes, and microscopes.
A lens is a curved and polished piece of glass or any other transparent material.
Let us know about the lenses in detail.
Types of Lenses = There are two types of lenses.
1. Convex Lens = A lens which is thicker in the middle and thinner at the edges is called a convex lens.
2. Concave Lens = A lens which is thinner in the middle and thicker at the edges is called a concave lens.
5. Sunlight is the mixture of these seven colours. All the above mentioned colours All the above mentioned colours can be remembered with the word VIBGYOR, where each letter represents the first letter of each colour, starting with violet. When white light coming from the sun splits into different colours on passing through tiny droplets of water suspended in the atmosphere, It is called dispersion of light.
6. Newton's disc is a coloured disk which is painted with the colours of white light (i.e., Violet, indigo, blue, green, yellow, orange and red) VIBGYOR, in the correct proportions, so that when it is rotated very fast, the disc appears white. When the disk is rotated at a high speed, the colours merge together and the eye responds, rapidly enough, and sees the colours mixed together to form white colour.

7. There are seven colours in the rainbow. You can also see these seven colours on the surface of compact disk (CD), soap bubbles, etc. These seven colours are :
- | | |
|--------|---|
| Violet | V |
| Indigo | I |
| Blue | B |
| Green | G |
| Yellow | Y |
| Orange | O |
| Red | R |
8. Take a glass prism and allow the beam of white light e.g., sunlight, to fall on one face of a glass prism. Place a white sheet of paper on the other side of the prism.
- Observation:
- A band of seven colours is seen on the paper. The seven colours seen on the paper are violet, indigo, blue, green, yellow, orange, and red.
- The band of seven colours formed on the paper screen due to the dispersion of light is called the spectrum of white light.

(F) Answer the following questions in detail ;

- Ans. 1. Light travels in straight lines. This mode of propagation of light is called rectilinear propagation.
- ... To show that light travels in a straight line.
- Materials required : Rectangular sheets of cardboards, thread, candle, and moulding clay.
- Procedure : Take three rectangular cardboard sheets of equal size. make hole in the centre of each card-board by placing them one above the other . Use small amounts of moulding clay to hold the three cards on the table. Pass the thread through the holes to arrange the three holes in a straight line. Now, light a burning candle at one end of the table such that its flame is at the same height as of the holes. Now look through the holes at the other end
- Observation :
- We will be able to see its light, coming in a straight line from the other side. Now move any card in such a way that the three holes are no longer in a straight line.
- We will not be able to see the light on the other side. This shows that light travels in straight lines.

Conclusion:

Light travels in a straight line.

2. Type of bodies on the basis of passing of light through them.

Transparent

All bodies through which light can pass easily are known as transparent bodies. For example, glass, a cellophane sheet and air.

Translucent

Those bodies which allow only a small amount of light to pass through them, are known as translucent bodies for example, frosted glass and waxed paper.

Opaque

Those bodies which do not allow any light to pass through them are known as opaque bodies. For example, wood, metal, etc.

3. When a light beam strikes on an object any surface, it may either bounce back or may get absorbed by it. The bouncing back of the light rays from the surface of an object is called **reflection of the light**. The ray of light which falls on an object is an incident ray of light. The ray of light which gets bounced or reflected from the surface of an object is the reflected ray of light. The angles between the incident ray and the normal at the point of incidence is called angle of inclination ($\angle i$). The angle between the reflected ray and normal is called angle of reflection ($\angle r$).

Mirrors are smooth and highly polished reflecting surfaces.

Mirrors change directly the direction of light falling on it.

This change of direction by a mirror is called reflection of light.

To show the reflection of light by a plane mirror:

Materials required:

A torch, a strip of mirror, a smooth wooden board and a chart paper.

Procedure:

Take a torch and cover its glass with a chart paper having 2 slits. Spread a chart on wooden board and place the plane mirror on the chart paper vertically. Now direct the beam of light on the mirror from the torch with slits. We should adjust the position of torch in such a way that its light is seen along the chart paper spread on board. Place the torch in such a way that its light strikes the plane mirror at an angle.

Observation:

Mirrors change the direction of light falling on it.

Conclusion:

Light gets reflected from a plane mirror.

4. Spherical Mirrors

A mirror whose polished, reflecting surface is a part of a hollow sphere of glass is called a spherical mirror.

There are two types of reflecting surfaces:

- One that bulges out called the convex surface.
 - One that curves inwards, called the concave surface.
- They Form convex mirror and concave mirror respectively.
5. Draw the diagram (Do Your self)
- a. Dispersion of light = Sunlight is the mixture of these seven colours. All the above mentioned colours All the above mentioned colours can be remembered with the word VIBHGYOR, where each letter represents the first letter of each colour, starting with violet. When white light coming from the sun splits into different colours on passing through tiny droplets of water suspended in the atmosphere, It is called dispersion of light.
- b. Newton's disc = Newton's disc is a coloured disk which is painted with the colours of white light (i.e., Violet, indigo, blue, green, yellow, orange and red) VIBGYOR, in the correct proportions, so that when it is rotated very fast, the disc appears white. When the disc is rotated at a high speed, the colours merge together and the eye responds, rapidly enough, and sees the colours mixed together to form white colour.
6. Take a circular disk of about 12 cm diameter.
Divide this disc into seven segments gives below.
Paint the seven rainbow colours on these segments. You can also paste coloured paper on these segments.
Make a small hole in the centre of the disc. Fix the disc on the tip of a ball pen.
Now, rotate the disc top, so that it spins fast, and observe.
Observation:
When the disc is rotated fast, the colours get mixed together and the disc appears to be white.

14

Waste Management

(A) Tick (✓) the correct option:

- Ans. 1. (b) 2. (b) 3. (d) 4. (d) 5. (c)
1. (b) 7. (c)

(B) Match the following columns:

Ans.	Column 'A'		Column 'B'
1.	Automobiles	→ a.	Sewage
2.	Sludge	→ b.	Non-biodegradable
3.	Plastic bags	→ c.	Bio-degradable
4.	Phosphates	→ d.	Gaseous waste
5.	Animal remains	→ e.	Algae

(C) Write 'T' for true and 'F' for false statements:

- Ans. 1. False. 2. True 3. True 4. True 5. True
1. False.

(D) Answer the following questions in brief :

- Ans. 1. Any materials generated from domestic, industrial or agricultural activities that has no immediate utility and is usually discarded.
2. The Oxygen molecules in the atmosphere are broken up between 80 km to 1000 km by ultraviolet rays of sun or by an electric discharge during thunderstorm. This leads to formation of ozone layer. Ozone layer protect us from ultraviolet rays of the sun that cause cancer.
3. Air is mainly a mixture of various gases such as oxygen, nitrogen, carbon dioxide etc. They have different but particular ratio. This ratio of gases is disturbed or abnormal gases are discharged into the atmosphere in the form of gases. This is called air pollution, for example, smoke from the industries, vehicles, dust storms etc.
4. The waste which is in liquid form or is released along with water is called as liquid waste. These include factories, power plants, underground coal mines, sewage from houses, chemicals from agricultural fields, buildings etc. Liquid waste mainly contaminates that water, hence is called as water pollution.
5. The household waste from toilets, bathrooms and kitchen.
6. The waste which is in liquid form or is released along with water is called as liquid waste. These include factories, power plants, underground coal mines sewage from houses, chemicals from agricultural fields, buildings etc. Liquid waste mainly contaminates the water, hence is called as water pollution. The drainage or the sewage would be directed to the pit. In this pit, the waste would remain for days and weeks. This led to breeding of flies mosquitoes and pathogens in the stagnant water.
7. This treatment removes the sludge, the solid content of the sewage. It is a mechanical process. It involves screening and settling of large particles. In this, sewage is passed through a large screen. The solid waste such as faecal matter, is allowed to settle down, like oils, grease, paint floating on top are skimmed off. This lead to two distinct layers. The materials that settle down at the bottom is called sludge.
8. Primary treatment = Mechanical process that removes the sludge.
Secondary treatment = Biological process that breaks down organic materials into simple substances.
Tertiary treatment = Chemical process aimed at improving quality of water.

(E) Answer the following questions in details:

Ans. 1. Waste are the unwanted materials which are discharged and thrown away, and which poses potential hazard to human health or to the environment when improperly treated, transported or disposed off. Wastes have become an important environmental and public health issue across many countries in the world. Waste materials are generated by us in our day to day life. For example, cooking food, bathing, tilting, washing clothes and utensils. All of these processes result in the generation of unwanted materials such as wrappers of chocolates, empty ice cream cups, pencil shaving, peeling of vegetables, waste paper, etc.

There are many ways of proper and safe disposal of wastes. Let us first learn about the different types of wastes.

Type of wastes

There are many types of wastes based on their physical characteristics.

Gaseous waste = Air is mainly a mixture of various gases such as oxygen, nitrogen, carbon dioxide etc. They have different but particular ratio. This ratio of gases is disturbed or abnormal gases are discharged into the atmosphere in the form of gases. This is called air pollution, for example, smoke from the industries, vehicles, dust storms etc.

Solid Waste = Waste which is generated mainly from houses, cattle shed, industries, agriculture and other activities. They are accumulated in the environment in the form of heaps dumped at public places, causing problem to the public. It includes things such as glass waste, peelings of fruits and vegetables, paper, torn clothes, cow dung, leather, rubber, brick, plastic bags, glass container, metal waste, cattle shed etc. This type pollution mainly involves the land, and if land is contaminated, it is called land pollution.

Liquid Waste = The waste which is in liquid form or is released along with water is called as liquid waste. These include factories, power plants, underground coal mines, sewage from houses, chemicals from agricultural fields, buildings etc. Liquid waste mainly contaminates that water, hence is called as water pollution.

Biodegradable Waste = The waste which is decomposed by microbial population in the natural environment is called biodegradable waste. This does not accumulate in the environment and does not cause any contamination. For example, dead and decaying plants and animals, vegetable peels and fruit remains, domestic waste products, agricultural wastes, paper, wood and cloth etc.

Non-biodegradable waste = Those waste materials which do not decompose or break down into smaller, simpler particles into, and harmless products. They do

not degrade in the nature on their own, and are called non-biodegradable wastes. For example, D.D.T, insecticides, pesticides, mercury, lead, arsenic, aluminium or tin cans, glass bottles and iron junk, plastics, etc.

2. **Biodegradable Waste** = The waste which is decomposed by microbial population in the natural environment is called biodegradable waste. This does not accumulate in the environment and does not cause any contamination. For example, dead and decaying plants and animals, vegetable peels and fruit remains, domestic waste products, agricultural wastes, paper, wood and cloth etc.

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3. Sewage is domestic waste water containing disease causing agents like bacteria, viruses and parasitic worms. They cause water-borne diseases like jaundice, cholera, hepatitis A and E, diarrhoea, dysentery, polio, etc. Sewage is laden with lot of pollutants and harmful materials called 'contaminants', that may result in contamination of water bodies.

Measure to control sewage

Following are the measures which everyone should adopt to control the generation of sewage.

1. Use flushes with low capacity.
 2. Never pour household products such as cleanser, beauty products, medicines, automobiles oils and paints, down the drain. These contain chemicals which waste water treatment plants may not be able to remove.
 3. Cooking oil, butter, meat, fats and plastic should be disposed off in the garbage bin. These materials can clog pipes and could cause over flow of sewage in home.
 4. Avoid stagnant water or collection of water in pit, as it will lead to breeding of flies, mosquitoes and worms.
4. Sewage treatment is the recovering of recyclable materials from municipal refuses by a number of methods, like-shredding and washing, etc. It is the process of rendering the dirty water from households and industries before it enters a water from body or is reused.

The industrial and domestic wastes are subjected to ETP (Effluent Treatment Plant) treatment prior to its disposal in water bodies.

Following are the steps for treatment of effluents before discharge.

Primary Treatment = This treatment removes the sludge, the solid content of the sewage. It is a mechanical process. It involves screening and settling of large particles. In this, sewage is passed through a large screen. The solid waste such as faecal matter, is allowed to settle down, like oils, grease, paint floating on top are skimmed off.

This leads to two distinct layers. The materials that settle down at the bottom are called sludge.

Secondary Treatment = It is a biological process. In this, organic material like food, soaps and detergents are broken down into simpler substances. In this, clear aeration or dissolved oxygen is blown onto the sewage.

Dissolved oxygen turns the biological matter into flocs, and changes nitrogenous wastes into nitrites and nitrates.

Often microorganisms are used to breakdown and remove the remaining dissolved wastes and fine particles.

Tertiary Treatment = It implies to 'third degree treatment'. It is basically a chemical process. It is aimed at improving the quality of water, so that it can be discharged safely into water bodies.

If disinfectants are used, it is called effluent polishing,

Presently, following methods of disposal are used in our country:

1. Disposal along with refused material
2. Disposal in river beds and on banks of rivers.
3. Open pit burning.
4. Disposal in low lying areas, estuaries and seas.
5. Solid waste management is the collection transportation, processing

and recycling of waste materials. The solid wastes containing hazardous chemicals should be neutralized and detoxified through treatment. These treatments are.

Land Filling = It is an important method of disposal of hazardous wastes. In India, such areas range from insanitary open dumps to properly operated landfills. Open dumping is a poor method of waste disposal because it causes environmental problems.

Properly operated sanitary landfills cause little damage to the environment. In this process layering of waste is done for filling of a waste land.

Incineration = It burns waste products. It is used in many industries and large cities, if they do not have enough vacant spaces. Most hazardous wastes are detoxified in this process. It is also an excellent long-term method of waste minimization, waste detoxification and disposal. Its cost of operation is high if heat content of waste is not utilized. In this, high temperature.

Recycling Methods = The process of extracting resources from waste is generally referred to as recycling, meaning to recover or reuse the waste material. The raw materials may be extracted and reprocessed or the calorific content of the waste may be converted to electricity.

Biological Reprocessing = Biological waste materials such as plant materials, food scraps and paper products can be recycled using composting.

Composting is a process of decomposition of heterogenous organic matter by a mixed microbial population used in a moist, warm and aerobic environment. The end product is compost.

6. Electrostatic Precipitator = Electrostatic precipitators are highly efficient dust collectors with proven collection efficiencies of upto 99.99 percent. Two electrodes are used in this method. When particulate matter is passed through the electrodes, the particles get precipitated on the electrodes.
Wet Scrubber = Scrubbers are often used in waste disposal system. Wet scrubbers are used for trapping emissions of SO_2 , NH_3 , and metal fumes in chemical, mining and metallurgical industries. Scrubbers, along with condensers and traps, are used to contain and collect waste solvents, toxic vapours and dusts.

Chapter -1

Crop Production

(A) Tick (✓) the correct option

- Ans. 1. (d) 2. (d) 3. (a) 4. (c) 5. (c) 6. (a)
 7. (c) 8. (b)

(B) Fill in the blanks :

- Ans. 1. Weeds, soil
 2. Float
 3. Crash, mixed cropping
 4. Weeds
 5. Rust, smut
 6. Transplantation
 7. Plant breeding
 8. Winnowing

(C) State whether the following are 'true or false':

- Ans. 1. False 2. False 3. True 4. False 5. True 6. False
 7. True 8. true

(D) Match the following :

- | | | |
|---------------------|-----|--------------------|
| Ans. 1. Rice | (a) | Kharif crop |
| 2. Mango | (b) | Horticultural crop |
| 3. Seed drills | (c) | Sowing |
| 4. Rahat and Dhekli | (d) | Sprinkler system |
| 5. Transplantation | (e) | Tomato |
| 6. Irrigation | (f) | Lever system |
| 7. NPK | (g) | Fertilizer |
| 8. Cochineal insect | (h) | Opuntia |

(E) Answer the following questions in short :

- Ans. 1. Ploughing or tilling of the soil creates tiny air space around soil particles and provides the source of oxygen for the roots. Water-logged and compact soil does not have air spaces which affect respiration of roots.
2. Sowing seeds at proper distance is very important for maximum germination of seeds. Sowing seeds in the same place might lead the plants to grow at the same place and they compete for nutrients, water etc. and hence the seeds don't grow properly.
3. Organic farming can be defined as a system of management and agricultural production that combines a high level of biodiversity with environmental practices that preserve natural resources and has rigorous standards for animal welfare.
4. Leveling is important because gravity is by far the most significant force in the

durability and function of buildings. Working parallel and perpendicular to the force of gravity is fundamental in designing and constructing buildings regardless of their shape.

5. There are several crop diseases that are caused by microorganisms like bacteria and viruses, such as:

- Rust and smut are fungal diseases of wheat.
- Blight of potatoes is a fungal disease.
- Wilt is a disease caused by bacteria.
- Blast is a disease of rice crop caused by an insect called gundhibug.

6. There are several precautions that are observed while using pesticides:

- Keep your nose and mouth covered and cover your hands with gloves.
- While spraying, position in such a way that the wind blows away from your face.
- After spraying, immediately wash your hands face and mouth with clean water.
- Shroff should be washed thoroughly before using. This may clean any pesticide left on them.

7. Some high yielding variety of crops are sonalika, Arjun, sharbati, and kalyan Sona are some high yielding crops of wheat. Jaya, padma, pusa-205 are some of the high yielding varieties of rice. Ganga, deccan are some high yielding variety of maize.

8. Milch animals are those animals that produce milk and gave us milk, a rich source of proteins, vitamins and minerals. They are also known as dairy animals. Some high yielding milk cattles are:

- Cow: jersey, frieswal, Karan- Swiss
- Buffalo: surti, mehsana, murrah

9. Crossbreeding involves the mating of animals from two breeds. Normally, breeds are chosen that have complementary traits that will enhance the offsprings' economic value. An example is the crossbreeding of Yorkshire and Duroc breeds of pigs.

10. Animal husbandry: Animal husbandry refers to livestock raising and selective breeding. It is the management and care of animals in which the genetic qualities and behavior of animals are further developed for profit. A large number of farmers depend upon animal husbandry for their livelihood.

Pisciculture: The breeding, rearing and transplantation of fish by artificial means is called pisciculture. Pisciculture is a process of growing fish and selling it or using its products for domestic or commercial use.

Apiculture: the maintenance of honeybees and hives - provides farmers and hobbyists with a variety of enterprises including production of beeswax, honey and other edible bee products; crop pollination services, and the sale of bees to other

beekeepers.

(F) Answer the following questions in detail:

1. Crop plants are the plants that are grown in large quantities in a field. The product of cultivated plants is called crop or produce. The crop product may be in the form of grains, roots, fibre etc., we get different kinds of food products such as serials fruits and vegetables from crops. We get serious from crop plants that are nutritious seeds of crops mainly rich in starch and fibre. Some of them are good sources of proteins, vitamins and minerals for example rise , maize, etc. Fruits are another type of crop plants that are a seed bearing raped ovaries of a flowering plant for example apple, mango, cherries and banana. Vegetables are 3rd type of crop plants that I have nutritious plant product eaten as a food. For example potato, spinach, carrot, onion, etc. Different types of crops that are found in India are:
 - Kharif crops: are the crops grown during the rainy season between June and October. They are sown at the beginning of monsoon season and harvested at the end of the monsoon. For example, raise, maze, cotton, soybean, pulses, etc.
 - Rabi crops: are the crops grown in the winter season and they are grown between October to March and April. They are shown in the beginning of winter. They are harvested in April and March for example wheat, gram, mustard, etc.
2. Fertilizers are the man made in organic compound used for supplying particular nutrients to the soil and manures are the organic substances obtained after decomposition from plant or animal waste. Advantages of fertilizers are they are quick in providing nutrients and restoring soil fertility they are portable and easy to transport plants easily absorb fertilizers com add also improves and increases the productivity of many crops. While the advantages of manual are day increases the water holding capacity of the soil, makes the soil porous and facilitates the exchange of gases, the texture of the soil also improves, and the number of microbes increases in the soil.

Difference between Manures and Fertilizers

Manures	Fertilizers
Manure is obtained naturally by the decomposition of dead plants and animals.	Fertilizers are chemical substances and are not typically natural.
It is not very rich in nutrients.	It is rich in soil nutrients like nitrogen, phosphorous, and potassium.

It is slowly absorbed by the plants.	It is easily absorbed by plants.
It provides a lot of humus to the soil.	It does not provide any humus to the soil.
They are prepared naturally in the fields.	They are prepared in the factories
These do not improve the physical conditions of the soil relatively	These improve the physical condition of the soil.
Does not adversely affect the plant or the soil if supplied in large quantities.	Adversely affects the soil and the plant if supplied in large quantities.

3. There are 3 natural methods of replenishing the soil nutrients, they are:
 - Field fallow: A fallow field is land that a farmer plows but does not cultivate for one or more seasons to allow the field to become more fertile again. The benefits of leaving land fallow for extended periods are: Breaking crop pest and disease cycles. Rebalancing soil nutrients. Providing a haven for wildlife.
 - Crop rotation: is defined as a system of growing different kinds of crops in recurrent succession on the same land. Rotating different crops year after year adds various economic and environmental benefits. In addition, crop rotation is helpful in long-term soil and farm management.
 - Mixed cropping: Growing two or more crops simultaneously on the same piece of land is known as mixed cropping. This lowers the risk and provides some protection if one of the crops fails. For example - Wheat with gram. These 3 natural methods have advantages like:
Helps in prevention of soil depletion, maintain soil fertility, reduces soil erosion, controls insect and mite pests.
4. Weeds are unwanted, persistent, harmful plants that impede the growth of other crop plants and negatively impact human activities, agricultural production, natural phenomena, and the national economy. Undesirable weeds are plants that grow alongside the main plants.

Ways to control weeds:

1. Weedicides, which are sprayed in fields to kill all weeds, can be used to control them.
2. Tilling before planting crops also aids in the removal of weeds.
3. Weeds are removed manually with a kauri, which entails regular uprooting or cutting of weeds close to the ground.
5. Farmers protect their crops from breast pests in different manners:
 - Crops can be protected from stray animals by putting up a fans or mud walls all around the field.
 - Birds can be scared off by beating the drums and installing scarecrows. A scarecrow is an image or an effigy in the shape of a human being that is placed in fields to frighten away birds.
 - Various poisonous chemicals are used to kill the pest in the field. They are called pesticides. Include rodenticides which are used to kill rodents such as rats, insecticides that are used to kill eggs, larvae, and adults of the insects.
6. Grains are obtained from the crops by:
 - Harvesting: a process of cutting and gathering of a matured crop. Harvesting can be done by the following methods including Sikkil that is used by hands tractor driven machines called harvesters, and by plucking the fruits and vegetables by hands.
 - The process of separating grains from harvested crops is called threshing.
 - a. Crashing is done either by hand or by using animals such as bullocks or camels. The harvested crop is spread on the ground and the camel and bullocks are made to walk over them again and again. This leads to separation of grains from the chaff.
 - b. A machine called thresher is also used for separating the grains.
 - c. Harvesting and threshing can be done simultaneously with the help of machine called combine.

2

Micro- Organisms

(A) Tick (✓) the correct option.

Ans. 1. (b) 2. (b) 3. (a) 4. (a) 5. (a)

(B) Fill in the blanks :

Ans. 1. Microscope
2. Binary fission
3. Mycelium

4. Ringworm, candidiasis
5. Silica
6. Viruses
7. Pathogens
8. Viruses
9. Bacteria
10. Sodium benzoate

(C) State whether the following are 'true or false' :

- Ans. 1. False 2. False 3. True 4. True 5. True 6. True 7. True
 8. True 9. False 10. True

(D) Match the following :

- | | | |
|-----------------------|---|---------------------------------|
| Ans. 1. Bacteria | → | a. Nostoc and Anabena |
| 2. Curding of milk | → | b. Bacteria and fungi |
| 3. Penicillin | → | c. Denitrification |
| 4. Yeast | → | d. Lactobacillus |
| 5. Blue green algae | → | e. Used in making of cakes |
| 6. Malaria | → | f. Helps in treatment of sewage |
| 7. Pseudomonas | → | g. Plasmodium |
| 8. Natural Scavengers | → | h. Antibiotic. |

(E) Answer the following questions in short :

- Ans. 1. Some organisms are known as microorganisms because these are small organisms that are not visible with the naked eye and can be seen only through a microscope.
2. Microorganisms can survive in extreme conditions because they are very adaptable and are capable of existing in extreme condition of temperatures and dryness by forming a hard outer covering called cyst. When the conditions become favourable again the cyst breaks and they come out to leave an active life.
3. Bacteria helps in biogas production by the action on excreta which further results in the production of biogas called methane that is used as fuel for cooking, heating and lighting.

4. **List of Protozoan Diseases**

Protozoan	Disease	Transmission
<i>Entamoeba histolytica</i>	Amoebiasis	Contaminated water or food
<i>Giardia lamblia</i>	Diarrhoea	Contaminated water or food
<i>Plasmodium</i>	Malaria	Mosquitoes
<i>Leishmania</i>	Visceral disease	Sand flies
<i>Trichomonas vaginalis</i>	Inflammation of urogenital tract	Sexually transmitted disease
<i>Trypanosoma brucei gambiense</i>	African sleeping sickness	Tsetse fly
<i>Cryptosporidium</i>	Watery diarrhoea	Waterborne outbreaks
<i>Toxoplasma gondii</i>	Toxoplasmosis	Ingestion of undercooked meat

5. Eutrophication is the process in which a water body becomes overly enriched with nutrients, leading to plentiful growth of simple plant life. The excessive growth (or bloom) of algae and plankton in a water body are indicators of this process. Agar, an algae is prepared by certain red algae. It is commonly used in the manufacturing of jellies, cosmetics and as a culture media for growing microorganism. It is also used as a solidifying agent in the preparation of medicines and some food products such as puddings and jellies.
6. A communicable disease is one that is spread from one person to another through a variety of ways that include: contact with blood and bodily fluids; breathing in an airborne virus; or by being bitten by an insect.
7. Nitrogen fixation is a method followed by many blue green algae like Anabena and nostoc used as fertilizers because of their ability to fix atmospheric nitrogen.

8. Along with bacteria, fungi are important as decomposers in the soil food web. They convert organic matter that is hard to digest into forms other organisms can use. Their strands – or hyphae – physically bind soil particles together, which helps water enter the soil and increases the earth's ability to retain liquid.

(F) Answer the following questions in detail:

Ans. 1. There are different types of microorganisms such as:

- Bacteria: is the simplest of all living organisms, and a single celled measuring between 2 to 100 microns. The different types of bacteria are Spherical called Cocci, rod shaped called bacilli, spiral shaped called spirilla and shaped known as vibrio. The structure of bacteria is that they are single celled Organism but can exist as a chain or a group of cells. A bacterial cell possesses a heart cell wall but does not have a nucleus. The nuclear material is scattered in the cytoplasm of the cell. Bacteria moves with the help of flagella. The nutrition of bacteria is that they synthesise their own food as they have chlorophyll in them, because of this they are known as autotrophic bacteria. They carry on photosynthesis, and produce food for themselves.
- Fungi: are plant like organisms that contain a cell wall but do not contain any chlorophyll and thus cannot perform photosynthesis. The body of fungus is made up of thread like thin filaments for hyphae. Fungi are mainly classified into 2 types, yeast and moulds. The size range of yeast ranges from 5 to 10 microns whereas mould size ranges from 2 to 10 microns east live in colonies and can be observed only through a microscope while some moulds such as mushrooms are visible with naked eye. Yeast can be cylindrical , spherical, elliptical in shape whereas moulds are cotton like threads for mycelium . Yeast can grow under aerobic as well as anaerobic conditions, while mould survive only under aerobic conditions. Fungi do not make their own food. Some fungi derived their food from dead and decaying organisms and are known as saprophytes such as mushrooms. Some fungi derived their food from other living organisms known as parasites.
- Protozoa pollen are considered to be the most primitive living organisms. Protozoans are the simplest commerce small animal like organisms. Their size ranges from 2 to 200 microns, for example amoeba, paramecium, plasmodium etc.

They obtain nutrition in following ways such as Euglena prepares its own food with the help of photosynthesis, some protozoans feed on dead and decaying matter, and some protozoans obtain their food from the body of another organisms.

- Viruses are a group of sub microorganism infectious agents that have the characteristics of both the living and non living things. They are considered as a connecting link between the living and non living world. Viruses are just like particles. They can be compared with sugar crystals when they are outside the living body. They do not have cell membrane, cytoplasm and nucleus. Each virus consists of a single strand of nuclear matter and is surrounded by a protein coat. They exhibit variety of shapes that can be spherical, rod shape, cuboidal or polygonal. The nutrition of virus is generated only from inside of the body of the host, when they are outside the body they are like a non living particle and needs no nutrition.
- 2. Beneficial bacteria are you in nitrogen fixation as some bacteria have the ability to fix free nitrogen from the air and helps in plant growth. These bacteria live in the root nodules of the leguminous plants and absorb atmospheric nitrogen and convert it into soluble nitrates. Bacteria is also helpful in decomposition of dead organisms because it helps in recycling the matter. These bacteria helps in returning carbon, nitrogen and other nutrients to the environment they are also known as natural scavengers. Bacteria is also used in formation of food products such as curd is made up with bacterial Lactobacillus. Bacteria is also helpful in the treatment of sewage as aerobic bacteria such as *Pseudomonas* and *Proteus* are utilised in the secondary treatment of sewage. It also helps in biogas production as it acts on excretory results in the production of biogas called methane used for cooking and heating. Bacteria is also used for the formation of manure and also in cellulose digestion. Bacteria is also used in industries for the production of antibiotics which are used to kill or stop the growth of other microbes. With the benefits of bacteria there are also harmful effects of bacteria such as it causes diseases that are most harmful such as tuberculosis, cholera, typhoid, whooping cough and anthrax. Bacteria also causes deterioration of food products such as it spoils the cooked food which result in food poisoning. Bacteria is also responsible for water pollution and can cause contamination of water and make a person ill.
- 3. Yeast is used in the preparation of food products such as idli, dosa, etc. Yeast does not require oxygen. It breaks down the sugar present in fruit and convert it into alcohol as a result of an anaerobic respiration. This leads to

the rising of idly or dosa mixture and its soreness. This process is known as fermentation. Yeast is also used in brewing and wine making industries as it respire anaerobically, it results in the formation of alcohol. This alcohol is used in the growing industries to make beer from Bali green. East also feeds on sugar present in grapes and helps to prepare wine. Yeast is also helpful in bakery products as it releases carbon dioxide during respiration periods this carbon dioxide is used in bakeries to make bread, pastries and cakes. East is added to the moist dough of the flour, where is respire using the sugar and produces carbon dioxide. The carbon dioxide forms the bubbles in the dough and makes the bread of cake rice. When the bread or cake is break, yeast is killed.

4. Let us study about different uses of algae in human life:
 - Nitrogen fixation: many blue green algae like anabaena and nastic are used as fertilizers because of their ability to fix atmospheric nitrogen.
 - As food: Some Algae are increasingly being used as a source of food for human consumption. Algae produce organic matter to photosynthesis, which in turn, provides food to aquatic animals.
 - Silica polin the cell walls of diatoms are a natural source of fine silica. Therefore, large deposits of diatom shells are used to make filters, special kinds of glasses and porcelain.
 - Industrial products: Agar: is prepared by certain red algae. Agar ag commonly used in the manufacturing of jellies cosmetics and as a culture media for growing microorganisms.
 - Oxygen: elgie r plant like organisms and carry out photosynthesis for obtaining food. During photosynthesis, they release oxygen which is necessary for survival.

Harmful effects of algae are that it can cause harm by releasing some toxins that pollute the water and make it unfit for drinking. Due to increase in the amount of algae in water, the elgi utilise oxygen present in the water and thus oxygen level in the water decreases. These algae compete with other aquatic animals they also released toxic chemicals that kill fishes, birds and other animals the water stinks and clean water turned into a stinking drain. This process of algae bloom due to increased nutrients in water is known as eutrophication.

5. Food preservation is the process of creating and handling food with an aim to stop or slow down its spoilage while maintaining its nutritional value format texture and flavour there are several methods of food preparation:
 - Boiling: can kill any existing microbes.
 - Dehydration and sun drying: removal of water from fruits and vegetables is called dehydration. Dehydration can be done by drying fruits and vegetables

in the sun or by removing their water content under controlled condition of temperature and humidity.

- Refrigeration and freezing: refrigerating at low temperatures and freezing helps to preserve food for a longer time because microorganisms such as bacteria and fungi cannot survive in cold temperatures. This helps in the prevention of microbial reproduction. Food items can be stored by freezing including meat milk and vegetables.
- Salting: not only adds taste and flavour but it also acts as a food preservative. Salting forces microorganisms to lose water by a process known as osmosis. Thus preventing their growth and reproduction.
- Chemical preservatives: inhibit microbial growth and are used to preserve food materials that's why they are known as preservatives.
- Pasteurization Pasteurization is a method of preservation of food in which food items are heated towards high temperature and then rapidly cooled. This helps to destroy harmful microorganisms without changing the composition form of flavour or nutritive value of the food items.
- Canning and isolation: of food in airtight cans is also an effective way of preserving food. Food materials are often kept in a closed container that reduces the chances of there being attacked by microbes.

Advantages of food preservation:

- Reduces food wastage
 - It increases the storage period of foodstuff
 - It ensures the availability of food throughout the year at every place
 - Making up for dietary inadequacies.
6. Nitrogen fixation is a method as nitrogen is an essential nutrient for life because it is needed for the formation of many biological molecules like proteins form amino acids and nucleic acids. Nitrogen cannot be directly assimilated by the living cells. Therefore it is essential to convert free nitrogen into useful nitrogen compounds. This is called fixation of nitrogen or nitrogen fixation. Nitrogen fixation occurs in 2 ways:
- Naturally: in nature, biological nitrogen fixation takes place through microorganisms containing the enzyme nitrogenase, which catalyses the conversion of atmospheric nitrogen into ammonia. The ammonia is used by plants for the synthesis of biological molecules such as amino acids, proteins and nucleic acids. These bacteria fix free nitrogen of the air as nitrogen compounds. Certain blue green algae like anabaena and nostoc can also help in fixing atmospheric nitrogen. Non leguminous plants also fix nitrogen from the atmosphere, for example alnus and ginkgo.

- By lightening: fixation of atmospheric nitrogen can be done by electric discharge during lightning. During rains, when lightning strikes, nitrogen and oxygen of the atmosphere combined to form nitric oxide. Nitric oxide on further combining with oxygen forms nitrogen dioxide. Nitric acid on reacting with some alkalis present in the soil forms nitrate. These nitrates serves as plant food and responsible for their growth.
- 7. Pathogens aadhaar disease causing microorganisms in plants animals and humans.

3

Combustion Flame and Fuels

(A) Tick (✓) the correct options:

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

(B) Fill in the blanks :

- Ans. 1. LPG or liquid petroleum gas
 2. Spontaneous combustion
 3. Combustion, supporting
 4. Water
 5. Ignition temperature
 6. Outer
 7. Complete combustion
 8. Low
 9. Calorific value
 10. More

(C) State whether the following are 'true' or 'false' :

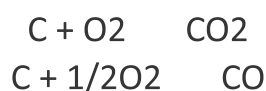
- Ans. 1. True 2. False 3. False 4. False 5. False 6. False
 7. True 8. True

(D) Match the following questions in detail :

- Ans. 1. Supporter of combustion ————— a. Coal
2. Minimum temperature at which a substance catches fire. ————— b. Calorific value
3. The burning region of gaseous fuel ————— c. LPG
4. Materials which produce heat and light ————— d. Petrol heat and light
5. The amount of heat produced by the complete combustion of one gram of fuel. ————— e. Oxygen
6. Solid fuel ————— f. Fuels
7. Liquid fuel ————— g. Flame
8. Gaseous fuel ————— h. Ignition temperature.

(E) Answer the following question in short :

- Ans. 1. Hydrogen is the gas having the highest calorific value.
2. Combustion is defined as the process of burning a substance in the presence of air or oxygen with the liberation of heat energy and light.
3. The 2 types of chemical reactions are when cold burns completely insufficient supply of oxygen, it forms carbon dioxide gas but if the air is less than the poisonous gas called carbon monoxide is emitted.



4. Calorific value is the amount of heat produced by the complete combustion of one gram of fuel. The unit of calorific value of a fuel is kJ/gm.
5. Water content is higher in green leaves due to which their ignition temperature is higher. Dry leaves have low ignition temperatures because of less water content. Due to high ignition temperature green leaves are difficult to burn.
6. CO₂ being heavier than oxygen, covers the fire like blanket and also brings down the temperature of fuel. Since, contact between the fuel and oxygen is cut off the fire comes under control.

(F) Answer the following questions in detail :

- Ans. 1. The conditions which are essential for combustion to take place are:
Combustible and non combustible substances: substances which burn easily in air or oxygen to produce heat and light alcohol combustible substances. For example: petrol, LPG, wax, wood, etc.

- The substances which do not burn are cool non combustible substances. A combustible substance only burn and does not support the presence of burning. For example hydrogenous combustible but does not support combustion.
 - Supporter of combustion. A substance which helps combustion is called supporter of combustion for example common during the combustion of carbon, oxygen is a supporter of combustion. If the supply of supporter of combustion is cut off the combustion stops and it is called as incomplete combustion. Due to incomplete combustion less heat and light are produced. For example, coal burns completely in sufficient supply of oxygen to form carbon dioxide gas but if the air is less than a poisonous gas called carbon monoxide is emitted.
 - Ignition temperature: the minimum temperature at which a substance catches fire and starts burning is known as its ignition temperature. It is also called kindling temperature or ignition point. Each substance has a definite ignition temperature that is characteristic to it. This is the reason why a lighted match, or a spark from a gas lighter, is required to ignite cooking gas in the burner. Similarly, vodka charcoal or coal begins to burn only when it is heated first with an outside source.
2. Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light, and various reaction products.the fire extinguisher works on 2 principles:
- Cooling all the burning substance to below its ignition temperature and,
 - Depriving the fire of fuel, oxygen is cut out from the combustible substances.
- Water can be used to extinguish fire on wood paper. Fire extinguisher are generally red coloured cylinders present in offices, trains, colleges and many public places. A fire extinguisher is an active Fire Protection portable device used to extinguish or control small fires by spraying it on a substance that cools the burning material and deprives the flame from oxygen. It is January handheld cylindrical pressure vessel containing an agent which can be discharged to extinguish fire. Water performs the function of an extinguisher also. Many fire extinguishers contain carbon dioxide as as it is stored in small tanks equipped with hand pumps or source of compressed gas to propel carbon dioxide through the nozzle. In a short acid fire extinguisher water is expelled out at high rate by the generation of carbon dioxide gas.

3. There are different types of combustion:
 - Rapid combustion: is a form of combustion in which large amount of heat and light is released in a very short interval of time which often results in fire. Combustion of LPG which produce heat and light instantly is an example of rapid combustion. A large volume of gas is also liberated sometimes during combustion besides the production of heat and light. The immediate liberation of large volume of gas creates excessive pressure and thereby creating a very loud noise. For example when we light firecrackers they do not only produce heat, light and sound rather there is liberation of large volumes of poisonous gases causing atmospheric pollution.
 - Slow combustion: is a type of combustion reaction that takes place very slowly and at low temperatures. The most common example of slow combustion is cellular respiration.
 - Complete combustion: of hydrocarbon fuel takes place in sufficient amount of air or oxygen. In this type of combustion, the substance gets completely burned to form its highest oxide. For example burning of carbon forms carbon dioxide as complete combustion.
 - Incomplete combustion: of hydrocarbon fuels takes place in inadequate amount of air or oxygen. In this type of combustion, some different gases are emitted. For example, when carbon is burned in insufficient quantity of air carbon monoxide is formed.
4. Candles are made up from paraffin wax obtained from the residue left during their fractional distillation of crude oil. Paraffin wax is low melting and vaporises on heating. A candle is a column of wax having a cotton thread at its centre called the wick, all along its height. There are different types of zones of a candle flame including:
 - Outermost non luminous zone: is a zone of complete combustion and is faintly visible. It surrounds the yellow luminous part of the flame. In this zone the wax vapours undergo complete combustion because plenty of air is present around it. This is the hottest part of the candle flame.
 - Central luminous zone: is a zone of incomplete combustion as it is a major part of the candle flame. This zone is bright yellow and luminous and lies below the outermost non luminous zone. In this zone wax vapour undergoes incomplete combustion because of insufficient oxygen. Its incomplete combustion of wax produces carbon particles. These growing carbon particles make the flame luminous. Thus, the central zone of the candle flame is luminous due to the incomplete combustion of wax in this zone. This part of the flame has moderate temperature.

- Inner dark zone of no combustion. The dark zone around the wick is called inner dark zone of no combustion. In this zone, very little or no combustion takes place because in this zone no air is present. This zone is dark due to the presence of unburned carbon particles in the wax vapour. This part of the flame is the least hot.

The lowest Blue Zone: is the zone located at the base of the flame. The blue colour of this zone is due to the burning of carbon monoxide produced in the dark zone.

5. The fuels are classified on the basis of their occurrence in 2 subtypes:

- Natural fuels or primary fuels: these fuels can be used directly. They are present in nature and are available easily. For example, coal, natural gas, petroleum, wood, etc.
- Processed fuels or secondary fuels: these fuels are obtained from the primary fuel by various physical or chemical processes. For example, kerosene, diesel, petrol, etc.

On the basis of physical state, fuels are divided into 3 types:

- Solid fuels: are the fuels that exist in solid state at room temperature. Solid fuels contain mainly carbon both as free and combined carbon. For example, firewood, agricultural waste, animal dung cakes, coke, coal, etc.
- Liquid fuels: are the fuels that exist in liquid state at room temperature. For example, petrol, diesel, etc.
- Gaseous fuels: are the fuels that exist in the form of gas at the room temperature. For example, natural gas, hydrogen gas, CNG, LPG, etc.

6. There are several characteristics that are important for a fuel to be ideal:

- it should have a high calorific value
- its ignition temperature should be low but well above the room temperature for it to catch fire at a desired point.
- The rate of combustion of the fuel should be moderate and such that the heat is released in a controlled manner. The fuel should burn smoothly and sputter.
- An ideal fuel should have low content of non combustible materials so that it does not pollute the air by releasing harmful gases.
- An ideal fuel should be easily available in large quantities and should also be cheap.
- A fuel should be easy to store and transport. Quite a large number of precautions have to be taken to handle, store and transport fuels as some of the fuels may be highly flammable.

- Quantity of a fuel is just by the emissions of suspended particulate matter, sulphur dioxide or carbon monoxide gases. A fuel is considered better if it does not produce these pollutants.
- 7. The common fuels burned in these appliances are natural or LPG gas, fuel oil, kerosene, wood, or coal. The types and amounts of pollutants produced depend upon the type of appliance, how well the appliance is installed, maintained, and vented, and the kind of fuel it uses. Some of the common pollutants produced from burning these fuels are carbon monoxide, nitrogen dioxide, particles, and sulphur dioxide. Particles can have hazardous chemicals attached to them. Other pollutants that can be produced by some appliances are unburned hydrocarbons and aldehydes.

4.

Coal and Petroleum

(A) Tick (3) the correct option :

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

(B) Fill in the blanks :

- Ans. 1. Coal, petroleum and natural gas
 2. Fractional distillation
 3. Cellulose
 4. lignite
 5. Hydrocarbons
 6. CNG

(C) State whether the following are 'true' or 'false':

Ans. 1. False 2. False 3. True 4. False 5. False 6. False

(D) Answer the following questions in short :

- Ans. 1. Bitumen is the petroleum product used for surfacing of roads.
 2. **The advantages of using compressed natural gas (CNG) and liquefied petroleum gas (LPG) as fuels are:**
1. They can be burnt directly.
 2. They can be transported easily through pipe lines.
 3. They are clean fuels and do not give smoke and harmful gases when burnt.

4. They give sufficiently good amount of heat energy when burnt.
3. Fossil fuels are the fuels found by the decomposition of dead plants and animals that got buried under the earth millions of years ago. Fossil fuels are formed from prehistoric plants and animals that lived millions of years ago. The ancient plants and animals lived in swamps and oceans. When these living things died in the soil, after millions of years passed, the dead plants and animals slowly decomposed into fossil fuels.
4. There are various sources of coals:
 - Coal is used as a fuel because it burns easily and has a high calorific value.
 - Coal is used to make fuel such as coal, gas, synthetic petrol, methane and coke.
 - Chemical energy stored in coal is used to heat water to produce steam that turns the turbines to rotate which generate electricity.
 - Coal is used to manufacture industrially useful organic compounds such as benzene, naphthalene etc.
5. The process used to separate the various components of petroleum is fractional distillation. It is a process used for separation of a mixture into its components by heating the mixture till the fractions separate out.
6. Natural gas is found with petroleum in oil wells. There are however, some oil wells, which yield only natural gas. It generates a large amount of heat by burning a unit quantity. Natural gas consists only of methane is called dry natural gas.
7. Limitations of natural resources are that it takes millions of years to form fossil fuels. They are called non-renewable resources because they are formed with extremely slow rate in the earth's crust. Presently, the rate at which these non-renewable resources of energy are being consumed is higher than the rate at which they are formed. It is expected that their stocks are likely to be exhausted in the middle of 21st century. Hence depletion of non-renewable resources of energy is known as energy crisis.

(E) Answer the following question in detail :

- Ans. 1. Coal is mainly composed of carbon but it also contains hydrogen, oxygen, nitrogen, and sulphur. Coal is classified on the basis of the presence of carbon content in it and the amount of heat it produces. The coal is classified into following types:
- Peat: is a spongy type of organic matter, and contains lot of fibre. It is the top most layer in the formation of coal and is the earliest stage in coal formation. It contains 27% of carbon.

- Lignite: is the young stage of coal formation. It has 28% to 30% of carbon. It has lot of fibrous matter and moisture. Its calorific value is 4.72 9.9 KJ/G hence, its value as a fuel is low. It is also known as brown coal.
 - Bituminous: Is the most commonly used variety of coal. It is shiny black in colour and has low moisture content. Its carbon content is 75% to 80% and its calorific value is 28 to 31 KJ/g.
 - Anthracite: is the best form of coal. It has less moisture content and is also known as smokeless coal. Its carbon content is 92-95% and its calorific value is 31 to 35 kJ per gram.
2. Destructive distillation of coal is a process when on heating the coal strongly in a closed tube, it breaks down into different components such as coal gas, coal tar, ammoniacal liquor and coke. This process is known as destructive distillation. The various product obtained during destructive distillation of coal are:
- Coal gas: is a mixture of hydrogen, methane and carbon monoxide gases. It is considered as good fuel due to its high calorific value. Coal gas is used as cooking gas, for lighting purposes and in chemical and metallurgical processes to create reducing atmosphere.
 - Ammoniacal liquor: is a solution of ammonia in water. When it reacts with sulphuric acid, it forms ammonium sulphate which is used as a fertilizer.
 - Coke: is a solid material containing mainly carbon. It is a very good fuel with the high calorific value than coal. Coal with less ash and sulphur content is quite highly priced in the market as it burns without smoke. It is also used as an excellent reducing agent in industries. It is also used to prepare industrially important gases like water gas. Coke is a good starting material for the preparation of Acetylene, acetic acid and plastic like polyvinyl chloride.
 - Cold Tar: is a viscous brown or black liquid. It is a residue left behind after destructive distillation of coal. It smells like naphthalene. It is a mixture of 200 organic compounds. Compounds obtained from coal tar are benzene, toluene, phenol, naphthalene, anthracene, etc.
3. Petroleum or petrol is used as a fuel in light automobiles such as motorcycles, scooters and cars. Heavy motor vehicles like trucks and tractors use diesel as a fuel. Petroleum is extremely important for the economy of a nation as it is a versatile source of energy. It is often called as black gold. The formation of petroleum was done by the organisms living in the sea. When these organisms died their bodies settled at a sea bed.

Over a period of time sand and clay accumulated over the layers of these plant and animal remains. These were subjected under high pressure and heat. Gradually they were converted into layers of sedimentary rocks. Plant and animal remain with the sedimentary rocks were eventually transformed into petroleum and natural gas.

4. Petrochemicals are chemical products derived from petroleum. **Some** chemical compounds made from petroleum are also obtained from other fossil fuels, such **as** coal or natural gas, or renewable sources such **as** corn, palm fruit or sugar cane.
- petrochemical. **Chemical** obtained either directly from cracking (pyrolysis), or indirectly from **chemical** processing, of petroleum **Oil** or **natural gas**. Major petrochemicals are acetylene, benzene, ethane, ethylene, **methane**, propane, and **hydrogen**, from which hundreds of other chemicals are derived. The various fraction of petroleum and their uses
- 1) **Petroleum gas**: It is used as a fuel in homes and industry. It is used as a fuel as such or in the form of Liquefied petroleum gas(LPG)
 - 2) **Petrol**: It is used a fuel in light motor vehicles. It is also used as a solvent for dry cleaning.
 - 3) **Kerosene**: It is used as a fuel in wick stoves and pressure stoves to cook food. It is used in lanterns for a lightning purpose.
 - 4) **Diesel**: It is used as a fuel in heavy motor vehicles. It is also used to run pump sets for irrigation in agriculture and in electric generators.
 - 5) **Lubricating oil**: It is used for lubrication in machines and engines.
 - 6) **Paraffin Wax**: It is used for making candles, vaseline, ointments, wax paper, and grease.
 - 7) **Bitumen**: It is used for road surfacing. It is also used for water-proofing the roofs of the building. It is used in making black paints.
5. With the usage of fossil fuels their conservation is also an important task because keeping in mind the limitations of fossil fuels the need to conserve natural resources to the extent where they are available for future generations as well. Several ways in which the conservation of fossil fuels can be done are:
- Use only renewable energy sources
 - In gas stoves, use high efficiency oils which burns up blue flame and not with a yellow flame
 - Switch off lights and fans when not in use
 - Use room heaters, coolers and air conditioners only when necessary.
 - Use vessels with a flat bottom for heating and not vessels with a round bottom

- Use solar cookers and solar heaters wherever possible
- Use energy saving devices like pressure cookers for cooking
- Cover the vessel while cooking vegetables, Dal, meat to prevent heat loss and use casseroles for keeping the eatables hot instead of heating them again and again
- Use compact fluorescent lamps, bulbs and tube lights which consume less energy instead of lamps that consumes more energy.
- Drive at a constant and moderate speed as far as possible. Switch off the engine at traffic lights or at a place when you are waiting.
- Ensure correct air pressure in the tyres.
- Maintenance of vehicles should be ensured regularly

5

Conservation of Plants & Animals

(A) Tick (3) the correct option :

- Ans. 1. (a) 2. (d) 3. (b) 4. (a) 5. (a) 6. (a)
7. (d)

(B) Fill in the blanks :

- Ans. 1. Microorganisms, plants and animals
2. India
3. Uttarakhand
4. Vulnerable species
5. Wildlife sanctuary
6. Endemic species
7. 1970, Chandi Prasad Bhatt
8. Calamites, Silphium
9. Climatic changes
10. Siberian crane

(C) State whether the following are 'true' or 'false':

- Ans. 1. False 2. True 3. True 4. False 5. True

(D) Match the following :

- Ans.
- | | | | |
|----|-----------------------------|------|----------------------|
| 1. | Kanha National Park | → a. | Madhya Pradesh |
| 2. | Kaziranga National Park | → b. | Ex-situ conservation |
| 3. | Red Data Book | → c. | IUCN |
| 4. | Seed Bank | → d. | Jammu & Kashmir |
| 5. | Dachigam wildlife sanctuary | → e. | Rhinoceros. |

(E) Answer the following questions in shorts:

- Ans.
1. Conversation is a wise use of natural resources with an aim to preserve and protect them.
 2. Biodiversity is the existence of a diverse variety of plants, animals and other living form.
 3. Biosphere reserves are the multi-purpose protected areas developed to:
 - Conserve biodiversity and integrity of plants animals and microorganisms
 - Educate train and create awareness about environmental aspects and eco friendly living
 4. Some of the wildlife sanctuaries in India are:
 - Gir wildlife sanctuary in Gujarat
 - Mudumalai wildlife sanctuary in Tamil Nadu
 - Ghana wildlife sanctuary Rajasthan
 - Dachigam wildlife sanctuary in Jammu and Kashmir
 5. National parks are protective areas reserved exclusively for the betterment of the wildlife. It is an area established at the approval of legislature some examples of National Park in India are Corbett National Park in nainital Uttarakhand, kanha National Park in Mandla Madhya Pradesh kaziranga national park in assam, etc. Migration is a movement of organisms from one place to another due to certain reasons Sandeep no
 6. Migration is a movement of organisms from one place to another due to certain reasons.

There are 4 several reasons for migration done by organisms:

 - To escape from the inhospitable climate
 - Enables birds to find plenty of food throughout the year
 - Migration provides a suitable place for reproduction which may not be available in their native place. For example the salmon migrates from saltwater to freshwater to lay eggs and comes back while freshwater is go to saltwater from fresh water to lay eggs.
 7. Paper is an important product that we obtained from the forests. It takes 17 full grown trees to make one tonne of paper. If we can save one paper in a day we can save many trees in a year. Paper may can be recycled 5 to 7 times for use. We should save, reuse used paper and recycle. By saving paper we are not

only save trees but also save energy and water needed for manufacturing paper. Also, it will reduce the garbage disposal problem and the pollution caused by the industries that are manufacturing papers.

(F) Answer the following questions in details:

1. Extinct species are the species whose members are not alive and their chances for further evolution are lost. There are 3 types of extinction:
 - Natural extinction: takes place due to the changes in the climatic or environmental conditions.
 - Mass extinction: When a large number of species become extinct due to natural catastrophes, it is called mass extinction. Mass extinction has taken place in earth's geological history.
 - Anthropogenic extinction: man-made extinction or extinction caused due to human activities is known as anthropogenic extinction. It occurs within a short period of time and can be minimised and controlled.
2. Threatened species are those species which have greatly reduced in number. Their natural habitats have been disturbed due to which these are near to extinct and are likely to become extinct if corrective measures are not taken on time. IUCN categorises threatened species into 3 categories:
 - Endangered species: are those species that are represented by fewer individuals because of unfavourable factors. These species would become extinct if the same factor continues. Examples are Indian rhinoceros, crocodile, blue whale, etc.
 - Vulnerable species: are those species that are likely to move into categories of endangered species if unfavourable conditions continue to operate in their habitat. Population of these species has been seriously depleted and their ultimate security is not assured. Some vulnerable species are cheetah, lion, musk deer and Indian bison.
 - Rare species are those species whose population are originally small and scattered in the world. These are localised in certain geographical areas and exhibit scattered population considering their global environment. In future, these species may enter into the category of vulnerable or endangered species for example, golden cat, monk seal, wild buffalo, etc.
3. **Endangered species:**
 1. An endangered species is a type of organism that is threatened by extinction.
 2. Species become endangered for two main reasons: loss of habitat and loss of genetic variation.

Five endangered species are:

1. Asiatic lion (*Panthera leo persica*).
2. Bengal tiger (*Panthera tigris tigris*).

3. Blue whale (*Balaenoptera musculus*).
 4. Banteng (*Bos javanicus*).
 5. Central Kashmir vole (*Alticola montosa*).
4. Extinction refers to the condition when a species becomes extinct, or its genetic heritage is lost. The species evolve into new species in order to attempt to cope with environmental changes or changes in the genetic heritage. Over 99% of all the species that once lived on the earth, amounting to over 5 billion species are estimated to be extinct. This could happen naturally due to the change in the environment or because of human activities like overhunting or destruction of habitat. The important causes of extinction include:
- Climate change: is yet another factor that could destroy terrestrial organisms. During the end of the last Ice Age most of the mega fauna were unable to adapt to the changing ambient temperatures.
 - Disease: various epidemics had been the cause of epidemic of a large population of humans and animals on earth. The Black Death wiped out 1/3 of the European population in the Middle Ages.
 - Loss of habitat: every animal has its own comfort zone where it can breed and raise its young ones. For example a bird is comfortable only on the branch of a tree. Due to expansion of human civilization and industrialisation, the forests have been destroyed which are an abode to most animals. Due to lack of space and eventually food the population of many organisms has been minimised.
 - Lack of genetic diversity: once the number of species start decreasing, the gene pool of that species grows smaller. Eventually, there is a lack of genetic diversity. For example, due to the habitat loss the African cheetah have a considerable low genetic diversity.
 - Pollution: is another factor that comes from industries and vehicles that has led to a drastic change in the oxygen levels of the atmosphere as well as water. This has led to the extinction of most of the aquatic as well as terrestrial species.
5. Differentiate between:
- a. Wildlife sanctuary: is a sanctuary or an area where protection is given only to fauna and operations such as harvesting of timber and collection of minor forest products are permitted so as they do not interfere with the well being of the animals. Killing or capturing of any species is prohibited. The number of sanctuaries in our country is 421.
Biosphere reserve refers to the areas that are used for multi purpose protection to conserve biodiversity and integrity of plants and animals and microorganisms. End to educate, train and create awareness about environmental aspects and eco friendly living
 - b. Zoo: or a zoological park refers to any park building, cage enclosure in which a

living animal or animals are kept for public exhibition. Zoo plays a major role in creating awareness among common people about the need to conserve nature. In India there are 169 zoos. The central zoo authority of India provides financial assistance to zoos and also gave funds for animal breeding programmes.

Botanical gardens: have been established to conserve rare plants and threatened species. Plant species are grown for identification purposes and each of the plants is labelled to indicate its scientific name, common name and vernacular name.

- c. Endangered species: are those species that are represented by fewer individuals because of unfavourable factors. These species would become extinct if the same factor continues.

Extinct species: is considered to be extinct when there is no reasonable doubt that its last existing member has died. Some extinct species are dodo, thylacine and passenger pigeon.

d.

- e. In situ: are those strategies that deal with the conservation of living resources through the maintenance within their natural habitat. It includes national parks, sanctuaries, biosphere reserves and forest reserves.

Ex situ: refers to the conservation of species outside the natural habitats. These include zoos, botanical gardens, seedbank and gene banks.

- 6. There are various steps and methods that are used to conserve forests:
 - Large scale cutting of trees should be avoided
 - Plantation of trees should be undertaken on a large scale
 - Effective system to fight forest fires should be set up

(A) Tick (✓) the correct option

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

(B) Fill in the blanks :

Ans. 1. Sexual
2. Hydras
3. Internal fertilization
4. Sexual reproduction
5. Egg, Uterus
6. Sperms, seminal fluid
7. Budding, binary fission
8. Milk

(C) State whether the following are 'true or false':

Ans. 1. True 2. False 3. False 4. True 5. False
6. True 7. True 8. False 9. True 10. True.

(D) Match the following :

Ans. 1. Hermaphrodites	→	a. Binary fission
2. Ameoba	→	b. Honeybees
3. Amniotic Sac	→	c. Birds
4. Implantation	→	d. Leeches
5. Parthenogenesis	→	e. Uterus
6. Oviparous	→	f. Tadpole
7. Viviparous	→	g. Shock absorber
8. Metamorphosis	→	h. Dolly
9. Clone	→	i. Testes
10. Male reproductive part	→	j. Humans

(E) Answer the following questions in short :

Ans. 1. Reproduction is a basic life process by which a living organism produces a new individual by using its own body material. The offspring or new individuals resembles its parents in all the basic features.
Reproduction is essential for the existence of any species. In the absence of it, a species would become extinct.

2. The organisms which lay eggs are called oviparous animals.
Organisms which directly give birth to young ones are called viviparous animals.
3. Fertilization in Humans
 1. Once a month, an egg cell is released from the ovary by process called ovulation.
 2. The egg cell moves into the oviduct or fallopian tube.
 3. During copulation, millions of sperms are released by penis inside the vagina. The sperms travel upwards into the uterus and gradually reach the oviduct, A single sperm meets the egg cell in the oviduct and fertilization takes place here.
 4. The fertilization egg moves down to the fallopian tubes into the uterus and develops into a human embryo.
Each of the parent contributes, equally to the formation of a zygote. Thus, the new individual which develops from the zygote inherits characteristic features of both the parents.
4. The embryo which is surrounded by a fluid filled sac called amniotic sac. It acts as a shock absorber.
5. Parthenogenesis is a form of reproduction in which the ovum develops into a new individual without fertilization. It has been observed in many lower animals, especially insects, e.g., aphids and honeybees. In honeybees, the queen and workers develop from the fertilized ova. However, males, called drones, are produced parthenogenetically, i.e., from an unfertilized egg.
6. Embryo gets embedded in the wall of the uterus. This process is termed as implantation. Here the embryo gets nutrition through a structure called placenta. Placenta supplies oxygen, hormones, nutrients and water to the developing embryo.
7. The mother's milk contains all the essential nutrients of a balanced diet in correct proportion needed by the newborn.
Mother's milk acts as a balanced diet for a newborn. It contains water, fats, lipids, a number of proteins, vitamins and minerals such as calcium and phosphorus. The milk also contains certain chemical substances which help in protecting the baby against infections and diseases.
8. If the fertilization does not take place, the unfertilized egg is expelled out from the uterus through the vaginal opening. In this, the lining of uterus is shed which becomes thick and cushiony, to prepare itself for receiving the fertilized egg. This is accompanied by a loss of blood. This duration is called a woman's period and technically this phase is called the menstruation'.

(F) Answer the following questions in detail:

Ans. 1. Fertilization in Humans

1. Once a month, an egg cell is released from the ovary by process called ovulation.
2. The egg cell moves into the oviduct or fallopian tube.
3. During copulation, millions of sperms are released by penis inside the vagina. The sperms travel upwards into the uterus and gradually reach the oviduct, A single sperm meets the egg cell in the oviduct and fertilization takes place here.
4. The fertilization egg moves down to the fallopian tubes into the uterus and develops into a human embryo.

Each of the parent contributes, equally to the formation of a zygote. Thus, the new individual which develops from the zygote inherits characteristic features of both the parents.

2. In case of human beings, the development starts from the fallopian tubes after the zygote is formed but is completed in the uterus where the baby grows and matures to be born.

In some animals such as frogs and butterflies, the zygote does not develop into a baby that looks like an adult, but it undergoes various other stages before becoming young one that looks like an adult. For example, a frog lays eggs in large numbers is called spawning. The baby that hatches out of a frog's egg has a structure like a fish and is called a tadpole. The tadpole undergoes several changes before becoming an adult frog.

In the same way, a caterpillar that hatches out of a butterfly's egg undergoes many stages such as larva, pupa before becoming an adult butterfly. In this case, the young caterpillars and pupae look entirely different from the adult. Their food and habitat are also different.

The process in which the zygote undergoes through a number of stages before developing into a young one that looks like an adult is known as metamorphosis. The word metamorphosis is derived from the 'meta' (meaning 'after') and 'morphe' (means ' form'). The life cycle of a frog and butterfly are shown in figure.

3. The male reproductive system of human beings comprises of the following organs:

Testes : These are two in number and are somewhat oval in shape. They lie within the scrotum. The testes produce the male sex cells, called sperms and the sex hormone, testosterone.

Vas deferens (Sperm duct) : This duct starts from the testes to the urethra by the muscular action of its wall.

Penis : Penis is a copulatory organ for the transfer of sperms into the vagina of the female.

Urethra : An organ called urethra is present inside the male reproductive system. It receives sperms and the fluid secreted by the seminal vesicles. This fluid provides nourishment to the sperms. The mixture of sperms and the fluid is called semen. This duct opens into the urethra.

Both the penis and urethra are also part of the male excretory system and help to excrete urine,

The testes lie outside the abdominal cavity enclosed in two small sacs of skin, called scrotum or scrotal sacs, which hang from the pubic region on either side of the penis. Testes are made up of a coiled mass of tubules which contain immature sperms.

4. Female Reproductive System

The female reproductive system consists of the following main organs:

Ovaries : There are two ovaries in a female body. Each ovary has the shape and almost the size of an almond. They produce one mature ovum each after every four weeks and female sex cells called ova.

Oviduct (Fallopian tube): it is a thin and coiled muscular tube which joins the uterus and the ovary. It carries the ovum released from ovaries.

Uterus: It is a broader muscular chamber which receives the ovum and contains the developing foetus.

External genitalia called **vulva**.

Vagina: The uterus opens into a wide muscular tube called vagina. The vagina serves as the copulatory organ and receives the sperms during copulation. It also acts as a birth canal. The vulva contains the opening of vagina.

5. Asexual Reproduction

The method of reproduction in which a single organism can give birth to one or more offsprings of its kind by itself is called asexual reproduction. In asexual reproduction, formation of gametes (reproductive cells) is not involved, therefore it does not require both male and female. It involves only one parent. This type of reproduction is observed in plants and lower animals such as amoeba, euglena, hydra, starfish, sponges and worms.

Sexual Reproduction

The method of reproduction in which both the parents (male and female) are needed to reproduce individuals of the same kind is called sexual reproduction. Sexual reproduction involves the formation and fusion of gametes (reproductive cells).

The male parent produces male gamete, i.e., sperm and the female parent produces the female gamete i.e. ovum (plural ova). The male and female gametes fuse to form the fertilized egg called zygote by the process known as fertilization.

Fish, frog, higher animals such as dogs, horses, cows and human beings reproduce by sexual reproduction.

6. When the fertilized egg reaches the uterus, it implants itself there. During the first eight weeks after fertilization, the baby is called as embryo.

The embryo gets embedded in the wall of the uterus for further development. It continues to develop in the uterus. Embryo attaches itself to the uterus wall, with the help of a disc like structure called the placenta. The embryo gradually grows inside the uterus and differentiate into hands, legs, head, eyes etc.

The stage of the embryo in which all the body parts can be indentified is called foetus. When the development of the foetus is complete, the mother gives birth to the baby.

The baby stays and grows inside the mother's womb (uterus) for about forty weeks or 9 months to develop completely. This is called the gestation period. During this time, the baby takes nourishment from the mother through the placenta and the umbilical cord.

The process of formation of an offspring from a zygote is known as development.

In case of human beings, the development starts from the fallopian tubes after the zygote is formed, but is completed in the uterus when the baby is grown and matures to be born.

7. Most of the animals reproduce sexually by producing gametes. The fusion of gametes leads to formation of zygote. The basic process of sexual reproduction is called fertilization.

Fertilization

The process of fusion of the male gamete (sperm) and female (ovum) is called fertilization. Fertilization is of two types:

External Fertilisation

When the fusion of male gametes and female gametes takes place outside the body of female partner, the fertilization is called external fertilization.

The organisms lay or discharge their gametes outside the body, where fertilization takes place.

In frogs and fishes, the male and female partners release their gametes in water. When male and female come together in water hundreds of eggs are released from the female body. These eggs float on the surface of water and are protected by a jelly like substance which hold these eggs together. Then male discharges sperm on the eggs. The egg and sperm fuse together after coming in contact. This is called fertilization. In external fertilization, production of a large number of sperms and eggs is necessary for fertilization because all the gametes do not fertilise as these get exposed to water, wind, rainfall and predators in water.

Internal Fertilization

When the fusion of the gametes of the male and female takes place inside the

body of the female partner, the fertilization is called internal fertilization.

In higher vertebrates like birds, mammals etc, the sperms are released into the female's body where fertilization takes place. This fertilized egg undergoes development in the female body.

Chapter-7

Adolescence & Reproductive Health

(A) Tick (✓) the correct option

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

(B) Fill in the blanks :

- Ans. 1. 11, 18-19
2. thyroid gland
3. sebaceous, sweat
4. pituitary gland
5. menarche
6. AIDS, STDs
7. insulin
8. menstruation

(C) State whether the following are 'true or false':

- Ans. 1. True 2. False 3. True 4. False 5. True
6. True 7. False 8. True

(D) Match the following :

- | | |
|---------------------|--------------------------------|
| Ans. 1. Oestrogen | a. Female hormone |
| 2. Adam's apple | b. Protruding part of throat |
| 3. Sebaceous glands | c. Oil glands |
| 4. Sweat | d. Mixture of salts |
| 5. Testosterone | e. Male hormone |
| 6. Menstrual cycle | f. Shedding of uterus wall |
| 7. AIDS | g. Venereal disease |
| 8. Insulin | h. Diabetes |
| 9. Thyroxine | i. Released from thyroid gland |
| 10. XX + XX | j. Female child |

(E) Answer the following questions in short :

- Ans. 1. **Adolescence** - The period of life between puberty and adulthood.
2. **Menarche** - The first menstrual flow at puberty in females.
Menopause - Cessation of menstruation in a female.
3. The exocrine glands are also known as ducted glands as their secretions are carried by the ducts. The examples of exocrine glands are salivary gland and tear glands. The glands which do not have ducts are called endocrine or ductless glands. The secretions of these glands are called hormones and are released into the blood.

4. You have already studied that the development of eggs of insects (such as silkworm) and frogs into adults through different stages is called metamorphosis. This is controlled by hormones.

In insects change of a larva to adult insects is controlled by insect hormone which is a combination of moulting hormone and juvenile hormone.

In frogs, metamorphosis is controlled by the hormone thyroxine produced by the thyroid gland. The production of thyroxine requires the presence of iodine in the water. In the absence of iodine, tadpoles cannot become adults.

5. Health is general state of a person's physical, mental and social well being. Health means freedom from sickness, disease, anxiety and tensions. To keep the body healthy, every human being needs to have a balanced diet. One should also observe personal hygiene and do physical exercise. Reproductive health is also an important aspect of Good health. Reproductive health includes all those aspects that ensure a responsible, safe and satisfying life.
6. The diseases which are transmitted from an infected person to a healthy person through sexual contact are called sexually transmitted diseases (STDs) or venereal diseases. The most common STDs are AIDS (Acquired immune deficiency syndrome), Syphilis, gonorrhoea and trichomoniasis. The causative agent of AIDS is human immunodeficiency virus (HIV).
7. During adolescence a lot of physical and mental changes occur. The adolescent sometimes may feel confused or insecure due to the stress caused by emotional pressure. Some individual from your peer group may suggest you to take drugs, smoke or alcohol for pleasure or to find relief from anxiety. These are bad for health and should be avoided. Just Say No to drugs as they are addictive (habit-forming). They have damaging effects on the body and mind. These bad habits of taking drugs/alcohol act as slow poison and degrade the body slowly.
8. AIDS is caused by a virus called HIV (Human Immunodeficiency Virus). This disease can be passed on from an infected person to another by sharing the needle of the syringe used for injecting drugs, blood transfusion, unprotected sex activities with an infected person and from an infected mother to a child.
- The HIV virus destroys the natural defence-mechanism of the body and make it susceptible to diseases. There is no vaccine or medicine for AIDS so far. So, as it stands today, AIDS is a preventable disease.

(F) Answer the following questions in detail:

Ans. 1. **Puberty in Girls**

Though it is not clearly defined that the secondary sexual character develops at which age but, in most girls puberty stage starts at the age of 11 or 12 and is complete by the age of 17. Female hormone oestrogen is responsible for the production of eggs and development of secondary sexual characters in female.

Some of the secondary sexual characters that develop in girls during Puberty are as follows:

- * Breasts develop and increase in size.
- * Hair develop in the armpits and pubic regions.
- * Hips broaden and pelvic region widens due to deposition of fats.
- * The voice become high pitched.
- * The menstrual cycle begins.

Puberty in Boys

In boys, Puberty usually starts around the age of 12 to 14 and continues till about the age of 18. Male hormone Testosterone is responsible for the development of secondary sex characteristics and the development of sperm cells in males.

Some of the secondary sexual characters that develop in boys during puberty are follows.

- * Facial hair (beard and moustaches develop).
- * The adam's apple becomes larger and voice become deep and heavy.
- * Muscles develop and shoulder become broad.
- * Hair develop under the armpits under chest, and in the pubic regions.

Growth is very rapid at the Puberty stage of an individual's life. The changes that one undergoes during this period are both physical and Psychological.

During puberty, there is a sudden increase in height.

At this time the long bones, that is, the bones of the arms and the legs elongate and make a person tall.

Girls usually grow faster than boys but about the age of 18, both reach their maximum height because boys gradually start gaining height and often surpass the height of girls.

The rate of increase in height is not same in all individuals. It varies from person to person. Some gain height earlier than the others, some grown suddenly while some grown gradually.

When a person enters the state of puberty, the body undergoes certain changes. These are described below:

In Males

- * The Shoulders broaden.
- * The Muscles of the arms and legs grow prominently because of protein deposited.

In Female

- * The regions below the waist becomes wider.
- * Fat starts depositing in the region of hips and thighs.

During puberty, the activity of sebaceous or oil glands and secretion of sweat glands increases.

- * The sebaceous glands produce oil or sebum which contain fatty acids and keeps the skin oily. This can results in acne and pimples on the face.

- * The sweat glands produce sweat which is a mixture of salts.

During puberty, the secretion of both these glands increases, especially in the armpits. This may result in characteristic odour of the body.

At Puberty, the reproductive organs of both males and females mature completely and become functional.

The male sex organs like the testes and penis develop completely. They start to produce the male gametes, the sperms and sex hormones.

In female, the ovaries enlarge and start producing female gamete called ova or egg and sex hormones

2. The reproductive organs of human beings, i.e., testis and ovary, secrete sex hormones which control all reproductive changes.

The testes secrete the male sex hormone called Testosterone. This regulates the development of secondary sexual characters and other changes at puberty. During puberty, the male gametes or sperm mature under the influence of testosterone.

The ovaries secrete the female sex hormone called estrogen. This results in the pubertal changes such as development of breasts and broadening of region below waist and deposition of fat in the hips and thighs.

The release of sex hormones in both male and females is under the control of a hormone secreted from endocrine gland called pituitary gland. The Pituitary gland itself in the development of sex cells.

These are as follows:

- * Follicle Stimulating hormone (FSH) in females.

- * Interstitial Cell Stimulating Hormone (ICSH) in males.

3. At Puberty, the reproductive organ, ovaries mature and start producing gametes. However the reproductive phase, in which gametes are produced is much longer in males than in the females.

There are two ovaries which are situated in the abdominal cavity. These produce one mature ovum each after every four weeks.

The process by which a mature ovum is released from an ovary is called ovulation.

During this period the wall of the uterus becomes thick. This is the preparation of uterus for receiving the fertilized egg and for the development of zygote.

It fertilization occurs, the developing zygote gets implanted in the wall of the uterus and develops into a foetus.

It fertilization does not occur, the released egg, and the thickened lining of the uterus along with its blood vessels are shed off. This causes bleeding called menstrual flow.

The bleeding from the vagina due to the break down of the thickened inner wall of the uterus and its blood vessels is called menstruation. Menstrual flow lasts for 4-7

days.

The beginning of Menstruation of Puberty is called Menarche. It determines the reproductive life of woman. Menstruation occurs once in 28-30 days.

The cycle of changes taking place in ovaries and uterus in every 28 days and marked by the menstrual flow is called menstrual cycle.

At 45 to 50 years of age, the menstrual cycle stops. Stoppage of menstrual flow is termed Menopause. Initially menstrual cycle may be irregular but it takes some time to become regular.

4. Zygote contains chromosomes in the nucleus which are thread like structures found in the cells that carry information in the form of genes.

Chromosomes present in the Zygote are responsible for determining the sex of the baby.

The human begins have 23 pairs of chromosomes in the nucleus of each cell.

- * 22 pairs of chromosomes out of 23 chromosomes are called Auto somes. They are responsible for the general characteristics of the human begins.
- * The remaining one pair, xy or xx of the chromosomes is called Allosomes or sex chromosomes which is different in males and females.

A female has two X chromosomes, while a male has one X and one Y chromosome.

The sex of a child totally depends upon the combination of sex chromosomes obtained from the parents. The gametes (egg and sperm) have only one set of chromosomes. The female gametes always have X chromosomes. But the male gametes may have X or Y chromosome. During fertilization, the female gamete (egg) fuses with the male gamete (sperm). Therefore,

- * When a sperm having X chromosome fuses with an egg having X chromosome the zygote would develop into a female child having two chromosomes.
- * When a sperm having Y chromosome fuses with an egg having X chromosome the zygote would develop into a male child with XY chromosomes.

Sex chromosomes of the father determine the sex of an unborn baby. Mother is not responsible for the sex of her baby and hence to blame her for this is totally unjustified.

5. The secretion of hormones is under the control of the pituitary gland located at the base of the brain.

- * These hormones reach the other glands to stimulate the production of other hormones.
- * The hormones released by the endocrine glands (or ductless glands) enter the blood stream.
- * The hormones then reaches a specific body part, such as an organ, tissue or cell. Such a body part is called the target site.
- * The target site then responds to hormone.

* The whole scheme of the role played by hormones in initiating reproductive functions is illustrated below.

6. All young girls and boys must have some physical exercise like, walking, running, cycling, jogging, swimming, skipping and dancing. It enhances growth, increase blood circulation and release tensions.

(G) Higher Order Thinking Skills (HOTS):

Chapter-8

Force and Friction

(A) Tick (✓) the correct option

- Ans. 1. (b) 2. (a) 3. (d) 4. (b) 5. (b) 6. (c)
7. (c) 8. (d)

(B) Fill in the blanks :

- Ans. 1. force. 2. gravitational 3. pull
4. attracts 5. newton 6. repels
7. motion 8. smoothners 9. reduces
10. less

(C) Give reasons for the following:

1. Because of the less friction.
2. Because the surface of the tyres become smooth, that furthers causes less friction, leading it to skid.
3. It experiences friction force due to which energy is released, this tremendous heat is produced.
4. Because they have strong engines and a streamlined body, they fly above sea level where air density is low and pressure is less.

(D) State whether the following are 'true or false':

- Ans. 1. False 2. True 3. False 4. True 5. False 6. True

(D) Match the following :

- | | |
|--|-------------------------------------|
| Ans. 1. The force between two masses | a. The difference of the two forces |
| 2. The maximum value of static friction | b. Limiting friction |
| 3. When a body is at rest, the force of friction is always equal to the applied force | c. Gravitation force |
| 4. The force that exists when a body rolls over the other | d. Rolling |
| 5. The resultant of two oppositely directed forces | e. Sliding friction |
| 6. The special shape of a body due to which it experiences least fluid friction | f. Streamlining |
| 7. When external force exceeds a certain limit, the body begins to move on the surface | g. Static friction |
| 8. A man pulling a bucket of water out of a well | h. Muscular force |

(E) Answer the following questions in short :

- Ans. 1. The force due to hammering changes the shape of the iron piece.
2. Muscular forces and gravitational forces.
3. Magnetic force.
4. Newton

5. To reduce friction and better grip.
6. The force required to keep a body in motion is less than the force required to start the motion. Therefore sliding friction is always less than the limiting value of static friction.
7. Gravitational.

(F) Answer the following questions in details:

Ans. 1. **Non Contact Forces**

Gravitational Force

All objects like a coin or a pen falls to the ground when it drops from the table.

Leaves, fruits also fall to the ground when they get detached from the trees.

When a pen is held in hand, it is at rest. As soon as it is released it starts falling and moving downwards. It is clear that the state of motion of the coin undergoes a change. It is converted from state of rest to state of motion. This happens because earth exerts force on all objects to pull them towards it. This is called the force of gravity or gravity.

It is not only the force of gravity exerted by the earth, but there exists a force of attraction between any two masses in the universe. This is a universal force and is known as the force of gravitation. It is the force of gravitation that keeps the planets moving around the sun and the moon revolving around the earth. Even the tides in the sea are caused by the gravitation force between the earth and the moon.

Electrostatic Forces

The force between electric charges is called Electric force or the force exerted by a charged body on another charged or uncharged body is known as electrostatic force. It is a type of non-contact force.

Magnetic Force

This is the force exerted by magnets on each other and on some metals like iron and Nickel since magnets attract iron, magnets are used to separate waste iron objects from garbage dumps so that they can be recycled.

A magnet has two poles-north pole and south pole. If we bring the north pole of one magnet towards the south pole of another magnet. We will feel our hands being pulled together as opposite poles attract each other. The strength of pull increases as the poles come closer together.

Contact Forces

For an object to pull or push there should be a contact between the two objects. Such a force is called contact force.

The types of contact forces are:

Muscular Force

The force exerted by the muscles of a human or animal body is called muscular force. We use our muscular force during walking, running, kicking and lifting certain objects.

Animals exert muscular force to do heavy works such as, pulling a cart, ploughing, carrying heavy loads etc.

Mechanical Force

The force exerted by a machine to do some work is called mechanical force. All machines need some energy to produce force.

For example, a car engine takes energy of petrol to generate mechanical force. This mechanical force produces motion of the wheels. Energy of moving air or wind is used to produce the force which rotates the wind turbines for grinding wheat.

Frictional Force

The force acting between two surfaces in contact which opposes the motion of one body over the other is called the force of friction.

Friction is the force that brings an object to rest.

2. Causes of Friction

The friction between any two surfaces is mainly caused by the following factors.

Due to interlocking of surfaces

No solid surface is perfectly smooth. This means all solid surfaces are rough. The degree of roughness varies from surface to surface. Some are more rough, while some others are less.

Even a surface which looks smooth is actually rough when seen from a microscope.

For example, a saw used by a carpenter has teeth. When two saws are slid over one another, the teeth of such saws get interlocked. This is similar to what happens when we are trying to move one object over another.

The interlocking makes it difficult to move the object on it. So, the rougher the surface, the greater are these irregularities. The opposing force or friction is also greater in such a case.

Force of Adhesion

When two surfaces kept in contact, they meet only at certain points. The molecules or atoms present at such points of contact attract each other due to electrostatic attractions. These attractions are called force of adhesion.

This force of adhesion opposes the motion and gives rise to friction force.

3. Types of Friction

There are three types of friction. These are static friction, sliding friction and rolling friction.

Static Friction

When two non-moving or stationary bodies are in contact with each other, the friction present between them is called static friction (f_s). If we keep on increasing the applied force, a stage is reached when the body begins to just move.

This is the stage of maximum static friction ($f_{s, \max}$). The maximum force of friction when the block is just starting to move is called the limiting value of the static friction or limiting friction.

Sliding or Kinetic Friction

Static friction has to be overcome before the bodies can move. Once a body starts moving over a surface, the friction, between it and the surface, is known as sliding or kinetic or dynamic friction.

The force required to keep a body in motion is less than the force required to start the motion. Therefore sliding friction is always less than the limiting value of static friction.

Rolling Friction

The force of friction between the two surfaces in contact when one of them rolls on the other is called rolling friction. This is smaller than the sliding friction.

That is why, under identical conditions, it is easier to roll a given object than to slide it.

4. Friction A Necessity

It may appear that since frictional force always opposes the motion it is always a curse but it is not so. Friction plays a vital role in our daily life. Without friction we are handicapped.

Some of its advantages are:

1. When we walk, we push the ground with our feet, the friction provides the forward reaction and we move forward on a highly polished floor there is a very little grip between the floor and our shoes due to lack of friction. So on a polished floor, when we push the earth backward we slip and fall. So friction enables us to grip the road and helps us to walk.
Running shoes are created with spikes in them. The spiked shoe was developed out of necessity as they provide good grip during jogging.
2. Friction is necessary to hold the nail in the wood or wall.
3. Writing with a pencil requires friction. We cannot hold a pencil without friction. It would slip out when we tried to hold it to write. The graphite pencil lead makes a mark on paper due to friction.
4. Tyres of all new vehicles have many treads and corrugations on them. The treads on the tyres increase friction and provide them with a better grip on the road when the corrugations get worn out, it loses its grip and the vehicles tend to skid.
5. Friction is necessary for lightening a match box, sewing of clothes and making a knot.

5. Increasing Friction

There are certain methods which help us in increasing friction these are:

1. By making the surface rough. A rough surface provides more resistance than a smooth surface in most cases. If the surface is smooth, protrusion such as rivets and screw heads can increase the friction. For example treads of tyres help to increase the friction between the road and the tyre.
2. The friction between two surfaces can be increased by pressing the surfaces together more strongly. This makes the projections press against each other more strongly and increases the size and number of connections between the

surfaces.

3. Parachutes are designed to increase friction. Air friction decreases the speed of parachutes of falling man. So he can land easily.
4. The tread on a car tyre is to more water out of the way as the tyre rolls over a wet road, reducing the risk of sliding.

Racing cars need smooth tyre as they are ideal for dry track but in rainy season they slide and skid and can cause accident.

5. We increase friction by using brake pads in the brake system of bicycles and automobiles when we ride a bicycle the brake pads are not in contact with the wheels but if we press the brake lever these pads come in contact with the wheel and arrest motion.
6. Kabbadi players rub their hands with the soil to ensure better grip.

6. **Reducing Friction**

The friction between two surfaces can be reduced by the following methods:

By Polishing the Surface

Rough surface can be made smooth by polishing. Polishing removes 'hills' and 'valleys' from the surfaces. Polished jewels are used in watches to hold axles between them unevenness of the surface can be achieved by rubbing the surfaces with sand paper.

By Lubricating

Friction in the machine can be reduced by applying lubricants (oil or grease). Oil is put into the machine where it coats surfaces that rub and make them slippery. A lubricant has much less friction than solid therefore, lubrication reduces friction. Without lubrication machine would slow down and get overheated. The oil film separates the two surfaces so that their small rough spots do not catch oil film separates surface, produces less friction which results in faster motion and heat.

By Sprinkling a Soft, Slippery Fine Powder on the Surfaces

A small quantity of talcum powder on a wooden surface or floor etc. reduces friction. This is the reason for spraying of talcum powder on a carrom board. Graphite powder is used in machines to reduce friction.

By using ball bearings or roller bearings

Ball bearings are also called antifriction bearings.

Ball bearing are small spheres of metals or ceramic used to reduce friction between shafts and axles.

The Ball bearing reduces the friction to of its original value.

By streamlining

Streamlining gives the transport a shape that moves more easily through air or water. It has a pointed nose or bow and smooth sides which do not push strongly against the air or water.

Body of fast moving animal like cheetah, aeroplane, rockets, ships, racing car, birds and fishes have streamlined bodies.

Chapter-9

Pressure

(A) Tick (✓) the correct option

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

(B) Fill in the blanks :

Ans. 1. force.
2. more
3. broad
4. same
5. increases
6. pressure

(C) State whether the following are 'true or false':

Ans. 1. True 2. True 3. True 4. False 5. False

(D) Answer the following questions in short:

Ans. 1. The S.I. unit of pressure is Pascal.

2. Pressure is the ratio of the force, acting perpendicular to a given area to the area, on which it acts.

Pressure is equal to the force per unit area.

â For a given force, smaller is the area of contact higher is the pressure exerted by it.

â For a given force, larger is the area of contact lesser is the pressure exerted by it.

â For a fixed area of contact, the pressure exerted increases with an increase in force or other may round.

3. A sharp knife is more effective in cutting objects than a blunt knife, due to its thick edge, blunt knife puts the force of our hand on a larger area of the object, so that pressure on the object is less whereas a sharp knife, due to its thin edge puts the same force on a small area of the object, and so the pressure produced on the object is large and the object gets cut easily.

4.

5. Hydraulic disc brakes, Hydraulic Press, Hydraulic Car Jack, Hydraulic garage lift are based on Pascal's Law.

Pressure exerted at any point on an enclosed liquid is transmitted equally in all directions throughout the liquid.

6. Astronauts wear specially made suits to go into space where the external pressure is less than the atmospheric pressure. Their suit maintains the pressure equal to the atmospheric pressure between the suit and the body in space. This prevents the

bursting of body cells under internal pressure with in the human body.

(E) Answer the following questions in detail:

1. 1. Nature has given broad feet to the elephant. The broad feet increases the contact area of feet with the ground. This reduces the pressure of its weight on the earth and so feet do not sink too much in the earth.
 2. A sharp knife is more effective in cutting objects than a blunt knife, due to its thick edge, blunt knife puts the force of our hand on a larger area of the object, so that pressure on the object is less whereas a sharp knife, due to its thin edge puts the same force on a small area of the object, and so the pressure produced on the object is large and the object gets cut easily.
 3. If we push a nail into wooden plank by its head. It did not go into the plank but if we push the nail by pointed end. It would easily go into wooden plank because in case first area is large and so pressure is less, but in case of pointed end area is less and so pressure exerted is more on wooden plank.
 4. A porter keeps a round piece of cloth on their heads when they have to carry a heavy load. This increases the area of contact of the load with their head and hence reduces pressure on their head.
 5. A school bag is provided with wide straps so that weight of the bag may fall over a large area of the shoulder of the child producing less pressure on the shoulder and due to less pressure, it is comfortable to carry heavy school bag.
 6. Buildings and dams are made broader at their base. This makes their overall weight act over a larger area and reduces their pressure on the ground.
 7. The railway tracks are laid on large sized wooden, iron or cement sleepers. This is done so that the thrust due to the weight of train is spread over a larger area. Due to this there is less pressure of track on the ground and railway line does not sink into the ground.
 8. Man uses skis to glide on snow. The use of skis increases the area over which the weight of the man acts. So his pressure on the snow decreases and he can glide across without sinking deep into the snow.
 9. A gas balloon often bursts when too much air is blown into it because of the increase in the pressure of this air over the thin membrane that makes the surface of the balloon. This membrane bursts when the pressure of the air inside it exceeds a certain limit.
 10. Tractors have broad tyres so that there is less pressure on the ground and the tyres do not sink into comparatively soft ground in the fields. In the same way a wide steel belt is provided over the wheels of army tanks so that they exert less pressure on the ground and do not sink into it.
2. Take a tall can. Drill three holes in its side at different heights from its bottom. Fill the can with water and observe.

Observation

Water rushing out from the lowest hole goes farthest; that from the highest hole falls nearest and that from the middle hole falls in between the two.

Conclusion

Pressure of water in the can is greatest near the lowest hold and least near the uppermost hole. Thus, the pressure due to liquid increases with depth from the surface of the liquid.

3. Because of the air pressure, as water tries to push into the bottle, it compresses the air causing the air pressure to rise which pushes back against the water.
4. When a person living in plains, go to attitude, air pressure decreases. Our lungs fill with air when air pressure in our lungs is less than the pressure of the air outside our lungs.

The internal pressure balance the atmospheric pressure at plains but at high attitude, there is reduced pressure and their is excess pressure on the inside.

This causes blood to ooze out, Headache, fatigue, irritability etc.

Divers need special protective suits to protect themselves from greater pressure at greater depth divers must avoid injuries caused by changes in air pressure. Pressure injuries are called barotraumas and can cause rupture of eardrum or damage to the sinuses. The inner ear and sinus are equalized using.

- 5.
6. The manometer is a simple device used for measuring pressure. Its structure is a U-tube with equal sized limbs. This U-tube is fixed on a suitable wooden stand. A suitable scale is fixed in between the two limbs of the U-tube.

The U-tube is about half filled with a coloured liquid. We observe that the level of the liquid is same in the two limbs when the two ends of the U-tube are open to the atmosphere.

However, if we fit a rubber tube connected to a pump on one of the limbs of the U-tube and compress the pump, the level of the liquid in this limb goes down. When one of the limbs is connected to a vessel that is being evacuated, the level of liquid in it goes up. The difference in the levels of the liquid in the two-limbs of the U-tube can be used to measure the pressure of the gas contained in the vessel.

7. $200/20 = 10 \text{ Pa}$: $200/10 = 20 \text{ Pa}$.
8. $F = 63 \times 9.3 \text{ N}$ Area unde 1 fnt = $180 \text{ cm}^2 = 180/10000 \text{ m}^2$.
 $F/A = 63 \times 9.8 \times 10000/180 \times 2 = 63 \times 98 \times 100/13 \times 2 = 1.75 \times 10^4 \text{ Pa}$.

Chapter-10

Sound

(A) Tick (✓) the correct option

- Ans. 1. (d) 2. (a) 3. (a) 4. (b) 5. (b)
6. (c) 7. (d) 8. (b)

(B) Fill in the blanks :

- Ans. 1. amplitude
2. time period
3. amplitude
4. vacuum
5. pitch, Hz
6. larynx
7. wind
8. Ultrasonic
9. frequency
10. noise

(C) State whether the following are 'true or false':

- Ans. 1. True 2. False 3. False 4. True 5. True 6. True
7. False 8. False

(D) Match the following

- | | | |
|--------------------------------|---|---------------------------------------|
| 1. Sound | → | a. Stringed musical instrument |
| 2. Sound cannot travel through | → | b. Larynx |
| 3. Amplitude | → | c. Pitch |
| 4. Frequency | → | d. Frequencies below 20Hz |
| 5. Audible Sounds | → | e. Loudness |
| 6. Ultrasonic Waves | → | f. Unwanted Sound |
| 6. Infra Sonic | → | g. Number of oscillations in a second |
| 7. Voice box | → | h. Produced due to vibration |
| 8. Shrillness | → | i. Used in SONAR |
| 9. Sitar | → | j. Vacuum |
| 10. Noise | → | k. Between 20Hz to 20000 Hz |

(E) Answer the following questions in short:

- Ans. 1. Sound is produced by a vibrating body. Sound produces the sensation of hearing in our ears.

When a person speaks, the molecules of the air near his mouth are disturbed.

Due to this, the molecules start vibrating to and fro about their mean position. If

we imagine the air molecules to be like small balls, as a sound wave travels through air. It makes these balls pushed close together and then pulled away from each other alternatively.

The area where they lie together are called compressions and the area where they lie away from each other are called rarefactions.

2. $f = \text{total OSC} / \text{total time} = 40/4 = 10 \text{ Hz}$

Time period = 0.1 sec

$T = 1/f = 1/10 = 0.1 \text{ sec.}$

3. Higher the frequency of a sound, higher is its pitch.

The voice of a child or a woman has higher frequency than the voice of a man.

The frequency of a human voice generally lies between 1000 Hz and 1500 Hz.

4. The human ear can hear the sounds having frequencies between 20 Hz to 20000 Hz. This is called the **audible Sounds**.

All sounds that we fail to hear through our ears are known as **inaudible sounds**.

5. The human ear can hear the sounds having frequencies between 20 Hz to 20000 Hz.

6. Regular vibrations produce pleasant or musical sounds whereas irregular vibrations produce disturbing sound called Noise. The harmonics give musical quality to the sound.

Noises are the annoying sounds produced by irregular vibrations. In Music, there is a eight related notes scale. These eight notes together are called octave.

(F) Answer the following questions in details:

1. Hang an electric bell inside a jar connected to a vacuum pump switch on the bell it starts ringing now start the vacuum pump so that it starts evacuating the air from the jar kept around the ball.

Observation

The sound becomes feeble and finally not heard.

If you stop the vacuum pump and remove the jar, Again the ringing sound of the bell is heard.

Conclusion

So sound can reach us only when there is air around it. Thus sound needs a medium for its propagation.

2. Tie one end of a rubber band to a nail on the wall and pull the rubber string gently to stretch it slightly pluck the rubber band with your fingers from the middle.

Observation

The rubber band moves up and down or vibrates and produces humming sound.

3. Sound, waves of frequencies above 20000 Hz are called **ultra sonic** waves.

Application of ultrasonic sound

* Ultra sonic waves are used for homogenizing milk. This helps in preservation of milk.

* Ultra sonic waves are used in medical diagnosis for detecting any deformity in

the unborne baby.

- * Ultra sonic waves are used for welding of metals.
 - * Ultra sonic waves are used in dish washing machines.
 - * Ultra sonic waves are used to find the depth of the sea.
 - * Ultra sonic waves are used to prepare many new materials such as alloys, emulsions, catalysts etc.
 - * Ultra sonic waves are used for detecting flaws in metal castings, automobile tyres etc.
 - * Most important use of ultrasounds is in SONAR stands for sound, Navigation and Ranging. SONAR is used in navigation of ships, to map sea beds and in submarines.
4. In humans, the sound is produce by 'larynx' also known as voicebox we have two vocal cords stretched across the voice box in our throat. Voice box is at the upper end of the wind pipe.
Our lungs forces air out through them, these cords vibrate and produce sound. Muscles attached to the vocal cords can make the cords tight or loose. When the vocal cords are tight and thin the voice quality is different from that it is at the time, when they are loose and thick.
5. Sound waves from outside are collected by the outer ear. Its shape is like a funnel. When sound enters it travels down a canal and reach the ear drum, a stretched thin membrane.
When the sound waves strike the ear drum, it starts vibrating. These vibrations are passed on to the oval window by three bones named (Malleus, incus and stapes) which act as a level. They cause magnification of vibrations. The vibrations then reached on the liquid in the cochlea and through it to the brain. This leads us to hear the sound.
Our ears are very delicate organs proper care must be taken to keep them in healthy condition.
1. Never insert any pointed object into the ear. It can damage the eardrum and make a person deaf.
 2. Never hit hard on anyone's ear.
 3. Never shout loudly into some one's ear.

6. **Amplitude**

If we pull the bob sideways and leave it, it will oscillate back and forth for some time and then come to a stop. It comes to the mean position when it stops.

"The Maximum displacement of the ball from the mean position during oscillation is called the amplitude of the oscillation."

In the figure the displacement AB or AC is called amplitude of the oscilating bob. Amplitude is denoted by A.

Oscillation

When the bob moves from the one position and comes back to the same position, it

is said to complete one oscillation. For example, the movement of a body from one extreme position to the other and back is one complete oscillation.

If the bob starts from A, goes to C and then to B, and then back to A we say one oscillation is complete.

Time Period

The time taken to complete one oscillation is called the time period of the oscillation. It is measured in seconds.

Frequency

The number of oscillations per second is called the frequency of oscillation. It is measured in units of hertz (Hz).

For example if a bob of the pendulum moves 5 times through point B in a second, its frequency is 5 oscillations per second.

The concept of Amplitude, frequency and time period is applied on any vibrating object or it can be applied to sound.

Frequency and Pitch

Sound waves are produced due to the to and fro oscillation of particles. If an object oscillates 50 times per second, it is said to have a frequency of 50 hertz (Hz).

The frequency of a sound determines its sharpness or shrillness. It turns out that if we increase the frequency of vibrations, the sound produced becomes sharper and shriller. On the other hand, decrease in frequency tends to make the sound flat.

This shrillness of sound is also explained using a term called pitch. Higher the frequency of the vibrating body, the higher will be its pitch.

Amplitude and Loudness

The amplitude of the vibrating body producing the sound determines the loudness of the sound. If the amplitude is higher, the sound produced is louder.

7. Musical Instruments

For a sound to be pleasant, the frequency and loudness should not change suddenly. Regular vibrations produce pleasant or musical sounds whereas irregular vibrations produce disturbing sound called Noise. The harmonics give musical quality to the sound.

Noises are the annoying sounds produced by irregular vibrations. In Music, there is a eight related notes scale. These eight notes together are called octave.

Musical instruments are classified into three categories.

Stringed Instruments

In a stringed instrument, music is produced by a vibrating string. The pitch of the sound produced is altered by changing the length of the vibrating portion of the string. For e.g. Sitar, guitar, the Piano and the violin are some stringed musical instrument.

In a Sitar, a player plucks the string with the right hand and the pitch of the sound produced is changed by pressing the string with the index finger of the left hand.

Percussion Instruments

In a Percussion Instrument, a vibrating skin or membrane produces a musical sound. Increasing or decreasing the tension in the membrane changes the pitch. For e.g. table, the dholak and the dafli are some other percussion instruments.

Wind Instruments

In case of wind instruments, it is the vibrating air column, which produces the sound. It is in the form of a hollow pipe. When we blow air through this pipe, then by opening and closing the holes properly, we hear pleasing and melodious notes through it.

Shehnai, flute and clarinet are some of its example.

8. Unwanted sound from any source that causes discomfort of any kind is called “Noise pollution”.

Noise pollution can damage the ears, causes loss of concentration tiredness, stress, sleep disturbance and temporary deafness.

Noise pollution is caused by motors, trains, aeroplanes, Radio, T.V. and loudspeaker etc.

Measures to limit Noise pollution

1. Ways of reducing unwanted noise include designing quieter engines.
 2. People living in flats should not talk too loudly or play the T.V./music too loudly so as not to disturb the neighbours.
 3. People working in factories etc. where they are subjected to constant loud noise of machinery should take special precautions to protect their ears.
 4. The use of sound insulating material in homes, such as carpets and curtains, double glazed windows also helps.
 5. The use of loudspeakers should be minimized.
 6. Traffic noise could be reduced to a great extent by installing traffic discipline among bus and automobile drivers.
 7. The farther away the noise originates the weaker it is, so distance is a natural barrier. For this reason, there should be trees between houses and a noisy road. Trees adsorb sound.
 8. Cars and other vehicles should not play loud music while driving. This can disturb the residents of the neighbourhood.
9. Time period = $1/f = 1/500 = 0.002$ sec.

10. CHARACTERISTICS OF SOUND

Frequency

Frequency is considered an important characteristic of a sound wave because different frequencies sound different to us.

The shrillness of a sound is dependent upon its frequency. The shrillness of a sound is called its Pitch.

Higher the frequency of a sound, higher is its pitch.

The voice of a child or a woman has higher frequency than the voice of a man. The frequency of a human voice generally lies between 1000 Hz and 1500 Hz.

Amplitude

The amplitude of a given sound determines its loudness greater is the amplitude of vibration, louder is the sound produced by it.

Loudness of sound is measured in decibel (dB) unit

Quality

The Quality of a sound is also called tone. The quality of sound is determined by the combination of all the frequencies present in it and their relative loudness. It determines the over all character of the sound.

Most instruments usually produce sounds (called notes) which consist of a basic or fundamental frequency and a number of overtones or harmonics of different loudness.

Chapter-11

Electric Current & Circuits

(A) Tick (✓) the correct option

- Ans. 1. (b) 2. (a) 3. (a) 4. (a) 5. (a)
6. (a)

(B) Fill in the blanks :

- Ans. 1. does not
2. negative
3. not
4. insulators
5. conductor
6. electric
7. Hofmann voltmeter
8. salt solution

(C) State whether the following are 'true or false':

- Ans. 1. True 2. False 3. True 4. True 5. True 6. True

(D) Answer the following questions in short:

- Ans. 1. Pure water is a bad conductor of electricity but the water that we use in our houses is not pure water. Tap water contains a lot of impurities. The presence of even a small amount of impurity makes a water a good conductor of electricity.
2. A person with wet hands touching electrical appliances get an electric shock.
3. Hydrogen gas is prepared by the electrolysis of acidified water, or 20% NaOH solution. Oxygen is obtained as a by product.
4. Electric current produces magnetic effect which causes deflection of the needle of a compass.
5. The production of chemical reaction by passing an electric current through an electrolyte.
6. If the electric supply of the area is not shut off and water is poured over electrical appliances, then electricity may pass through water and harm the fireman.

(E) Answer the following questions in details:

1. Rainwater contains dissolved salts. This makes it a conducting solution. There are no dissolved salts present in the distilled water. Hence, rainwater can allow electricity to pass through it while distilled water cannot.
2. This is done to prevent rusting of iron by protecting it to come in contact with air and moisture.
The process of coating iron and steel sheets with a thin layer of zinc is a special case of electroplating and is called **galvanisation**.
3. **Applications of Electrolysis**

The principle of electrolysis is used in the following processes:

* **Manufacture of Industrial Chemical**

Many chemicals which are used in industry in large quantities are prepared by electrolytic method.

1. Sodium hydroxide, NaOH, and Chlorine gas are prepared by the electrolysis of brine (20% common salt solution).
2. Hydrogen gas is prepared by the electrolysis of acidified water, or 20% NaOH solution. Oxygen is obtained as a by product.

* **Extraction of Metals**

More electropositive metals, such as sodium (Na), potassium (K), calcium (Ca) and magnesium (Mg), aluminium (Al), etc. cannot be obtained by carbon reduction process. These metals can be obtained by the electrolysis of their molten chlorides, hydroxides or oxides.

Electroplating

The process of depositing a thin layer of a metal on any conducting substance by the process of electrolysis is known as electroplating.

For example, deposition of silver on brass or copper objects and that of copper, nickel, chromium etc. on objects made of iron is done by electroplating.

Electrorefining

The metals obtained by chemical reduction methods generally contain many impurities. Such metals can be refined very easily by electrolysis method. The method of refining metals by using electricity is called electrorefining. This method can be used to purify metals such as copper, zinc, gold, nickel, aluminium and silver, etc. Let us understand this method by an experiment.

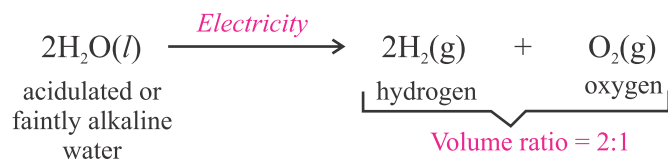
4. Take a beaker, two thick copper wires, sodium hydroxide (NaOH), large test tubes. Remove about 0.5 cm of the plastic insulation from both the ends of both the copper wires. Place these wires in a beaker as shown in the figure.

Fill half of the beaker with water and dissolve 2-3 pellets of sodium hydroxide in it. Fill two test-tubes with this water. Place them over the open ends of the two wires in the beaker. Connect the other ends of the wires to a battery. Bubbles of gases are seen evolving at the ends of the wires in the beaker. The gases liberated are collected in the two test-tubes by the downward displacement of water. After sometime, note down the volumes of the two gases collected in the test tubes.

The gas collected at cathode (Test Tube A) is double in volume to the gas collected at anode (Test-Tube B), i.e., the volumes of the two gases collected are in the ratio 2:1.

Once the test-tubes are filled with the respective gases, remove them and cork the test tubes. Bring a lighted matchstick near the mouth of test-tube A and remove the cork. The gas burns producing an explosive sound. This shows that the gas collected at cathode is hydrogen. Conduct similar test with the gas in test tube B. The match stick starts burning violently. This shows that the gas collected at anode is oxygen.

Since the volumes of hydrogen and oxygen gases are in the ratio 2:1, therefore it is concluded that water is made of hydrogen and oxygen combined in the ratio 2:1 by volume.



Electrolysis of water can be described by the equation,
Thus, the process of decomposition of an electrolyte with the help of electricity is called electrolysis.

Chapter-12

Rain, Thunder and Lightening

(A) Tick (✓) the correct option

- Ans. 1. (c) 2. (b) 3. (d) 4. (b) 5. (b)
6. (c) 7. (a) 8. (d)

(B) Fill in the blanks :

- Ans. 1. attract
2. conduction
3. attract
4. positive
5. electric
6. travel
7. lightening conductor
8. avoid

(D) Match the following:

- | | | |
|------------------------|---|--|
| 1. Lightning conductor | → | a. Repel each other |
| 2. Lightning | → | b. Positively charged |
| 3. Like charges | → | c. Charging up an object |
| 4. Unlike charges | → | d. A device used to detect charge on an object |
| 5. Electrification | → | e. Attract each other |
| 6. Electroscope | → | f. Due to sudden expansion of air |
| 7. Protons | → | g. Huge electric spark |
| 8. Thunder | → | h. Protection of buildings |

(D) State whether the following are 'true or false':

- Ans. 1. False 2. True 3. True 4. True 5. True 6. False
7. True 8. False

(E) Answer the following questions in short:

- Ans. 1. Positive Charge.
2. The sun in the bark of the tree is subject to extreme temperatures many times more than the surface of the sun due to electrical resistance.
3. 50,000 F
4. Because of the same charges, they repel each other and in second case, unlike charges attract each other.
5. Because when the balloon is rubbed by synthetic cloth, it gets charged and gets stuck to the wall due to the electrostatic force.

(F) Answer the following questions in detail:

1. Take a glass rod and charge it by rubbing it with a piece of silk cloth. Suspend the

charged rods with the help of a thread.

Take another glass rod, charge it by rubbing it with a piece of silk cloth. Bring this charged glass rod close to the one end of the suspended glass rod.

Two charged glass rods repel each other. As soon as we bring a charged glass rod closer to the suspended glass rod it moves away from it.

Now, repeat this process for two ebonite rods after rubbing them with a woolen cloth.

The suspended ebonite rod moves away when another charged ebonite rod (Charged with woolen cloth) is brought close to it.

In this activity we have brought close together the charged objects that were made of the same material.

Now, if two charged objects made of different materials are brought close to each other.

Take a glass rod charged by rubbing it with a silk cloth suspend it with the help of thread.

Take an ebonite rod and charge it by rubbing with a woolen cloth. Now bring the ebonite rod close to the glass rod.

Ebonite rod and the glass rod attract each other.

Conclusion

- * Two charged bodies repel each other if they are made of the same material and are charged in similar fashion.
 - * Two charged bodies of different materials, charged with different material attract each other.
 - * It is observed that:
 - * Glass rod attains positive charge and silk attains negative charge when glass rod is rubbed on silk cloth.
 - * Ebonite rod attains a negative charge and woolen cloth attains Positive charge, when ebonite rod is rubbed on woolen cloth.
 - * It is seen that like charges repel each other while unlike charges attract each other.
2. An electroscope is used to detect whether a body is charged or not.
 3. The huge masses of clouds get electrically charged due to rubbing of the clouds with the air and due to other charged particles present in the air.

When two opposite charged clouds come near to each other, a large quantity of electric charge flows rapidly from one cloud to the other through the air. When this happens, a spark of electricity is seen in the sky.

This rapid flow of charge in the atmosphere between the two opposite charged clouds is called electric discharge or lightening.

Due to the production of heat at the time of lightening. Air gets heated and expands suddenly (temperature of 30000°C). This rapid expansion of air sends a disturbance through the air producing loud sound. This loud sound is heard as Thunder.

4. To minimise the dangers of lightening following precautions must be followed :

- * During lightning and thunder storm no open place is safe.
 - * Do not take shelter under a tree not only there is danger of being struck by lightning, but if the tree gets struck by lightning, it could catch fire and cause great harm to you.
 - * After hearing the last thunder wait for at least 30 minutes before coming out.
 - * You can take shelter inside a car or a bigger vehicle like a truck but with windows and doors of the vehicle shut.
 - * Carrying of umbrella is not good for walking in the thunderstorms.
 - * If in a forest, take shelter under the shorter tree.
 - * In an open field, stay far away from all trees and poles of metal objects. Do not lie on ground. Instead, crouch low on the ground. Keep your hands on knees with your head between the hands.
 - * Electrical appliances like computers, TVs etc. should be unplugged. Electrical lights do not cause any harm so they can remain on.
 - * Bathing should be avoided.
 - * During a thunderstorm telephone cords, electrical wires and metal pipe use should be avoided. It is safer to use mobile phones and cordless phones.
5. A lightning conductor is a device used to protect buildings from the effect of lightning.

It is a pointed conductor that is fixed above the highest point of the building. This conductor is properly earthed by a good conducting path made by using a thick strip of metal.

Principle of lightning conductor

When a highly charged cloud passes over a tall building, it induces an opposite charge on the pointed end of lightning conductor. This charge quickly flows to the earth through the copper rod. Thus, the lightning discharge is prevented and the building is saved from damage.

Van de Graff Generator

Man has continuously tried to build up machines and equipment that tend to duplicate the natural phenomena. Van de Graff Generator is high voltage machine. This can produce potential difference of the order of 10 million volts (that is very large). However it is still small in comparison to the potential difference (~ 100 million volts) that exists between a charged cloud and earth during lightning.

Chapter-13

Light

(A) Tick (✓) the correct option

- Ans. 1. (a) 2. (a) 3. (a) 4. (b) 5. (c)
6. (b) 7. (c) 8. (b)

(B) Fill in the blanks :

- Ans. 1. incidence , equal , reflection
2. 90 degree
3. 2
4. erect , lateral inversion
5. reflection
6. reflections
7. dispersion
8. regular
9. opposite
10. spectrum

(D) Match the following:

- | | | |
|----------------------------------|---|---|
| 1. Kaleidoscope | → | a. formed on a screen |
| 2. Luminous objects | → | b. Replica of an object |
| 3. Real images | → | c. Reflector in solar cooker |
| 4. Plain mirror | → | d. Do not emit their own light |
| 5. Non-luminous objects | → | e. Violet, Indigo, Blue, Green, Yellow, Orange, Red |
| 6. Dispersion | → | f. Angle of reflection |
| 7. VIBGYOR | → | g. Multiple reflection |
| 8. Image | → | h. Non-luminous object |
| 9. Angle of incident is equal to | → | i. Splitting of white light |
| 10. Moon | → | j. Emit their own light |

(D) State whether the following are 'true or false':

- Ans. 1. False 2. True 3. True 4. True 5. True

(E) Answer the following questions in short:

- Ans. 1. The ray of light which falls on object is incident ray of light. The ray of light which gets bounced or reflected from the surface of an object is called reflected ray of light.

2. Laws of Reflection

There are two laws of reflection. These are:

1. The incident ray, the reflected ray and the normal lie in the same plane.
2. The angle of incident is always equal to the angle of reflection, i.e., $\angle i = \angle r$

Activity given below demonstrates the laws of reflection.

3. 45 degree.
4. The decomposition of a beam of white light into coloured beams that spread out to

produce spectrum.

5. **Uses of Plane mirrors**

Plane mirrors are commonly used:

- * as a looking glass
- * for making periscope
- * as a reflector in solar cooker.

6. Lateral dispersion

(F) Answer the following questions in details:

Ans. 1. Fix a drawing sheet on a drawing board with the help of some drawing pins. Draw a line AB on the sheet and place the plane mirror strip with its back surface along this line.

Fix two pins P and Q vertically on the paper along an inclined direction. Look at the images of these pins in the mirror and adjust your eye, so that the images of these pins are seen in one line. Now, fix a pin R so that its lower end and the lower ends of the images of pins P and Q appear in one line. Fix a fourth pin S so that on looking along the direction SR, you find that the lower ends of the images of P and Q are covered by the pin S.

Mark the positions of all the pins on the paper. Join QP and SR and produce them so that they intersect at N. At N draw NM perpendicular to AB.

Measure the angles PNM and SNM. These are the angle of incidence and angle of reflection, respectively. Repeat the experiment by fixing the pins P and Q along different directions. Measure the angles of incidence and reflection in each case.

We find that the angle of incidence is equal to the angle of reflection in each case. Also, the incident ray (PQN), the reflected ray (NRS) and the normal at the point of incidence (NM) all lie in the same plane – the plane of the paper. Thus, the law of reflection are verified.

2. If the rays do not actually meet, but appear to meet when produced backwards, the image is virtual. The virtual image can be photographed but it cannot be taken on a screen. It is an erect image. The image of our face in a plane mirror is an example of virtual image.

3.

4.

5. **KALEIDOSCOPE**

Kaleidoscope uses the idea of multiple reflection to form many beautiful and fascinating coloured patterns. It uses three plane mirrors inclined to each other at 60° .

To make a Kaleidoscope you need three flat rectangular mirrors of equal size, rubber bands, tracing paper, thin cardboard and broken pieces of coloured glass or coloured bangles.

Place the three mirrors with their shiny surfaces facing inside using the long side of

each mirror. Put two of the rubber bands around them to hold them securely together. Make a cylindrical tube with the thin cardboard so that the rubber banded mirrors fit into it. Cover both ends with tracing paper. At one of the ends, place pieces of broken glass or bangles over the tracing paper and fix another piece of tracing paper to hold the glass pieces of broken glass or bangles over the tracing paper to hold the glass pieces (or bangle pieces) in place. Put this into a cylindrical tube and fix it in place. Your Kaleidoscope is ready. You can paste coloured paper over the cylindrical tube to make it more attractive. Hold it to light and slowly rotate the tube and enjoy the beautiful patterns that emerge.

6. **DISPERSION OF LIGHT**

The splitting of white light into seven colours is called dispersion of white light. Let us do a simple activity to show dispersion of light.

The dispersion of white light into seven colours occurs because the lights of different colours bend through different angles while passing through a glass prism. Sir Issac Newton was the first to obtain the spectrum of sunlight by passing the sunlight through a prism.

The band of seven colours formed due to the dispersion of white light is called spectrum of white light. The seven colours in the spectrum are Violet, Indigo, Blue, Green, Yellow, Orange and Red (VIBGYOR).

The Rainbow is an example of dispersion of white light. After a rain shower, there are droplets of water suspended in air. These water droplets act as small prisms. When sunlight passes through these droplets, it is split into seven colours. The condition for the seven colours. The condition for the formation of a rainbow in the sky are:

- * the sun and the rain must be opposite to each other.
- * the sun must be low in the sky, and
- * the observer must have his back to the sun.

Chapter-14

Human Eye

(A) Tick (✓) the correct option

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

(B) Fill in the blanks :

Ans. 1. pupil
2. Cones
3. focal length
4. convex
5. large
6. less number
7. rhodopsin, iodopsin
8. concave
9. opposite
10. spectrum

(C) State whether the following are 'true or false':

Ans. 1. False 2. False 3. False 4. False 5. True 6. False

(D) Match the following:

1. Retina	→	a. Vitamin A
2. Braille	→	b. Concave lens
3. Blind spot	→	c. Blind
4. Myopia	→	d. Screen
5. Carrot	→	e. No rods and cone cells.

(E) Answer the following questions in short:

Ans. 1. Louis Braille
2. 25 cm
3. (a) retina
(b) iris

(F) Answer the following questions in detail:

1. The eye has a roughly spherical shape. The human eye is very small, approximately 2.5 cm. in length. The eyelids act as the shutters of the eye to protect them from injury. On the outside the eye has an eye ball, and there is white fluid all around it. The outer part of the eye is tough so as to protect the interior parts from shocks and accidents.

Our eyeball consists of following parts:

Cornea

The white part of the eye that we can see is known as sclera. This is filled with a clear watery fluid. The thin transparent tissue that covers the front part of the eye is called

cornea. The cornea protects the inner delicate structures of the eye and helps in refraction of light. The second layer also called the inner layer is known as the choroid. It is black coloured to prevent internal reflection. It also protects the light-sensitive parts of the eye.

Iris

This is a coloured part behind the cornea which can be blue, green, brown or hazel in colour. The colour of iris depends upon the pigments present in it. The function of iris is to control the size of the pupil through contraction and expansion of the muscles of Iris.

Pupil

The pupil is a dark hole present in the eye which regulates the amount of light entering the eye. The pupil appears black because no light is reflected from it.

When the light is bright, the pupil contracts to allow less light through. Whereas in dark, the pupil expands to allow more light to reach the back of the eye.

Eye lens

There is a convex lens made of a transparent jelly like material present in the eye. This is called eye lens. The lens helps in focussing the light that passes through the pupil into the eye. This helps in focussing the image on the retina, by bending the light rays. It is held in position by ciliary muscles which help in changing the focal length of the eye lens.

Retina

A lining present behind the eyeball is called the retina. Retina is sensitive to light and has two type of receptor cells. These are rods and cones.

The central part of the retina, called the yellow spot or macula, contains only cone cells. This is the region of the best vision. The rest of the retina has different combination of rod cells and cone cells.

The rods of the retina are sensitive to low light conditions, while the cones are sensitive to colour and are receptive in light of higher intensity. These cells get sensitized by light and generate impulses, i.e., it converts light into electrical signals that are later sent down the optic nerve to the brain. The brain sends back messages after interpretation of signals. This tells us what we have seen.

The nerves which carry impulses from eye to brain and from brain to eye are optic nerves.

At the junction of the optic nerve and the retina, there are no sensory cells, so no vision is possible at that spot. This is called the blind spot.

2. Role of Nutrients

Eye health has a very strong relationship to the food we eat. The nutrients required for normal vision are Vitamin A, Vitamin C and beta carotene.

The Retina of human eye contains two types of light-sensitive cells-Rods and cones. The rod cells contain a pigment Rhodopsin and cone cells contain a pigment iodopsin in them. These pigments are sensitive to different light intensities and lead us to see during day and night.

Rhodopsin is sensitive to dim light. Therefore, it plays an important role in night vision, whereas, iodopsin is sensitive to bright light and is, therefore, responsible for vision during the day time. These photopigments (Rhodopsin and iodopsin) are derived from Vitamin A, Vitamin A is, thus, essential for a good vision. Its deficiency can cause problems like night blindness or xerophthalmia.

3. For a distinct visibility of objects, a normal human eye can accommodate for all distances from the near point at 25 cm. to the far point at 25 cm. to the far point at infinity. Sometimes, the eye of a person gradually loses its power of accommodation. In such conditions, the person cannot see the objects clearly. The vision becomes defective. There are mainly two common defects of vision-myopic and Hypermetropia.

Myopia

In myopia or near-sightedness or short sightedness, a person can see nearby objects clearly but cannot see the distant objects clearly. In such a defective eye, the image of a distant object is formed in front on the retina and not at the retina itself. This may arise due to two reasons—(i) the lens might be too thick (ii) a smaller eyeball.

This defect can be corrected by using spectacles with concave (diverging) lens. A concave lens of appropriate focal length is able to bring the image of the object back on the retina itself by diverging the rays of light entering the eye.

Hypermetropia

In hypermetropia or for sightedness, a person can see distant objects clearly but cannot see nearby objects so clearly. In this case, the image is formed behind the retina. This defect may arise due to two reason—(i) the lens is too thin (ii) a large eyeball.

Hypermetropia can be corrected by using spectacles with convex lenses (converging lenses). The convex lens converges the ray of light on the retina forming a clear image.

Other defects which result in improper vision are astigmatism and presbyopia about which you will learn in higher classes.

4. ACCOMMODATION POWER OF THE EYE

The ability of an eye to adjust the focal length of its lens is called its power of accommodation. This adjustment is necessary for bringing near and far objects into focus. The process of bending light to produce a focussed image on the retina is called refraction.

While viewing distance objects, the ciliary muscles relax hence making the lens thinner and lens convex. This results in increase in the focal length to focus the image of the distant objects on the retina.

Contrary to this, when we observe things closer to us, the ciliary muscles contract. This makes the lens thickened and more convex with a short focal length.

5. BRAILLE SYSTEM

This is a touch aid. Standard Braille is a medium of communication and it is done by making raised dots on a thick sheet of paper. The protrusion of the dot is achieved

through the process of embossing Braille system has its own symbols for each alphabet, word, prefix, suffix and numeral. It also contains short forms of many words. These special symbols save space and increase the reading speed. Braille reader can go through and read 100 to 200 words per minute.

Each Braille character or cell is made up of 6 dots arranged in a rectangular box. The box contains two dots horizontally and three dots vertically in the form of rectangular grids.

With six dots arranged this way one can obtain sixty three different patterns of dots. A visually challenged person is taught Braille by training him or her discerning the cells by touch accomplished through his finger tips. Each dot has a numbered position in the Braille cell. These dots make up the character in Braille representing letters of the alphabet, punctuation marks etc.

The height of each dot is 0.5 mm.

The horizontal and vertical spacing between two dot centres within a cell is 2.5 mm. The blank space between the dots on the adjacent cells is 3.75 mm. horizontally and 5 mm. vertically. A Standard Braille page is nearly 28 cm. by 30 cm., with a maximum of 25 lines and 40 to 43 cells per line.

6. **Care of the Eyes**

Eye is the most delicate organ in our body. The following suggestions will help you to maintain your eyes in a healthy state:

- * Wash your eyes with clean cold water whenever you feel eyes are strained or tired.
- * Do not rub your eyes.
- * Protect your eyes from the direct sunlight and from the dust.
- * Do not watch television or work on computer for long hours, particularly in a completely dark room.
- * Do not read in dim light, in a moving bus or while lying down.
- * While reading, keep the reading material at a distance of about 25-30 cm. from your eyes.
- * Take your eyes from any injury during playing, running etc.
- * If you feel strain in your eyes, go to the doctor for eyesight check up, use spectacles, if required.

Chapter-15

Earthquakes

(A) Tick (✓) the correct option

- Ans. 1. (a) 2. (c) 3. (d) 4. (a) 5. (b) 6. (c)
7. (d) 8. (c)

(B) Fill in the blanks :

- Ans. 1. faults
2. seismic waves
3. epicentre
4. shock waves
5. Richter
6. dangerous
7. geological conditions
8. vertical/standing

(C) State whether the following are 'true or false':

- Ans. 1. False 2. True 3. False 4. False 5. False 6. False
7. True 8. True

(D) Answer the following questions in short:

- Ans. 1. Shaking of the ground and the shifting of large sections of the earth's rocky outer shell.
2. Bhuj in the state of Gujarat. Its magnitude on the Richer scale was 7.7.
Jabalpur, in the state of Madhya Pradesh. Its magnitude was 6.0.
Maharashtra on September 30, 1993. It caused a loss of nearly 10,000 lives and destroyed several villages.
3. The energy released at the focus of an earthquake, propagates outwardly.
4. (a) Seismograph (b) Richter scale
5. Earthquake are mostly caused by the rupture of geological faults, or by huge amount of gas migration (mainly methane) deep within the earth, volcanic activities, landslides, mine blasts and nuclear explosions.

(E) Answer the following questions in detail:

1. The magnitude of an earthquake is a measure of amplitude of the seismic waves. The magnitude or intensity of energy released in the earthquake is measure by Richter Scale, devised by Chales F. Richer in 1935 and modified by Richter and his fellow Bano Gutemberg in 1965. Generally, it ranges between 0 and 9. Richter scale is a logarithmic scale which means, a change in the value on the scale by one corresponds to 10 times change in the energy associated with the earthquake. Both Bhuj and Kashmir earthquakes had magnitudes greater than 7.5.
2. **If you are indoors:**

* Get under a heavy desk or table and hand on to it, move into a hallway or

- get against an inside wall. Stay there till the shaking stops.
- * Stay away from tall and heavy objects that may fall on you.
- * If you are in bed, do not get up. Protect your head with a pillow.

If you are outdoors

- * Get into an open area away from buildings, power lines, chimney and anything else that might fall on you.
 - * If you are in a car or bus, do not come out. Ask the driver to carefully move the vehicle to a clear spot. Do not stop on or under a bridge or overpass or under trees, light posts, power lines. Do not come out till the tremors stop. Do not use your telephone, except for a medical or fire emergency. If an emergency occurs and phone does not work, send someone for help. Do not expect firefighters, police or Paramedics to definitely be there for you. They may not be available.
3. Richter scale is used to measure destruction energy of an earthquake. Yes it will be recorded on the seismograph, but it will not cause any damage as it is less in intensity.
 4. One destructive effect of earthquakes is occurrence of tidal waves, properly called seismic sea wave, or Tsunami. Tsunami is a Japanese word meaning “harbor wave”. These are the waves which often affect distant shores, originate from undersea or coastal seismic activity, landslide and volcanic eruptions. Sea water is displaced into a violent motion and swells up ultimately breaking over land, even over very long distances, having a great destruction power. The last Tsunami occurred on 26th Dec, 2004 after an earthquake in Indonesia. It resulted in 2,72,000 deaths in 12 countries with 10,000 deaths in India alone, Tsunami may travel hundreds of kilometers across the deep ocean, reaching speeds of about 725 to 800 km/h. It may become a towering wall of water 50 ft. high or more, capable of destroying entire coastal settlement.
 5. **General Suggestions**
 - * Keep the shoes, flashlights and a disaster supply kit ready so that the same can be used straightaway.
 - * People living in or around coastal areas should move over to higher grounds at the first hit/warning of an earthquake.
 - * People living in mountainous Regions should keep a watch on falling rocks and other debris and should stay away from slopes and cliff.
 - * As fires occur very often during an earthquake, one should be on the lookout for them.

During the Earthquake, one should follow the given suggestions.

If you are indoors:

- * Get under a heavy desk or table and hand on to it, move into a hallway or get against an inside wall. Stay there till the shaking stops.
- * Stay away from tall and heavy objects that may fall on you.

- * If you are in bed, do not get up. Protect your head with a pillow.

If you are outdoors

- * Get into an open area away from buildings, power lines, chimney and anything else that might fall on you.
- * If you are in a car or bus, do not come out. Ask the driver to carefully move the vehicle to a clear spot. Do not stop on or under a bridge or overpass or under trees, light posts, power lines. Do not come out till the tremors stop. Do not use your telephone, except for a medical or fire emergency. If an emergency occurs and phone does not work, send someone for help. Do not expect firefighters, police or Paramedics to definitely be there for you. They may not be available.