BOOK-6

Chapter-1 : Living and Non-living Thing

A. 1. d, 2. a, 3. d, 4. d, 5. c

B. 1. T, 2. T, 3. F, 4. T, 5. F

C. 1. mass and occupy space, 2. cell, 3. tree, 4. excretion, 5. respiration, 6. species

D. 1. 8-9 years

2. Sponges, corals ans sea anemones do not move from one place to another.

3. 70-90 years

4. The process of getting rid of wastes by the living organisms is called excretion.

E. 1. The process of intake of oxygen and giving out of carbon dioxide is known as breathing.

2. 60-80 years

3. All living things show growth. Growth is an increase in the size of an organism.

4. Reproduction is necessary for living things to survive generation after generation.

5.

S. No.	Living things	Non-living things
1	Protoplasm is present.	Protoplasm is absent.
2	Body of living things is made up of cells.	Cells are absent.
3	Living organisms have definite shape and size.	They do not have definite shape and size. They have irregular shape.
4	Growth occurs in living things.	Growth does not occur in these things.
5	Locomotion is spontaneous.	Movements are induced.
6	All living things respire.	Non-living things do not respire.
7	Their life cycle involves a number of stages like birth, growth, reproduction and death.	There is no life cycle.

6. You have seen various kinds of organisms in your surroundings. Are they all alike ? Obviously not. A cow differs from a dog, a dog differs from a cat and a cat differs from a pig. Each kind of organism (cow, dog, cat and pig) has many individuals may differ slightly but their form, habitat and behaviour are almost the same. Such a group of similar living organisms is known as a species. The members of a species have similar body parts, live in the same habitat, eat the same kind of food and reproduce among themselves.

Chapter-2 : Animals : Forms and Function

A. 1. d, 2. a, 3. b, 4. b, 5. b, 6. a, 7. b

B. 1. T, 2. T, 3. F, 4. F, 5. T, 6. T

C. 1. organ systems, 2. skeleton, 3. crawling, 4. cartilages, 5. humerus, 6. pivot

D. 1. All living organisms are made up of one or more cells. For this reason, cells are known as the structural units or the building blocks of life.

2. Controls all the functions of the body.

4. The skull is the bony structure that surrounds and protects the brain.

E. 1. The human body contains more than 650 muslces which are attached to the skeleton, which provide the pulling power for us to move around. The main job of the muscular system is to provide movement for the body.

2. The joints in the body are the places where two bones are joined together.

3. A ball and socket joint allows radial movement in almost any direction.

4. Earthworms have liquid skeleton. They have a long tube-like body. The body is made up of many rings or segments joined end to end. It has no bones. Muscles in a worm's body can be squeezed differently to change the body

shape. These changes in the shape help the worm to move along.

5. The skeletal system serves many important functions. It provides shape and form to our body. It allows bodily movement, produce blood for the body, and store minerals.

F. 1. Group of organs work together to carry out various functions in our body. Such a group of organs is called an organ system. There are many organ systems that work together in our body. They all work to keep us alive.

Name of some organ system : Skeletal system, Muscular system, Circulatory system, Respiration system, Reproductive system, Nervous system, Digestive system, Excretory system.

2. The backbone is also called the vertebral column. It is composed of 33 small, ringlike vertebrae joined end to end. The backbone protects the spinal cord. Backbone runs along our back starting from the neck. It is attached to the base of the skull. It forms the central supporting rod for the skeleton.

3. a. Cockroaches walk and climb as well as fly in air. They have three pairs in legs. These help in walking. The cockroaches have distinct muscles attached to the skeleton, which are strong and help them in walking. They also have two pairs of wings attached to the breast muscles that help in flying.

b. During movement, the earthworm first extends the front part of the body, keeping the remaining part (the rear part or posterior part) of the body fixed into the ground. Then it fixes the front part and releases the rear part. It then shortens the body and pulls the rear part forward. In this way, the earthworm moves forward.

c. Snakes move very fast by crawling on their bellies. Special structures called scales are present on their bodies. The scales help in crawling. During movement, the body curves into many loops. Each loop gives the snake a forward push by pressing against the ground. Many snakes can swim in water also.

d. Fish has various types of fins that helps it to swim. Fish locomote with the help of their tail. In order to move along, fish moves its tail from side to side. The powerful muscles in its tail push the water backwards and the fish moves forward. The fins help the fish to move easily through water.

4. To support and protect our delicate internal organs, our body has a rigid supporting system known as the body skeletal system. The skeletal system serves many important functions. It provides shape and form to our body. It allows bodily movement, produce blood for the body, and store minerals. The skeletal system consists of bones and cartilages. While bones are hard structures, the cartilages are soft and elastic, and can be easily bent. A cartilage can easily be located in the ear lobe and nose.

5. Immovable Joints : These joints do not allow any movement. For example, joints between the upper jaw and the rest of the head, joints between the bones of the skull and joints in the tooth sockets.

Slightly Movable Joints : These joints allow very little movement. For example, joints between the ribs and the breastbone and joints between adjacent vertebrae in the backbone.

Freely Movable Joints : These joints allow movement of bones in various directions. For example, joints in the shoulder, elbow, neck and knee.

6. Freely movable joints are of four main types, depending on the type of movement they allow:

(i) Ball and socket joint
(ii) Pivot joint
(iii) Hinge joint
(iv) Gliding joint

(i) Ball and Socket Joint : A ball and socket joint allows radial movement in almost any direction. They are found in hips and

shoulders.

(ii) Pivot Joint : A pivot joint allows rotation around an axis. In this joint, the rounded surface of one bone fits into a ring formed by the other bone, so that one bone is able to rotate over the other in a ring. The neck and forearms have pivot joints.

(iii) Hinge Joint : A hinge joint allows movement in one direction only. It allows movements like in those of a door on its hinge. Examples of hinge joint are elbow joint, wrist joint and knee joint.

(iv) Gliding Joint : A gliding joint allows bones to glide over each other, so that side to side as well as backward and forward movement can take place. Only slight movement takes place in this joint. It is present in the bones of the ankle.

Chapter-3 : Habitat of the Living

A. 1. c, 2. a, 3. c, 4. c, 5. b

B. 1. aquatic, 2. forests, 3. aquatic, 4. long, 5. gills,

C. 1. Forest are large areas of land covered with plants and trees.
2. Grasslands are large areas of land covered with grasses or shrubs.
3. Deserts are large, dry areas of land that receive little or no rainfall.
4. Ocean
5. River
6. Features or habits that help an organism to live in its habitat are called adaptations.
7. Camouflage
8. Deep and spread-out roots.
9. They also have special organs called gills for breathing under water.
10. Whales and dolphins have nostrils or blowholes on top of their heads for breathing. These animals come to the surface to take in air.

D. 1. Biotic (living) components : These include all plants and animals in the habitat.
Abiotic (non-living) components : These include sunlight, water, soil, air, and temperature.
2. Terrestrial habitats : Habitats on land are called terrestrial habitats. Forests, grasslands, deserts, and mountain regions are examples of terrestrial habitats.
Aquatic habitats : Habitats in water are called aquatic habitats. Oceans, rivers, ponds, lakes are examples of aquatic habitats.

E. 1. Forests
Forests are large areas of land covered with plants and trees. They occupy about one-third of our planet. The following are some examples of plants and animals found in forests.
Plants : Orchids, mango, elm, maple, teak, birch, and willow.
Animals : Macaw, bald eagle, woodpecker, python, lizard, wolf, monkey, fox, and tiger.
Grasslands
Grasslands are large areas of land covered with grasses or shrubs. The following are some examples of plants and animals found in grasslands.
Plants : Grasses and shrubs.
Animals : Deer, giraffe, lion, zebra, and gazelle.
Deserts
Deserts are large, dry areas of land that receive little or no rainfall. Most deserts are very hot during the day and very cold at night. The following are some examples of plants and animals found in deserts.
Plants : Cactus, date palm, acacia, and agave.
Animals : Camel, kangaroo rat, thorny devil (a type of lizard), and rattlesnake.
Mountain Regions
Mountain regions are normally cold and windy. Some even receive snowfall. The following are some examples of plants and animals found in mountain regions.
Plants : Pine, larch, spruce, and fir.
Animals : Snow leopard, yak, and mountain goat.
2. Animals : Animals such as sloth, stick insect, and leaf insect are shaped or coloured to match their surroundings. This type of adaptation, called camouflage, makes these animals difficult to spot and protects them

from their enemies.

Adaptations for Grasslands

The following are some of the adaptations shown by plants and animals living in grasslands.

Plants

Grasses, have deep, spread-out roots that enable them to absorb water even during periods of scarcity.

Chapter-4 : Plants : Kinds and Functions

A. 1. a, 2. a, 3. b, 4. b, 5. a, 6. d

B. 1. T, 2. T, 3. F, 4. T, 5. T, 6. F

C. 1. similarities, 2. Herbs, 3. tree, 4. root system, shoot system, 5. sepals, 6. carpel

D. 1. Mustard and Radish
2. Mango, guava
3. In addition to the function mentioned, roots have to perform some specialised functions. Therefore, there is a change in their structure. This change in structure to perform special functions is called modification.
4. The place on the stem from where the branches or leaves emerge is called node.

E. 1. Plants with green and tender stems are called herbs. They are usually short and may not have many branches, e.g. mustard, radish, etc.
2. Some plants have the stem branching out near the base. The stem is hard but not very thick. Such plants are called shrubs, e.g. rose, jasmine, etc.
3. Some plants are very tall and have very hard and thick brown stems. The stem has branches in the upper part, much above the ground. Such plants are called trees, e.g. mango, jamun, guava, etc.
4. It consists of a main root which grows vertically downwards into the soil. It is also known as the primary root and gives out lateral branches called secondary roots.

F. 1. Herbs

Plants with green and tender stems are called herbs. They are usually short and may not have many branches, e.g. mustard, radish, etc.

Shrubs

Some plants have the stem branching out near the base. The stem is hard but not very thick. Such plants are called shrubs, e.g. rose, jasmine, etc.

Trees

Some plants are very tall and have very hard and thick brown stems. The stem has branches in the upper part, much above the ground. Such plants are called trees, e.g. mango, jamun, guava, etc.

2. The primary functions of a root are :
   - Roots fix and anchor the plants to the soil.
   - They help in the absorption of water and minerals required for the growth and development of plants from the soil.
   - Roots also bind the soil together and prevent the washing away of soil (soil erosion) by the water or wind.
   - They give support to the plants and help them to stand erect.
3. i. There are buds at the tip of the stem or a branch. These buds help the plant to increase in height. The space between the branch and the main stem is called an axil.
   ii. The gourd, grapevine and the passion flower plants have weak stems. You will also notice thin, thread-like structures on the stems. These are the modifications of the stem and are known as stem tendrils.
   iii. The flat green portion of the leaf is called the lamina or leaf blade.
   iv. The ovary contains many bead-like structures. These are called ovules.
4. In most plants, all the four whorls are present in a flower. Such flowers are called complete flowers. Examples : pea, mustard, gulmohar, hibiscus and petunia.

   In some flowers, one or more whorl is missing. Such flowers are called incomplete flowers. Examples : mulberry and date palm.
5. Functions of Flowers
   - Reproduction : A flower is the organ of reproduction in plants and leads to the formation of fruits and seeds. New plants are produced after germination of seeds.

- Source of food : We get nectar from flowers. Nectar is used as food by insects.
  Cloves (lavang) are obtained from the dried unopened flower buds of clove plant.
- Ornamental value : Ornamental flowers are used in bouquets and interior decoration.
  Plants are grown in gardens, residences and on road-sides. They add colour to the surroundings and purify the environment with their fragrance.

6. Leaves are modified to give support : In pea plants, some leaves are modified into thin, coiled thread-like structures called leaf tendrils. These help the plant in climbing.
   Leaves are modified into spines : In cactus, leaves are modified to form spines. This reduces loss of water from the leaves. Spines also protect the plants from being eaten away by the grazing animals.

Chapter-5 : Sources of Food

A. 1. d, 2. b, 3. a, 4. b, 5. b, 6. b, 7. d, 8. a

B. 1. T, 2. T, 3. T, 4. T, 5. T, 6. T

C. 1. Food, 2. South Indian, 3. in gradients, 4. plants, animals, 5. animals, 6. green plants

D. 1. The food we eat consists of different parts or components. Every time you bite into a juicy apple, a pastry or any other food stuff, one or more of these components which are needed by our body for growth and maintenance are called nutrients.
   2. The food which is eaten regularly in substantial quantity to constitute the major part of the diet and supply sufficient proportion of energy and nutrients needed by the body is called the staple food. It varies from place to place.
   3. They have sharp, broad cutting teeth in front and flat, grinding teeth at the back.
   4. The plant parts that are not eaten or cannot be eaten by us as food are known as non-edible parts.

E. 1. It provides us energy for the continuation of different functions of the body. It is the fuel of the body and keeps it fit and fine.
   2. - It Provides us Energy
      - It Helps in Growth and Development
      - It Helps to Overcome Wear and Tear
      - It Protects the Body against Diseases
   3. The raw materials used for the preparation of food are called ingredients.
   4. We eat different kinds of food during different parts of the day, like lunch, dinner, etc and every meal tastes different because the raw materials used are different.
   5. Crows and Bears

F. 1. - It Provides us Energy : The food that we eat is digested, absorbed and then oxidized to provide energy. The energy thus released is utilized by us to perform various functions of life.
      - It Helps in Growth and Development : Our body is composed of millions of cells and these cells come from other cells by the process of cell division. Food provides all the necessary materials for cell division and helps in growth and development.
      - It Helps to Overcome Wear and Tear : Food is required to make more protoplasm which is necesary for the repair of damaged cells or the replacement of worn-out tissues and for the healing of wounds.
      - It Protects the Body against Diseases : Food provides resistance to the body against various diseases. Deficiency of food may cause several diseases.
   2. Different parts of the plants from which food is obtained are the roots, stems, flowers, leaves, fruits and seeds.
      The plant parts which are eaten are called edible parts. The plant parts that are not eaten or cannot be eaten by us as food are known as non-edible parts.
      Food from Roots
      Carrot Turnip
      Food from Fruits
      Bananas Apple
      Food from Seeds

Wheat Kidney beans Rice

3. A variety of food products are obtained from animals. These foods help in body-building and growth.

   Milk : We get milk from cow, buffalo, goat and some other animals. Milk is used to prepare milk products such as cheese, butter, ghee, curd and ice cream.

   Eggs : Eggs of hen, duck, quail are used as food.

   Meat : Meat of hen, duck, fish, goat and crab are used as a food.

   Honey : Honey is a sweet liquid produced by honey bee, which we use as food as well as medicine.

] 4. Herbivores : Herbivores eat only plants or plant products. Cow, buffalo, horse, deer, elephant, camel and giraffe are herbivores. They have sharp, broad cutting teeth in front and flat, grinding teeth at the back.

   Carnivores : Carnivores eat the flesh of other animals. Lions, tigers, jackal, snakes and vultures are carnivores. These animals have long sharp teeth or beaks to tear the flesh.

   Omnivores : Omnivores eat both plants and animals. Bears, crows and cockroaches are omnivore animals. Human beings also come in this category. Some carnivores and omnivores are known as scavengers. They mainly consume dead bodies of animals and help to keep the surroundings clean.

5. Parasites are small animals that depend on other living things such as plants and animals for food. Mosquitoes live on blood that they suck from humans and other animals. They have a long, sharp pipe like organ instead of teeth, which is used to pierce the skin and suck the blood. Some other parasites are bugs, fleas, tapeworm, roundworm, etc.

Chapter-6 : Components of Food

A. 1. c, 2. c, 3. c, 4. b, 5. b, 6. a, 7. c, 8. b, 9. c, 10. b

B. 1. F, 2. T, 3. T, 4. T, 5. F, 6. T, 7. T

C. 1. nutrients, 2. carbohydrates, 3. vita, life, 4. proteins, 5. more proteins, 6. water, 7. healthy, 8. Marasmus, 9. haemoglobin

D. 1. i. Retardation in growth of muscles
   ii. Thin wrinkled and in elastic skin
   2. i. Swollen body
   ii. Hair fall
   3. i. Impairment of vision in dim light
   ii. Impairment of vision at night
   4. i. Bleeding gums
   ii. Reduced apetite
   5. i. Swelling in hands and feet
   ii. Numbness of arms and legs
   6. i. overweight
   ii. snoring

E. 1. d, 2. c, 3. e, 4. b, 5. a

F. 1. Milk butter, eggs, carrots, tomatoes.
   2. Proteins, which are required for growth and repair of body.
   3. Milk, pulpy fruits, whole grains.
   4. Scurvy is caused by vitamin C.

G. 1. • Carbohydrates • Proteins
   • Fats • Minerals
   • Vitamins • Water
   • Roughage
   2. Glucose ($C_6H_{12}O_6$), sugar ($C_{12}H_{22}O_{11}$), and starch [$(C_6H_{10}O_5)n$] are typical carbohydrates.
   3. The vitamins are classified as A,B,C,D,E and K.
   4. • It helps to move (transport) substances within the body.
   • It helps to absorb nutrients from food.
   5. Because it helps in retaining water in the body. It ensures the smooth movement of waste through the rectum and prevents constipation. Cellulose, referred to as fibre or roughage, swells up in the intestine by absorbing water. Thus, add bulk to the food and gives a sense of filling after the meal.
   6. • Adequate breast feeding by mothers should be provided to children.
   • The children should eat enough fruits, green-leafy vegetables, soyabean products and skimmed milk.

H. 1. The food we eat consists of different parts or components. Every time you bite into a juicy apple, a pastry or any other food stuff, one or more of these components which are needed

by our body for growth and maintenance are called nutrients.The main nutrients are :

- Carbohydrates
- Proteins
- Fats
- Minerals
- Vitamins
- Water
- Roughage

All of these components help in our growth and survival. They can be grouped into these kinds according to their importance :

Energy-yielding : Carbohydrates and fats, which produce energy in our body.

Body-building : Proteins, which are required for growth and repair of body.

Protective : Vitamins and minerals which help to perform necessary activities of life and fight diseases.

2. A balanced diet is one which contains all the nutrients in proper amount according to age and work we do.

   No single food item offers all the nutrients required by our body. Only a combination of different food items in adequate quantities will form a balanced diet. Balanced diet implies a complete meal. But, you must understand that people at different age and conditions need different nutrients in different quantities.

   - Growing children need more proteins to build their body.
   - Infants need more of vitamins and proteins to build their bodies and to keep diseases away.
   - Nursing mothers and pregnant women also need more of proteins to serve the needs of the growing baby.

3. The sources of vitamin B are : complex seafood, milk, meat, peas and it help growth and development.
4. When anyone does not take balanced diet, his/her food lacks in one or more of the nutrients. Diseases are caused when one or more nutrients are not present in the daily diet in the required amount.

   Deficiency of nutrients is also caused by over cooking or wrong cooking habits, for example, throwing away the water in which leafy vegetables or rice was cooked. This water had all the nutrients. Deficiency of nutrients is also caused by much loss of liquids from the body due to frequent diarrhoea (loose stomach), worms in the intestines and after repeated infections.

5. • overeating.
   - eating only fried food.
   - eating canned food in which quantity of proteins and minerals are less.
   - Sometimes, the nutrients are destroyed when food is not properly cooked or stored. For example,
   - washing the vegetables after cutting reduces the level of the nutrients as some of them are soluble in water.
   - cooking food without covering the vessel destroys the nutrients.
   - warming and frying the food again and again also destroys the nutrients.

6. • Night Blindness : Night blindness is caused by the deficiency of vitamin A. Impairment of vision in dim light or at night is the symptom of this disease.
   - Beri-Beri : Deficiency of vitamin B in our diet can cause a disease called beri-beri. The symptoms of this disease are swelling in hands and feet and numbness of arms and legs.
   - Pellagra : Pellagra is another disease which can be caused by the deficiency of vitamin B. Skin rashes, weakness and mental depression are some of the symptoms of this disease.
   - Rickets : This disease is caused due to the deficiency of vitamin D. Affected children develop long narrow chest, enlargement of bones at the ends and protruding stomach. The main cause of this disease is deficiency of vitamin D.

Chapter-7 : Separation of Substances and Cleaning of Food

A. 1. a, 2. b, 3. b, 4. a, 5. c, 6. a

B. 1. mixtures, 2. water, 3. xxxxxx, 4. river, 5. filtration, 6. distillation

C. 1. T, 2. T, 3. T, 4. F, 5. F

D. 1. A substance which is made of two or more kinds of particles of different substances in such a way that the particles can be separated by physical means is called a mixture.

2. The pure substances which are present in a mixture are called components of the mixture.

3. A substance made of only one kind of particles is called a pure substance.

4. Centrifugation is a method for separating the particles suspended in a liquid.

E. 1.
- To remove undesirable components
- To protect ourselves from diseases
- To improve taste
- To make it more nutritious

2. Evaporation

3. The process of carefully transferring a liquid from one container to another without disturbing the materials settled at the bottom.

4. The process of converting a liquid into its vapour form is called evaporation. This process helps to remove the liquid in a mixture (solution) so as to obtain the solid components. Heating the solution helps to quicken the process of evaporation.

5. Threshing

F. 1. A pure substance : A substance made of only one kind of particles is called a pure substance. All particles of a pure substance are alike. Pure substances have a definite composition.

All elements like hydrogen, oxygen, carbon, nitrogen, silver, copper, gold, etc are pure substances. In the same way, compounds like sugar, sodium chloride, potassium permanganate, water and carbon dioxide are also pure substances.

Mixture : A substance which is made of two or more kinds of particles of different substances in such a way that the particles can be separated by physical means is called a mixture.

2.
- To remove undesirable components
- To protect ourselves from diseases
- To improve taste
- To make it more nutritious

3. a. When the particles of the components of a mixture are different in weight, they can be separated by winnowing. This method is usually used by farmers to separate the husk from grains. The farmers allow the mixture of grains and husk to fall from a height so that the wind blows through it. The grains being heavy fall down straight (vertically) to the ground whereas, the husk being lighter is carried by the wind to a shorter distance where it settles in a heap away from the heap of grains. Next time you visit a flour mill (atta chakki) remember to see how the workers use winnowing to remove husk from the food grains. So winnowing is based on the fact that different substances have different densities.

b. Insoluble substances which are heavier than water can be separated by sedimentation and decantation.

Sedimentation : Sedimentation is a process in which heavier particles of an insoluble solid in a liquid settle down. The solid particles called sediments settle down during sedimentation forming a layer.

Decantation : Decantation is the process of pouring out the liquid or water (which contains the dust or soil particles) without disturbing the sediment.

c. This is a method for separating the particles suspended in a liquid. For this a machine called centrifuge is used. The mixture of suspended particles in a liquid is taken in a test tube. This test tube is placed in the centrifuge machine. The mixture is rotated at high speed in the centrifuge machine, either manually or electrically. As the mixture rotates, force acts on the suspended particles. Due to this force, the heavier suspended particles settle down at the bottom of the test tube and the lighter liquid particles

(clear water) remain on top.

Centrifugation is used in dairies for separating cream from milk. Milk is rotated at high speed in a container. The lighter part i.e., cream separates out and float in the centre. So, the milk and cream are separated.

d. When the components of a mixture have different solubilities, filtration can be used to separate them. The process of separating insoluble solid substances from a liquid mixture using a filter is called filtration. Here a filter acts much like a sieve. However, a sieve is used to separate a mixture of two solid substances, whereas a filter is used to separate a mixture of liquid and insoluble solids. A very common example of filtration is the straining of tea. A tea strainer (which is a kind of filter helps to separate the insoluble tea leaves from the tea. However, it cannot separate the sugar particles which have dissolved in the tea, nor the milk particles which are suspended in the tea. This is why a simple filter like a muslin cloth or a tea strainer will not help to purify water completely, as the suspended impurities will not be removed by it. For this purpose, you will need a porcelain filter. Candles which have very fine pores do not allow suspended germs to pass through them.

4. The process of conversion of water vapour into its liquid form is called condensation.

   To understand this process, let us boil some milk in a vessel and cover it with a plate. Remove the plate after a few minutes. What happens ? You will notice water drops under the plate that was used to cover the boiled milk. The water vapour have condensed into its liquids form, the water drops. This explains the process of condensation.

5. This process is used to separate the volatile solid components of a mixture. Sublimation is the process in which certain solids directly change into the gaseous form without going through the liquid form. Some common sublime substances are iodine, camphor, ammonium chloride, naphthalene, etc. When a sublime substance is heated, it changes into vapour form. Then this vapour is cooled to form the solid substance again, which is called sublimate.

6. We will have to use more than one method. First, we will separate sand from the mixture using either decantation or filtration. Then we will use evaporation and condensation to separate salt and water.

Chapter-8 : Materials of Daily Life : Clothes

A. 1. c, 2. b, 3. a, 4. b, 5. a, 6. d

B. 1. T, 2. T, 3. F, 4. T, 5. F

C. 1. Neolithic, 2. clothes, 3. sheep, 4. artificial, 5. knitting 6. wrapping

D. 1. Nature provides many different kinds of fibres such as jute, cotton, silk and wool. All fibres which are collected from plants and animals are called natural fibres.

   2. Fibres manufactured in factories using chemicals are called synthetic fibres.

   3. • Cleaned and carded raw cotton is used for many purposes in hospitals.
      • Since it is very light and a good absorbent, it is mainly used for making clothes for summer.

   4. A machine used for weaving cloth from the yarn

E. 1. A long, narrow and thin thread like structure found in plants and animals. It can be made artificially.

   2. Weaving is a process of arranging two yarns together.

   3. Knitting is the process of making a piece of fabric from a single yarn.

   4. The world's most important non-food crop is cotton. It is a soft fibre that grows around the seeds of the cotton plant. Black soil which has the ability to retain moisture is best suited for cotton cultivation.

   5. Jute is one of the cheapest natural fabrics which is obtained from the patsun plant. It grows best in warm, humid climates where

the annual rainfall is 150 cm or more. It grows best in the alluvial soil in the Ganga-Brahmaputra Delta.

F. 1. Long ago, when man lived in caves, he did not have the kind of clothes that we have today. He covered his body with animal skins, leaves and the bark of trees. However, these things were too hot for the summers and no warm enough for the winters.

After the invention of fire, people used to cover their body with leaves, bark of the trees and animal skins.

The man of the Neolithic age made the discovery of agriculture. Now they started to grow many crops such as corn, vegetable, cotton, jute, etc.

2. Fabrics made of fibres obtained from natural sources are called natural fabrics. They are further divided into two categories: animal fabrics and plant fabrics.
   - Animal fabrics : Fabrics obtained from animal sources are wool, silk, cashmere and fur.
   - Plant Fabrics : Fabric originating from plants are cotton, jute, flax, ramie and hamp.
3. Fabrics manufactured in factories using chemicals are called synthetic fabrics. They are also known as artificial fabrics. Some famous synthetic fabrics are nylon, polyester, terrylene plastics made from chemicals that are obtained mostly from petroleum. The plastic is first heated to melt it. It is then forced through a device called a spinneret, which contains fine holes. The long threads that emerge from the holes are allowed to cool and solidify. Several of these threads are twisted together to make the yarn, which is then used to make synthetic cloth.
4. To see how weaving is done.
   - Take two sheets of paper of different colours (glossy sheets).
   - Cut square pieces of length and width equal to 20 cm from each sheet.
   - Fold both the sheets into half.
   - Draw lines on both sheets.
   - Cut strips from one sheet and cut along the dotted lines on the other sheet.
   - Weave the strips one by one through the cuts in the sheet of paper.
5. - Jute is used to make sacks and other wrapping materials.
   - It is used for making cloth to wrap bales of raw cotton.
   - It is woven into curtains, chair, handbags, coverings, carpets and many other items.

Chapter-9 : Sorting Materials into Groups

A. 1. d, 2. c, 3. a, 4. a, 5. b

B. 1. do not have, 2. transparent, 3. solids, 4. insoluble, 5. float on

C. Do yourself

D. 1. The process of grouping things on the basis of their properties is called classificiation.
2. Based on their hardness, materials can be classified as hard or soft.
3. Sand
4. Liquids that dissolve in water are said to be miscible in water. For example, alcohol and vinegar.
5. Floatation is the ability of some materials to float on water.

E. 1. In everyday life, we often group materials for our convenience. At home, we usually store things in such a manner that similar objects are placed together. Such an arrangement help us to locate them easily.
2. Bark of a tree, road, and brick are examples of rough surfaces.

   Flower petals, surface of a mirror, and a baby's skin are examples of smooth surfaces.
3. Materials that allow light to pass through them are called transparent. For example, plain glass.
4. Materials that allow light to pass through them partially are called translucent. For example, certain plastics.
5. Materials that do not allow light to pass through them are called opaque. For example, metals.

F. 1. Materials can be sorted on the basis of properties such as lustre, transparency,

solubility, floatation, etc.

Lustre

Lustre is the ability of some materials to shine. Based on whether or not they have lustre, materials can be classified as follows.

- Materials that have lustre : Metals such as gold silver, copper, and iron are examples of materials that have lustre.
- Materials that lack lustre : Paper, cardboard, wood and rubber are examples of materials that lack lustre.

Roughness

Based on the roughness of their surfaces, materials can be classified as rough or smooth.

- Rough : Bark of a tree, road, and brick are examples of rough surfaces.
- Smooth : Flower petals, surface of a mirror, and a baby's skin are examples of smooth surfaces.

Hardness

Based on their hardness, materials can be classified as hard or soft.

Hard : Wood and metals are examples of hard materials.

Soft : Cotton and sponge are examples of soft materials.

Transparency

Based on the amount of light that can pass through them, materials can be classified as transparent, translucent, and opaque.

- Transparent : Materials that allow light to pass through them are called transparent. For example, plain glass, water, and air.
- Translucent : Materials that allow light to pass through them partially are called translucent. For example, oiled paper and certain plastics.
- Opaque : Materials that do not allow light to pass through them are called opaque. For example, wood and metals.

2. Solids : All solids have the following characteristics.
   - They have a definite shape and volume.
   - They cannot be compressed easily.
   - The particles they are made up of are packed very tightly.
   - Examples : Gold

   Liquids : All liquids have the following characteristics.
   - They have a definite volume but no definite shape. They take the shape of the container they are poured in.
   - They can be compressed more easily than solids.
   - The particles they are made-up of are not so tightly packed as in solids.
   - Examples : Water

   Gases : All gases have the following characteristics.
   - They have no definite shape or volume.
   - They can be compressed very easily.
   - The particles they are made up of are packed loosely.
   - Examples : Oxygen

Chapter-10 : Change and Reaction

A. 1. b, 2. c, 3. d, 4. a, 5. a, 6. c, 7. c, 8. c

B. 1. T, 2. T, 3. F, 4. T, 5. T,

C. 1. slow, 2. slow, 3. periodic, 4. causes, 5. effects, 6. interaction, 7. interact, 8. energy

D. 1. Periodic changes occur repeatedly after regular interval of time and whose occurrence can be predicted are called periodic changes.
   2. The changes which occur by man are called man-made changes.
   3. Changes which are useful to us, are known as desirable changes.
   4. Permanent

E. 1. Periodic changes occur repeatedly after regular interval of time and whose occurrence can be predicted are called periodic changes.
   2. Fast changes occur very fast. These changes occur within seconds or minutes.

      For example, changing of ice into water, explosion of crackers.
   3. The change, which takes place over a long time is called slow change.

      These slow changes may take hours, days, months or years.

      For example, germination of a seed, growing

of a first plant from its seedling.

4. Burning of fuels to produce heat which is used for various purposes, like cooking of food, etc is a desirable change whereas burning of wood in forest fire is an undesirable change.
5. For a farmer, rain may be desirable change when crop needs water but it is undesirable for person who constructs a house as rain may damage the construction of house.
6. A change is reversible if the substances can be brought back to their original form.

   For example, ice changes into water on heating whereas water changes into ice on cooling.

   Thus, this change is a reversible change.

   A reversible change is indicated by using double arrow ($\rightleftharpoons$) pointing in opposite directions between the initial and the final states of the substance.
7. A chemical change is a permanent change in which an entirely new substance is formed with different properties.

   A chemical change is a permanent change in which the composition of the substance changes giving rise to one or more new substances with different properties.
8. A physical change is a temporary change during which no new substance is formed.

   It is reversible and the composition of the substance remains unchanged.

F. 1. If we want to light a matchstick, we slightly rub the matchstick on the rough surface of the match box.

   What will be the result?

   The matchstick may not light up. Hence, for lighting a matchstick with sufficient rubbing on the match box is essential.

   Hence we can say that change depends upon the intensity of interaction.

2. The same change may be desirable at one time and undesirable at other times:
   - Burning of fuels to produce heat which is used for various purposes, like cooking of food, etc is a desirable change whereas burning of wood in forest fire is an undesirable change.
   - The changing of milk into curd is a desirable change whereas milk going bad on a hot summer day is an undesirable change.

   The same change may be desirable for someone but undesirable for others :
   - For a farmer, rain may be desirable change when crop needs water but it is undesirable for person who constructs a house as rain may damage the construction of house.
   - Cutting of trees in a forest is a desirable change for a woodcutter who needs wood for his survival but it is undesirable change for animals because it disturbs the environment of forest.

   According to the circumstances, some changes are always desirable or always undesirable. We always want to speed up a desirable change and slow down an undesirable change.

3. i. A physical change is a temporary change during which no new substance is formed.

      It is reversible and the composition of the substance remains unchanged.

   ii. Pasteurization is a technique, which is used to slow down the spoilage of milk. In this technique, milk is heated to high temperature and then suddenly cooled, for this sudden change of temperature microbes are killed. Pasteurized milk is stored in tetra packs and it does not spoil for several days without refrigeration. Louis Pasteur developed this technique.

   iii. In every change that occurs around us, energy is involved. This energy is either absorbed or evolved.

      Exothermic Changes

      Exothermic changes are those chemical changes, during which energy is released in the form of heat.

      For example :

      Lime stone + water $\longrightarrow$ calcium hydroxide + heat

      In some reactions both heat and light are produced.

Endothermic Changes

Endothermic changes are those chemical changes during which energy is absorbed in the form of heat.

For example:

Decomposition of baking soda (sodium bicarbonate) on heating.

$2NaHCO_3 \longrightarrow Na_2CO_3 + H_2O + CO_3$

In natural phenomenon, energy is also absorbed or released.

For example, changes of seasons, earthquakes, cyclones, growing of plants, ripening of fruits, etc all are the natural phenomenon. In all these changes, energy is either absorbed or released.

During cyclones and earthquakes huge amount of energy is also released.

To make their food, plants absorb energy from sunlight. This energy is used for growth of plants and ripening of fruits.

Hence, we can conclude that all the changes whether they are natural or man-made, energy is released or absorbed in all type of changes.

4. We changes our home, school, playground and many other places. For example, a sudden change in weather conditions, rainfall, flowering of plants, germination of seeds, ripening of fruits, drying of clothes, change of day and night, melting of ice, evaporation of water, burning of fuels, cooking of rice, making of chapatis, formation of curd from milk, rusting iron, burning of fireworks, etc are changes that take place around us. Changes may involve different kinds of alterations in position, shape, size, colour, state, temperature, composition and structure. A change always has some cause which brings it about.

   Study of changes helps us to find remedies for the adverse effect of certain undesirable changes.

5. Yes, it is possible.
   - Growth of a plant : Slow change, irreversible change, desirable change, chemical change.
   - Rusting of iron : Slow change, undesirable change, irreversible change and non-periodic change.

Chapter-11 : Motion and Measurements of Distance

A. 1. b, 2. a, 3. d, 4. a, 5. a, 6. b, 7. X, 8. a, 9. d

B. 1. F, 2. T, 3. F, 4. T, 5. 6. F, 7. F, 8. F

C. 1. oscillatory, 2. periodic motion, 3. random, 4. xxxxx, 5. 100000, 6. measurement tape, 7. non-stretchable string, 8. mass

D. 1. Air transport, water transport and land transport.
   2. Boats, ships and aeroplanes.
   3. "The motion that is not repeated at regular interval of time is called non-periodic motion." Examples :
   4. Measurement is the comparative study of an unknown quantity with some known fixed quantity of same kind. This known fixed quantity is called ''unit''.

E. 1. Change in position of an object with time.
   2. These are not accurate ways of measuring things. Some persons may have longer arms than the others. Likewise, the length of the hand and foot may vary from person to person.
   3. 86400 seconds
   4. Liter
   5. 1000 milliliters
   6. The unit which is agreed by all people as the basic unit of measurement is called the 'International System of Units' or 'Standard Unit' of measurement.

F. 1. i. Try to notice the motion of a spinning top and the blades of a fan. They move in a circle about a fixed axis. Same is the case with the potter's wheel, the wheel of a sewing machine and the giant wheel. Also, the earth and the moon spin on their axis. So, 'A motion is said to be in rotational motion if an object moves in a circular path around a fixed axis without changing its position.'
   ii. We start with a position of rest and move to and fro and while changing the direction we pass through the state of

rest. The 'to and fro' motion or vibrations of an object about its position of rest is called oscillatory motion'. For example, the movement of a pendulum and swing.

iii. In both oscillatory and vibratory motions, the motions are repetitive and the time taken to complete a single oscillation or vibration remains the same. So, 'the motion where an object repeats its motion after a fixed time interval is called periodic motion.'

iv. "The motion without any periodic motion sequence or direction is known as random motion".

Examples :

- A player of football on the field.
- A monkey performing antics on a tree. The buzzing bee.
- The ball during a game of hockey or football.
- Flying motion of a sparrow (bird).

2. Measurement is the comparative study of an unknown quantity with some known fixed quantity of same kind. This known fixed quantity is called ''unit''.

Need For Measurement

The earliest method of telling the time was the position of the sun in the sky. Romans used sand clocks for measuring a fixed duration of time.

But such units of measurement were not reliable because they vary from person to person and from place to place and are affected by the local conditions.

As the time passed, each country developed its own system of units and measurement. But this created a lot of confusion in commercial dealings and other multiple dealings. Because the same quantity of measurement happened to appear different for different people.

We cannot find out the length, area, volume, mass or temperature of different objects by just looking at them.

Nowdays, standard units of measurement are used in science and technology almost universally. ''A standard unit is used to measure any quantity completely and uniformly''.

3. Do yourself
4. The divider is placed such that each tip is at the points A and B.

   Then without disturbing the divider the distance between the two points is measured with a ruler.
5. Suppose the thickness of 1 page is 0.12 mm. So, we just have to count the number of pages and divide it by 2. and after that multiply that number by thickness of 1 page.

Chapter1-2 : Electric Current and Circuit

A. 1. b, 2. c, 3. c, 4. a, 5. a

B. 1. T, 2. F, 3. T, 4. F, 5. T, 6. T

C. 1. 1.5, 2. negative, 3. tungsten, 4. electric current, 5. insulators, 6. conductors

D. 1. An earliest cell known as simple Volta cell was discovered by an Italian scientist, Alessandro Volta. He discovered that when plates of two different metals are placed in an acid solution electricity is produced.

   This cell consists of two metal plates: a zinc plate and a copper plate. Dilute sulphuric acid is used as the solution between the two plates. When the two plates are connected to a battery bulb it starts glowing.
2. Dry Cell
3. Solar cells are used in wristwatches and calculators.
4. CFL stands for Compact Fluorescent Lamp. A compact fluorescent lamp is a smaller version of the fluorescent lamps that have been used to provide energy-efficient light for offices, factories, stores and schools for over 60 years.

E. 1. Electric cell, solar cell and battery
2. Dry cell was invented by G. Leclanche in 1868.
3. This carbon rod acts as positive terminal.
4. The zinc container acts as a negative terminal.
5. Insulators are used to cover the conductors to prevent current leakage and make sure the user does not get an electric shock.

F. 1. there are some other dry cells or electric cells as a source of electricity, which generated

direct current (DC) due to chemical reaction that takes place inside it.

The dry cell is used in torches, transistors, toys and clocks etc. Dry cell was invented by G. Leclanche in 1868. A single dry cell gives a voltage of 1.5 volts.

Advantages of Dry Cell

The dry cells have the following advantages :

- Dry cells are light in weight and small in size.
- Dry cell can be transported from one place to another place easily.
- There is no fear of spoilage / leakage in dry cells.

2. We use electric bulbs in our bedrooms, kitchens, bathrooms, etc. An electric bulb and a torch bulb have an outer case made up of glass. The outer case is fixed on a metallic base.

   An electric component which converts electric energy into light energy.

3. An electric current is a form of energy i.e., electrical energy which gets converted into heat and light energy, when it flows through an electric bulb.

   An electric current has electrical energy. This gets converted into light and heat energy when the current flows through any electrical gadget. The flow of electric current goes from positive terminal (+) to the negative terminal (–).

4. If you will connect the two ends of a cell to a bulb using copper wires, the bulb lights up. This is because you have provided a path for electric current to flow from the positive terminal of the battery to the negative terminal through the bulb. Such a path of an electric current is known as a circuit.

   The set up consisting of the source of electricity, such as an electric cell, the electric bulb (or any other electrical equipment) and electric wires (metal wires) joint together in such a way that the electric current can flow along a closed loop known as an electric circuit.

5. The materials that do not allow electric current to pass through them are called insulators. Wood, cotton, wool, plastic, rubber, mica, bakelite, ebonite, distilled water and glass are some insulators.

Chapter-13 : Fun with Magnet

A. 1. d, 2. X, 3. c, 4. a, 5. a, 6. b

B. 1. F, 2. T, 3. F, 4. T, 5. T

C. 1. xxxxxx, 2. diamagnetic, 3. compass, 4. attract, 5. magnetic

D. 1. A material (substance) which attracts pieces of iron or steel.
   2. Brick, wood, silver, water, etc.
   3. A device containing suspended magnetic needle used for finding directions.
   4. When the permanent magnet is removed, it loses property of magnetism. It is called temporary magnet.

E. 1. The poles are located at its two ends.
   2. Place the rectangular piece of iron on the table. Now place one of the poles of the bar magnet, while holding its other end carefully, near one edge on the bar of iron. Without lifting the bar magnet, move it along the length of the iron bar to the other end. Now, lift the magnet and bring the same pole to the same initial point of the iron bar. Move the magnet along the length of the iron bar to the other end. Repeat the process about 30-40 times. Now bring an iron pin near the bar. You see that pin is attracted to the end of the iron bar. Hence it is proved that the iron bar bas become a magnet.
   3. The strength of the field varies depending on its location around the magnet. The magnetic field of a bar magnet is strongest at eighter pole of the magnet.
   4. Freely suspended bar magnet comes to rest in the north-south direction. It is because the earth itself behaves like a bar magnet. The South pole of this bar magnetic towards the geographical north pole of the earth. Its north pole is towards the geographical south pole. Thus, the magnet aligns itself in the north-south direction under the influence of the earth.

Magnetic poles do not exist separately. Magnetic poles always exist in opposite pairs.

F. 1. A compass is a circular box with a glass cover. A magnetised needle is pivoted in its centre. It can rotate freely when the box is held horizontal. Directions are marked on a circular dial around the needle. Its needle indicates the north-south direction when in comes to rest. The compass is then rotated until the north marked on the dial comes at the north end of the needle painted in a different colour, usually red. Then the other directions can also be known.

2. 

3. It is used for finding directions.
   It is used in making toys.
5. It was found that a piece of this rock, when suspended freely, pointed itself in a certain direction. Therefore, it came to be used for finding directions. Due to this property it was called lodestone, which means 'leading stone'.

Chapter-14 : Importance of Air

A. 1. b, 2. c, 3. c, 4. c, 5. b

B. 1. F, 2. F, 3. F, 4. F, 5. T, 6. T, 7. T, 8. F

C. 1. harmful, 2. and protect, 3. oxygen, 4. Nitrogen, 5. 219°, 6. quickly, 7. oxygen, 8. carbon dioxide

D. 1. The layer of air covering the whole Earth.
2. 78%
3. Dry ice is the solid form of carbon dioxide.
4. The air in motion is called wind.

E. 1. Carbon monoxide and nitrogen oxide
2. Ethylene, sulphur dioxide
3. Sulphur dioxide, nitrogen oxide and unburnt hydrocarbons
4. Carbon monoxide
5. Sulphur dioxide

F. 1. a. The layer of air covering the whole Earth.
   b. • Land organisms take it directly from the atmosphere.
   • Water organisms take water - dissolved oxygen.
   • Soil organisms take oxygen from the air trapped in between the soil particles.

2. a. Air is made up of 78% nitrogen, 21% oxygen, 0.9% argon, 0.04% water vapour, 0.3% carbon dioxide and 0.03% are the other trace gases.
   b. • Air helps in the dispersal of seeds and fruits.
   • Air helps in pollination of flowers.
   • Air helps in the movement of sail boats, gliders, parachutes and aircrafts.

3. a. Carbon dioxide is dissolved in beverages like sodawater and lemonade. As carbon dioxide is sparingly soluble in water it is dissolved under pressure to make these aerated drinks. That is why when you pull off the lid of the bottle the pressure is suddenly reduced and the gas gushes out with effervescence.
   b. Plants also use carbon dioxide from the air to make their own food. The chloroplasts in the leaves bring about a chemical union of carbon dioxide and water in the presence of sunlight and produce carbohydrates (sugars) which are then stored in the form of starch.

4. Due to combustion of petrol and diesel not only poisonous gases are produced, but also a huge amount of oxygen of the atmosphere is depleted. Among the various toxic pollutants of the automobile exhausts, carbon monoxide, nitrogen oxide, sulphur dioxide, ethylene, etc, are notable.

5. • Excess of carbon dioxide causes suffocation.
   • Carbon monoxide, the deadly poisonous gas released from automobiles, aircrafts engines and space rocket engines reduces oxygen carrying capacity of blood.
   • Sulphur dioxide released from coal and oil

combustion causes headache, chest constriction, irritation in the respiratory tract, vomiting, etc.

- Photochemical smog causes eye irritation, loss of vision, abdominal pain and also cancer.

6.
- Factory area should be separate and quite some distance away from residential areas.
- Old industrial processes should be so modified that they produce the least pollution.
- Thermal power plants and factories should install equipments designed properly to limit emission of pollutants in air.
- Factories should change the methods of manufacture and use fuels that case lesser pollution.

Chapter-15 : Importance of Water

A. 1. a, 2. a, 3. d, 4. c, 5 b

B. 1. F, 2. T, 3. F, 4. T, 5. T

C. 1. Transpiration, 2. evaporation, 3. famine, 4. rain, 5. Heavy rain

D. 1. iii, 2. v, 3. iv, 4. i, 5. ii

E. 1. 96%
2. The Earth
3. Release of water vapour by plants through the holes of their leaves.
4. If the falling rain drops pass through a cold region, they become solid ice balls called hail.

F. 1. Evaporation and condensation of water take place on a very large scale on the surface of Earth and its atmosphere. These processes play a key role in cloud formation and rain. Water from oceans, seas, rivers, ponds, live tissues of plants, etc. absorb heat from the sunlight and evaporates. The water vapour moves up and gets mixed with the air. During exhalation, a large amount of water vapour is exhaled out of the animals and human bodies and plants. The large number of plants on Earth also release water vapour through their stomata in the process of transpiration. All these water vapours mix with the air. When the temperature of air increases, it expands. This makes the air lighter and it rises in the atmosphere taking water vapour with it. As the air rises, it begins to cool. The water vapour condenses on dust particles present in the atmosphere to form millions of tiny droplets of water. These droplets are so fine that they remain floating in the air. The cluster of these tiny droplets of water floating in the air appear as clouds.

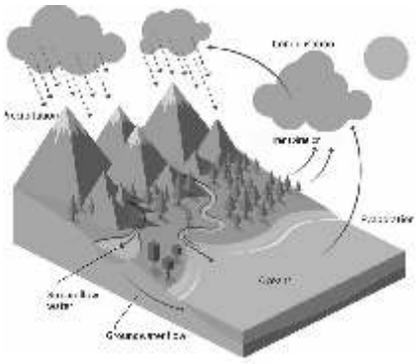
2. The level of water in wells, lakes, ponds, rivers goes down or dries up. As a result the plants dry up. This situation is called drought. There may be lack of good fodder and water causing a famine. As a result humans and animals die because of hunger and dehydration.

3. Heavy rainfall in an area leads to the high rise in the level of water in rivers, lakes and ponds. Crossing the limits the water spreads over large area. The villages, fields, forests and even cities get submerged in water. This situation is called flood. During floods, plants and crops die due to suffocation by excess water or due to soil, holding their roots, being washed away. Cattle also die sinking in water and due to shortage of food. Floods cause damage to buildings, shortage of food and clean drinking water.

4. It looks blue from the space because of so much of water on its surface.

5. Storing rainwater that collects on roofs instead of letting it go down the drains, is practical solution of water scarcity.

G. 1. Most of the water (about 97%) is in the seas and oceans as salt water. This water is too salty to drink by humans or land animals and irrigation (used by plants). Thus only a very small part (about 3%) of the total water is fresh water (drinkable). Out of this, most of it (about 2.997%) is frozen in glaciers and polar ice-caps or is buried so deep under that it is very costly to draw out. Thus only about 0.003% of the fresh water is available to us in the rivers, lakes, streams, underground, soil moisture and water vapour.

2. 

The water cycle in nature

3. • Do not leave a tap running while brushing your teeth.
   • Get the leaking pipes and taps repaired.
   • Use a bucket of water to bathe instead of running water.
   • Use a wet cloth to clean the car or floor instead of using hose.
   • Watering the plants with mugs of water saves a lot of water at home.

   Collecting rain water and storing it for later use is called rainwater harvesting. Storing rainwater that collects on roofs instead of letting it go down the drains, is practical solution of water scarcity. In rooftop rainwater harvesting, rainwater is led to underground storage tank through pipes. If it overfills, excess water can be allowed to go in dugout ponds or into a deeper pit in the ground. This then seeps into the soil their raising the level of the groundwater.
4. Water is also used for transportation and recreation (water sports like boat race, surfing, etc). Water also regulates the climate of a place because it does not heat up or cool down as fast as land. This helps to control its temperature and neighbouring atmosphere. Water is also home to many plants and animals and enables them to survive in very hot or cold conditions.
5. The rainwater falls on seas, rivers, lakes, ponds and streams. The rain that falls on land flows into rivers through streams or collects into lakes and ponds. The rivers go into the seas and oceans. Some of the rainwater seeps down into the soil and gathers underground as ground water. The groundwater is pumped out for domestic, irrigation and industrial use. Most of it goes into rivers and finally into the seas. Some rainwater gets frozen on mountains during the cold weather. It melts during summer and flows into rivers, and then into seas and oceans. Some of it is used for irrigation.
6. Besides being essential for life, water is used for many other purposes. In India, about 70% of the total water available is used for agriculture, 22% by industries and power plants and only 8% for personal or domestic needs like cooking, bathing, washing.

   Water is also used for transportation and recreation (water sports like boat race, surfing, etc). Water also regulates the climate of a place because it does not heat up or cool down as fast as land. This helps to control its temperature and neighbouring atmosphere. Water is also home to many plants and animals and enables them to survive in very hot or cold conditions.

Chapter-16 : Light, Shadows and Reflection

A. 1. c, 2. a, 3. d, 4. a, 5. b, 6. c, 7. d, 8. b

B. 1. F, 2. F, 3. T, 4. F, 5. F

C. 1. transparent, 2. colour, 3. no-light, 4. photograph-like, 5. colours

D. 1. It is the firefly glowworm, commonly known as jugnu.
   2. All bodies through which light can pass easily are known as transparent bodies.
   3. When light falls on a smooth polished surface, it bounced back. This bouncing back of light is called reflection of light.
   4. The impression of an object as seen in a plane mirror.

E. 1. Sun
   2. Jugnu
   3. The presenter arranges three pieces of card, with holes in, in an uneven line. The light stops and cannot travel through all three cards. When she arrange the holes in a straight line, the light can travel through.
   4. No, because the glass sheet is transparent, we cannot see its shadow.

5. Rectilinear theory of light.

F. 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 the 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 example 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.

2. When light falls on a smooth polished surface, it bounced back. This bouncing back of light is called reflection of light.

All of us know about regular and diffused reflection. 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.

The surfaces of ordinary objects (such as the surface of a wall) produce the irregular or diffused reflection. When a parallel beam of light falls on such a surface, different rays are reflected in different directions, i.e., they get diffused. This type of irregular or diffused reflection is very useful to us as it enables us to see the various objects around us without glare.

3. • A shadow is formed whenever the path of light is obstructed by an opaque object.
   • A shadow is always black irrespective of the colour of the object or the light emitted by the source.
   • A shadow is formed when an opaque object blocks the path of light.
4. The presenter arranges three pieces of card, with holes in, in an uneven line. The light stops and cannot travel through all three cards. When she arrange the holes in a straight line, the light can travel through.
5. A pinhole camera is a device which forms a photograph-like image of a bright object on a screen.

   We can make a pinhole camera by using an empty tin or a rectangular cardbox and a tracing paper.

   Take the tin (or box) and remove its lid (or one side) with a piece of tracing or waxed paper and secure it in position by using a rubber band or some thread or some suitable 'tape'. Make a small pinhole near the centre of the other side of the tin (or box). Our pinhole camera is now ready for use.

   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.
6.

Image	Shadow
1. Size is same as that of the object. 2. Shadows all 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'.	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 scree.

Chapter-17 : Waste

A. 1. a, 2. c, 3. d, 4. d, 5. a

B. 1. animal products and micro-organisms, 2. paper, 3. in rottening and decoying, 4. rot, 5. land

C. 1. F, 2. T, 3. T, 4. T, 5. T, 6. F

D. 1. Those materials that are of no use and are thrown out are called wastes.
2. Paper fruit peels, pencil shaving, etc.
3. During the process, these substances decay in the presence of moisture, soil and micro-organisms. Time needed for decay depends on quantity and climate.
4. Substances that can be broken down into harmless substances by micro-organisms.
5. Substances that cannot be broken down into harmless substances by micro-organisms.
6. Green garbage bin : It is used for collecting kitchen, plant and animal wastes.

E. 1.
- The places look dirty, and emit foul smell.
- There are many crows and animals wandering.
- There is large quantity of garbage found in open.

Consequences
- The beauty of the place is spoiled.
- The environment is polluted.
- The animals spread diseases.
- This is an eyesore.

2.
- The beauty of the place is spoiled.
- The environment is polluted.
- The animals spread diseases.
- This is an eyesore.

3. We should put the wastes (biological/ biodegradable) in soil pit for its degradation to make useful material called compost. It can be used as manure for plants. It also improves the soil's quality and water holding capacity.

4. Vegetable peels, fruit peels, leaves, flowers, pencil shavings, cow dung, urine, etc.

The rottening of wastes is supported and decayed by animal products and micro-organisms. Small animals, worms, insects and micro organisms that live in soil feed on these wastes.

They convert them into useful wastes or manure. Animal dung (cow dung) and animal urine have many micro-organisms that support in rottening and decaying of biodegradable wastes.

5. If biodegradable wastes are wrapped in a polybag and thrown, then the interaction of wastes, micro-organisms and climatic factors (air, temperature and water) will not take place. This will delay rottening of wastes and we will not get useful materials from these wastes.

6. Solid Waste Management

Solid waste management is done by :
a. Collection of solid wastes.
b. Disposal of solid wastes.
c. Recycling of solid wastes.

a. Collection of solid wastes : Domestic garbage is collected by street sweepers or collectors. The garbage is separated into three categories :
- Biodegradable wastes.
- Non-biodegradable wastes.
- Recyclable wastes.

After this, the wastes are sent to their respective stations for processing and treatment.

b. Disposal of wastes : There are different methods of disposal of solid wastes.

c. Recycling of solid wastes : The materials are cleaned and sold to industry. They are remanufactured and sold to consumers (recycled).
- Solid wastes like plastics, metals, papers, glasses, etc., are recycled for reuse. These wastes are collected from various sources and sent to respective industries for recycling.
- Natural wastes are converted to useful products like manure and fuel for use at cheaper rates.

7. Do yourself

F. 1. Those materials that are of no use and are thrown out are called wastes. There are two types of waste :
- Biodegradable wastes (Rottening wastes)

- Non-biodegradable wastes (Non-rottening Wastes)

Vegetable peels, fruit, peels, leaves, flowers, pencil shavings, cow dung, urine, etc.

2. The method of reducing the burden on natural resources for materials like metal, paper, glass, etc., by reuse of used scrap and waste materials is called recycling.

   Paper is very important for all of us. Books, notebooks, newspapers, cards, magazines, etc., all are made up of paper. Used and old papers can be used again by recycling them.

   Advantages of Recycling

   - It lessens the burden on natural resources.
   - It makes the natural surroundings clean and better.
   - It produces useful and reusable materials.
   - It provides an employment and a source of livelihood.

BOOK-7

Chapter-1 : Nutrition in Animals

A. 1. d, 2. b, 3. b, 4. b, 5. b, 6. c

B. 1. T, 2. T, 3. T, 4. F, 5. F

C. 1. oxygen, 2. heterotrophic, 3. carnivores, 4. hydra, 5. ingestion, 6. Nutrition,

D. 1. Those animals who totally feed on plants and its products; e.g., goat, cow, rabbit.
   2. Hair-like projection on the body of paramecium.
   3. The act of getting and eating food collectively are called ingestion.
   4. The unicellular Amoeba engulfs tiny particles of food by throwing its false feet, known as pseudopodia around it. The pseudopodia join together to form a small cavity known as a food vocuole.

E. 1. All living things perform like processes, which are processes that the organism completes that are necessary to keep it alive and functioning well.
   2. The process of taking or consuming and utilizing food is called nutrition.
   3. 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.
   4. The process in which the body gets rid of the undigested solid parts of the food.
   5. Those animals who feed on other animals are called carnivores; e.g., lion, tiger.

F. 1. Based on the structure and function, teeth are of four types. There are 4 incisors, 2 canines, 4 premolars and 6 molars in each jaw.
      - Your front teeth are known as incisors. These are chisel-shaped and are used for biting and cutting.
      - Next to the incisors are the canines. These are pointed and are used for piercing and tearing pieces of food such as meat.
      - The teeth at the back of your mouth are broad with an almost flat surface. These crush and grind the food. These are called the premolars and molars. Molars are larger than premolars. Wisdom teeth are the last molars to come through, at the back of the mouth. The white substance that covers your teeth is called enamel. It is the hardest substance in the body.
   2. The tongue pushes the food from the mouth towards the pharynx from where it reaches the food pipe, also known as the oesophagus. This oesophagus is about 25 cm long and lies behind the wind pipe. Food is pushed down by the movement of the wall of the food pipe. This wave like movement in the food pipe which pushes the food forward is called as peristalsis. Actually this wave like movement takes place throughout the alimentary canal and pushes the food downwards. The word alimentary canal is used to describe the entire tube which is concerned with ingestion,

digestion and absorption of food.

Movement of food in oesophagus

3. The thick muscular walls of the stomach contract to churn the food to mix it with digestive juice produced by the cells lining the stomach. The digestive juice contains the enzyme pepsin that helps in breaking down proteins into amino acids.

   The inner linning of the stomach secretes mucous, hydrochloric acid and digestive juices. The mucous protects the lining of the stomach. The acid kills many bacteria that enter along with the food and makes the medium in the stomach acidic. The digestive juices break down the proteins into simpler substances.
4. They first swallow the grass and it is stored in a part of their four-chambered stomach called rumen. Here, partial digestion of food occurs and the product is called cud. When the animal is resting, the cud is brought back into the mouth in small quantities and the animal chews it further. This is called chewing the cud. This helps in the digestion of cellulose. That is why these animals are called ruminants. The ability to ruminate not only provides for better utilisation of the food but it has the added advantage that the time needed for grazing (in a dangerous environment with little cover) is reduced to a minimum. The chewing of meal can be carried out later in a safe place.
5. Amoeba is a microscopic, single-celled organism found in pond water. It is a simple organism having an irregular shape.

   The unicellular Amoeba engulfs tiny particles of food by throwing its false feet, known as pseudopodia around it. The pseudopodia join together to form a small cavity known as a food vacuole. The food inside the vacuole is digested by digestive juices. It is absorbed and assimilated there to provide energy and perform other functions.

Chapter-2 : Nutrition in Plants

A. 1. a, 2. d, 3. c, 4. c, 5. a

B. 1. F, 2. T, 3. T, 4. F, 5. T

C. 1. dodder, 2. green pigments, 3. lichen, 4. iodine, 5. xxxxxx

D. 1. Two
   2. The chloroplasts are green because of the presence of a green pigment called chlorophyll.
   3. Leaves
   4. A type of small wild plant (a fungus) that is usually poisonous, with a round top and a thin supporting plant.

E. 1. The term ‘nutrition’ refer to all activities included in obtaining food and its utilization in the body.
   2. Autotrophic nutrition and Heterotrophic nutrition
   3. It is a type of nutrition in which the green plants manufacture their own food from simple raw materials such as sunlight, carbon dioxide and water. Green plants show autotrophic mode of nutrition.
   4. A nutrient a substance used by an organism to survive , grow and reproduce.
   5. Mushrooms, yeast.

F. 1. Green plants obtain energy to make food from sunlight. The process of synthesizing food in plant in the presence of sunlight is called photosynthesis. The word ‘photo’ means ‘light’ and ‘synthesis’ means ‘to combine’.

   Leaves are the parts of the plants which carry out photosynthesis. They are called the food factories of plants. There are small cells present in all green leaves and in young stems which contain several green structures called chloroplasts. These chloroplasts contain the green pigment called chlorophyll and hence looks green. The chlorophyll traps the energy from the sun for the process of

photosynthesis. There are tiny pores present on the underside of the leaves, called the stomata (singular : stoma). The plants take in carbon dioxide needed for photosynthesis through stomata. The roots of the plants absorb water and minerals from the soil and transport them up to the leaves. Water and minerals are carried out by the xylem vessels which form pipe lines through the root, stem, branches up to the leaves.

During photosynthesis, a chemical reaction takes place in the green parts of the plants. In presence of sunlight carbon dioxide and water change into glucose, the food prepared by the plant and oxygen is released into the atmosphere. The food is then transported to all parts of the plant to perform various functions. The extra food is stored in the form of starch in different parts like leaves, stems and roots.

2. Keep a green potted plant in a dark place for two days. In this way the leaves become free of starch. Select a healthy green leaf and cover the middle part of it with a black paper strip as shown in the figure. Now, keep the plant in sunlight for the whole day. Now, pluck that leaf and remove the black paper strip. Test the leaf for the presence of starch by keeping the leaf in a petri dish and adding a few drops of iodine solution. What do you observe? The part of the leaf which was not covered by paper strip turns blue-black indicating the presence of starch while no change in colour is seen in the part of leaf which was covered by black paper strip showing that no starch is formed in that part.
3. In a pitcher plant, the leaf lamina is modified to form a pitcher like structure and the leaf tip is modified into a lid. When an insect happens to enter a pitcher, the lid is enclosed. The insect, thus, gets trapped in the pitcher, where it is then digested.
4. Life would be impossible on the earth.
5. Plants constantly need nutrients for their growth. They absorb these nutrients from the soil. In a forest, these nutrients get naturally replenished by decaying of dead plants and animals. However, on a farm these nutrients have to be added to the soil in the form of manure and fertilisers. These manures and fertilisers contain plant nutrients such as nitrogen, potassium and phosphorus.

Chapter-3 : Animal Fibres

A. 1. b, 2. b, 3. b, 4. b, 5. d, 6. b

B. 1. F, 2. F, 3. F, 4. T, 5. F, 6. T

C. 1. clothes, 2. angora wool, 3. cocoon, 4. sericulture, 5. alpaca fleece

D. 1. Thick hair on the body of animals
   2. These include cotton, the most widely used of all textile fibres, flax, hemp, jute, etc.

      The base of plant fibres is cellulose which is the material used by nature as a structural material in the plant world.
   3. Angora wool is obtained from the angora rabbits. It is an extremely soft, fluffy and warm fibre. This soft fibre is used in sweaters, mittens (gloves) and baby clothes.
   4. Burrs are soft fluffy fibres in wool. These are removed manually. These are the same burrs which sometimes appear on your sweaters.

E. 1. We wear sweater in winter to protect ourselves from the cold.

      The bodies of certain animals like sheep, goat and yak are covered by a thick coat of hair. This coat of hair is called fleece. It protects the animals from cold. Wool is obtained from the fleece of animals.
   2. Hair of sheep
      - They are used in making woolen clothes.
      - They are warm

      Hair of man
      - They are not used in woolen making clothes.
      - They are not warm.
   3. In this fibres are passed through metal teeth to straighten them and remove dirt. As the fleece of sheep and goat is white, black or brown in colour, the fibres can be dyed in various colours.
   4. Silk is a smooth fibre made of the protein secretions from Bombyx mori or silkworms.

Silk is a natural animal's product and therefore quite costly. Silk production requires continuous monitoring and feeding of the silkworms and a great deal of effort but surprisingly results in small amount of thread.

5. According to the Chinese legend the wife of mythical yellow emperor, 'lady Hsi-Ling-Shih' is known as the 'Goddess of Silk'.

F. 1. Plant fibres : These include cotton, the most widely used of all textile fibres, flax, hemp, jute, etc.

The base of plant fibres is cellulose which is the material used by nature as a structural material in the plant world.

Animal fibres : These include wool and silk. Wool comes mainly from fleece of sheep. We get wool also from goat, yak, camel and rabbit. Silk is produced by cocoon-spinning silkworm.

Animal fibres are made up of proteins, the complex compounds that form a major part of bodies of all animals.

2. Angora, Mohair yak, cashmere and vicuna.
3. First and the foremost are the breeding and rearing of wool bearing animals.

Rearing of Sheep : Sheep are reared in many parts of our country for wool. There are 40 different breeds of sheep in the world producing approximately 200 types of wool.

Lohi, Nali, Bakharwal, Marwadi, Patanwadi and Rampur Bushair are some names of Indian breeds of sheep that yield wool.

The major wool producers in the world are Argentina, South Africa, Australia and China.

Certain breeds of sheep have thick coat of hair on their body which yields good quality wool in large quantities. These sheep are ''selectively breed'' with one parent being a sheep of good breed. Once the reared sheep have developed a thick growth of hair then hair is shaved off for getting wool.

The process of conversing of fibre into wool yarn is an elaborate process and involves the following steps :

Shearing : Once a sheep develops a thick coat of hair, it is shaved off for getting wool. The removal of wool from a sheep is called Shearing. It can be done manually with a large razor or with a shearing machine. Producers shear their animals in the summer months.

4. The sheared skin with thick coat of hair is then washed thoroughly with detergent in tanks to remove grease, dirt and dust. This process is called scouring. Earlier scouring was done in tanks but now-a-days, it is done by machines.
5. The female silk moth lays eggs. When the eggs hatch, a tiny caterpillar crawls out. This is the silkworm and larva. The silkworms continuously feed on finely-chopped mulberry leaves for about six weeks. During this period, they grow in size and their glands that produce silk develop and attain one-third the size of the larva. At this stage, silkworm is ready to enter the next stage of its life cycle called pupa. The pupa grows and changes inside the cocoon. A few weeks later the cocoon opens and an adult moth comes out. In four to six days, the female moth lays around 400 eggs and another life cycle starts.

   If the silkworms were allowed to mature and break through the cocoon, the silk would be remembered useless for commercial purposes. So the encased insect is plunged into boiling water to kill the inhabitant and dissolve the glue holding the cocoon together. The fibre is then located and the cocoon unwound onto a spindle to be made into thread.
6. A female silk moth lays hundreds of eggs at a time. These eggs are placed in open containers of wood or cardboard. The eggs are kept in a moist, warm and well ventilated place. The temperature of 85° F (Fahrenheit) is maintained. This is known as incubation. After hatching, the silkworms are fed on freshly-chopped mulberry leaves. For six weeks, the worms eat almost continuously and increase in size. At the end of this period, they are ready to spin their cocoons. Branches of trees or shrubs are placed in their rearing houses. The worms climb these branches and make their cocoons out of one continuous

thread, taking about eight days for the process. This is called spinning of the cocoon.

The cocoons are collected and put into very hot water passed through hot air, or exposed to the scorching heat of the sun. This kills the silkworm and loosens the silk fibres. The silk fibres are then taken out and unwound from the cocoon. This process is called reeling. This is done by machines. The fibres are then spun into silk threads. These are then woven into silk fibres.

Chapter-4 : Heat and Temperature

A. 1. c, 2. c, 3. d, 4. a, 5. b

B. 1. T, 2. T, 3. T, 4. F, 5. T

C. 1. Heat energy, 2. Thermometer, 3. alcohol, mercury, 4. digital, 5. Convection

D. 1. Heat has been accepted as a form of energy which is transferred from a body at higher temperature to the one at lower temperature. When we hold a rod with its one end in fire, we find it is difficult to hold it after sometime. It happens because the rise in the rod's temperature, caused by fire, starts burning our skin. The temperature is the degree of hotness or coldness of an object. It tells us whether a given material is hot or cold and how hot or cold it is.

We can get an idea of the temperature of an object just by touching it. If the object feels hot, its temperature is high, but if the object feels cold, its temperature is low.

Temperature is generally the measure of how hot or cold, a body or substance is. In other words, temperature is the degree of hotness or coldness of a body.

The SI unit of temperature is Kelvin (K). The other common unit of temperature is degree Celsius (°C). Temperature can also be measured in degree Fahrenheit (°F).

2. Land Breeze
   - They blow from land to sea.
   - They are dry winds.
   - They blow at night.

   Sea Breeze
   - They blow from sea to land.
   - They have moisture.
   - They blow in the day time.

3. Insulators : Materials which do not allow heat to be conducted through them easily.

   Conductors : Materials which allow heat to be conducted through them easily.

4. Laboratory Thermometer : Thermometer used in laboratory consists of a capillary glass tube. One end of the capillary tube is closed and the other end had a delicate bulb. The bulb is filled with alcohol or mercury. This thermometer is usually used to measure temperature which ranges from 10°C to 110°C. There are marks called calibrations on the stem of the thermometer. The marks are shown as horizontal lines.

   Clinical Thermometer : The thermometer used to measure the temperature of the human body is called the clinical thermometer. It is an example of mercury thermometer. The thermometer consists of a glass tube with a fine bore. There is a kink or constriction near the bulb. This kink is made to ensure that the mercury inside thermometer does not contract and flow back into the bulb when thermometer is taken out of the body. The normal body temperature of a healthy person is 37°C or 98.6°F. During high fever, this temperature goes up but it cannot go below 35°C or above 42°C. Thus, this thermometer is usually used to measure temperatures which ranges from 35°C to 42°C.

   Alcohol is another liquid which is used in thermometers but such a thermometer measure temperature only up to 78°C. Therefore, it cannot be used to measure very high temperatures.

5. Conduction of heat
   - Heat is transmitted by molecules of the medium. Material medium is necessary.
   - Heat passes from molecule to molecule without any transfer of the molecules of the body.
   - It is a slow process.
   - Heat travels in any path.

- Solids are heated by conduction.

Convection of heat

- Heat is transmitted by molecule of the medium. Material medium is necessary.
- Molecules carrying heat with them move fro
- It is a slow process.
- Heat travels in any path.
- Liquids and gases are heated by convection.

6. Convection of heat
   - Heat is transmitted by molecule of the medium. Material medium is necessary.
   - Molecules carrying heat with them move fro
   - It is a slow process.
   - Heat travels in any path.
   - Liquids and gases are heated by convection.

   Radiation of heat
   - Heat can pass through vaccum.
   - Material medium is not necessary. Radiations take place even in the absence of molecular medium.
   - It is a very quick process.
   - Heat travels in straight lines.
   - Medium is not heated up by radiation.

E. 1. The degree of 'hotness' or 'coldness' of a body.
   2. Heat is a form of energy.
   3. It is the process of heat transfer among solids. The tiny particles of solids, as atoms or molecules, transmit heat to the adjoining particles through their vibratory motion. During conduction, heat moves from the hot end to the cold end without the actual displacement of the vibrating particles from their position.
   4. Nowadays, digital thermometers are very common. Mercury is not used in these thermometers which is an advantage as mercury is a toxic substance. The temperature is displayed in a numerical form.

F. 1. Temperature of an object is measured with an instrument called thermometer. Thermo is latin word meaning heat and meter means a measuring device.

Some liquids increase in volume with the increase in temperature. This property of expansion is used to measure temperature by measuring the increase in the volume of the liquid. Mercury is used in conventional thermometer. Mercury has a fairly uniform rate of expansion for a wide range.

Different units of temperature are represented by different temperature scales. Two reference temperatures are chosen– melting point of ice and boiling point of water. The increase in the volume of the liquid in a tube (corresponding to these two temperatures) is divided into a certain number of division. Each division is called a degree.

2. Laboratory Thermometer : Thermometer used in laboratory consists of a capillary glass tube. One end of the capillary tube is closed and the other end had a delicate bulb. The bulb is filled with alcohol or mercury. This thermometer is usually used to measure temperature which ranges from 10°C to 110°C. There are marks called calibrations on the stem of the thermometer. The marks are shown as horizontal lines.

Clinical Thermometer : The thermometer used to measure the temperature of the human body is called the clinical thermometer. It is an example of mercury thermometer. The thermometer consists of a glass tube with a fine bore. There is a kink or constriction near the bulb. This kink is made to ensure that the mercury inside thermometer does not contract and flow back into the bulb when thermometer is taken out of the body. The normal body temperature of a healthy person is 37°C or 98.6°F. During high fever, this temperature goes up but it cannot go below 35°C or above 42°C. Thus, this thermometer is usually used to measure temperatures which ranges from 35°C to 42°C.

Alcohol is another liquid which is used in thermometers but such a thermometer

measure temperature only up to 78°C. Therefore, it cannot be used to measure very high temperatures.

3. • The thermometer should be washed before and after use with dettol solution or with clean water, and handle it with care.
   • The mercury level should be below the kink.
   • The thermometer should be given soft jerks two-three times to bring the mercury level below the kink.
   • Do not hold the thermometer near the bulb.
   • Place the mercury level along the eye sight while noting down the reading in the thermometer.
   • Do not place the thermometer on hot flame or in the hot sun.
4.

Conduction	Convection	Radiation
1. Heat is transmitted by molecules of the medium. Material medium is necessary.	Heat is transmitted by molecule of the medium. Material medium is necessary.	Heat can pass through vaccum.
2. Heat passes from molecule to molecule without any transfer of the molecules of the body.	Molecules carrying heat with them move from one part to other part.	Material medium is not necessary. Radiations take place even in the absence of molecular medium.
3. It is a slow process.	It is a slow process.	It is a very quick process.
4. Heat travels in any path.	Heat travels in any path.	Heat travels in straight lines.
5. Solids are heated by conduction.	Liquids and gases are heated by convection.	Medium is not heated up by radiation.

Chapter-5 : Structure of Matter

A. 1. b, 2. x, 3. b, 4. c, 5. c

B. 1.F, 2. T, 3. T, 4. F, 5. T, 6. F

C. 1. undistructable, 3. electron, 4. valence, 5. mass, 6. 6, 2, 7. protons, neutrons, 8. eight, valence electrons, 9. x, x, 10. Ca

D. 1. Building blocks of matter of one kind.
   2. John Dalton
   3. It was J.J Thomson himself, who as early as 1898, put forth the first model often called plum cake model.
   4. he was an English Physicist and Nobel Laureate in Physics credited with the discovery and identification of the electron.
   5. $P-1^{1}P$
   6. Electrons in outermost shell.

E. 1. The nucleus of an atom is held together by the strong nuclear force that binds together protons and neutrons.
   2. The number of electrons in a neutral atom is equal to the number of protons. The mass number of the atom (M) is equal to the sum of the number of protons and neutrons in the nucleus.
   3. • The maximum number of electrons which can be accomodated in a given shell (orbit) is given by the general formula n^2 where n is the number of shell.
      • The maximum number of electrons possible in outermost shell (last orbit) is 8 and in the last but one (penultimate) shell is 18.

Shell Number	Maximum number of electrons
n=1 [K-shell]	$2 \times (1)_2 = 2$
n=2 [L-shell]	$2 \times (2)_2 = 8$
n=3 [M-shell]	$2 \times (3)_2 = 18$
n=4 [N-shell]	$2 \times (4) = 32$

   4. 35-chlorine has 17 protons and 18 Neutrons in its nucleus. Both of these man and s table

isotopes have a total of 17 electron.

5. It has lost 3 valence electrons.
6. Atoms , generally, do not occur in their free state in nature. Atoms of almost all gases, most common liquids and solids occur in combined state with one or more atoms of the same elements or different elements. As you have read in previous section, atoms combine to form molecule to attain stable noble gas (inert gas) electronic configuration.

   The combining capacity of atoms is defined in terms of valency.

   Valency : The combining capacity of an atom is determined largely by number of electrons in the outermost orbit or shell. When atoms combine, one or more electrons in the outermost shells are either shared or transferred between atoms. The number of electrons involved in this process is called valency of that atom.

   Alternatively, the number of hydrogen atoms or chlorine atoms which combine with one atom of the element is called valency.

F. 1. Dalton's Atomic Theory

- Matter is composed of atoms.
- Atoms cannot be subdivided.
- Atoms can be neither created nor destroyed.
- Atoms of particular element are identical in size, shape and mass and atoms of other elements are different in size, shape and mass.
- Properties of atoms of one element differ from the properties of atoms of other element.
- The chemical change is union or separation of atoms.
- The number of atoms of an element that combine with the number of atoms of other element(s) to form a compound is always fixed. This is why composition by mass of a particular compound is always the same.

For his monumental discovery, Dalton is regarded as the father of modern atomic theory.

2. J.J. Thomson explained that in discharge tube experiment cathode rays consist of stream of negatively charged particles. These negatively charged particles were named as electron by G.J. Stoney. He proved that whatever gas be taken in the discharge tube and whatever be the material of electrodes the value of charge/mass (e/m) was always the same.
3. The atom has a small positively charged centre, called nucleus, and the entire atomic mass is concentrated in it because some of the particles were deflected with large angle from the vicinity of central of atom.

   Rutherford's Model of Atom

   On the basis of particles scattering experiment, Rutherford in 1911 proposed the model of an atom.

   - An atom is made up of positively charged nucleus which is surrounded by negatively charged electrons revolving around the nucleus.
   - Electrons and nucleus in an atom are held together by electrostatic force of attraction.
   - The number of the electrons in an atom are equal to the number of protons. This maintains the neutral character of the atom.

4. The K shell, which contains only and S sub shell, can hold up to 2 electrons, the L shell, which contains and S and a p. can hold up to 2 + 6 = 8 electrons, and so forth, in general, the nth shell can hold up to $2n^2$ electrons.

Chapter-6 : Physical and Chemical Change

A. 1. c, 2. d, 3. c, 4. c, 5. c, 6. a

B. 1. T, 2. T, 3. F, 4. T, 5. T, 6. T

C. 1. chemical, 2. physical change, 3. effervescence, 4. chemical equation, 5. shipping industry

D. 1. No new or different substance is formed. The composition of the substances remains unchanged.
   2. Tearing of paper
   3. These changes are usually permanent and irreversible.
   4. Digestion of food

5. The process by which a chemical change takes place, by which new substances are formed is called chemical reaction.

E. 1. Physical change

- It is a temporary change that can be reversed easily.
- No change occurs in the mass of the substances undergoing the change.
- No new or different substance is formed. The composition of the substances remains unchanged.

Chemical change

- It is a permanent change that cannot be reversed.
- Mass of the individual substances may either increase or decrease. However, the total mass of all the reactants is equal to the total mass of the products.
- It results in the formation of at least one new substance. The constituent particles of the new substance are different from the constituent particles of the original substances.

2. Burning : Burning is a fast process. It requires only oxygen. It takes place at a very high temperature.

Rusting : We have noticed iron objects like iron nails or iron gates covered with a reddish-brown substance. This substance is rust. When iron is left exposed to moist air, it chemically reacts with oxygen and water in the air to form a powdery substance iron oxide (Fe_2O_3) which we call rust

$4Fe + 3O_2 + H_2O \longrightarrow 3Fe_2O \cdot H_2O$

iron oxygen water iron oxide (rust)

Rusting occurs in the presence of both oxygen and water. The more humid the air, faster the rusting occurs. The rust slowly 'eats away' or corrodes the iron, leading to considerable loss.

3. Galvanizing : Galvanizing is a process in which a layer of metals like chromium or zinc is deposited on the surface of iron articles electrolytically by passing electric current.

Alloying : When mixed with certain corrosion resistant metals or some non-metals, iron forms alloys which are resistant to rusting. Stainless steel and alloy of iron, nickel and chromium does not rust.

4. Painting : Hot-dip galvanization is more resistant painting.

Galvanizing : Galvanizing the surface of iron articles. Galvanizing is a process in which a layer of metals like chromium or zinc is deposited on the surface of iron articles electrolytically by passing electric current.

F. 1. c, 2. a, 3. e, 4. b, 5. f, 6. d

G. 1. Conversion of milk to curd is an example of chemical change because new substances are formed which have different composition and properties. The products formed are entirely different from the initial substance.

2. It is a physical change because we can always get the solid back by letting the water evaporate, so it has not changed chemically.

3. Reversible change

4. Galvanizing the surface of iron articles. Galvanizing is a process in which a layer of metals like chromium or zinc is deposited on the surface of iron articles electrolytically by passing electric current.

5. Crystallisation technique is better than simple evaporation technique as :

During evaporation process, some solids may decompose and some like sugar may get charred when solution is heated to dryness.

Some of impurities are so small and they may remain dissolved in the solution even after filtration. On evaporation, these contaminate the solid.

H. 1. These changes occur when objects or substances undergo a change that do not change their chemical composition. A physical change involves a change in physical properties.

Examples of Physical Change

- Evaporation or condensation of water.
- Boiling of water.
- Tearing of paper.
- Dissolution of salt in water.
- Glowing of an electric bulb.
- Hammering a wooden log.

- Whipping of cream.
- Melting of candle wax.
- Expansion or contraction of substances on heating or cooling.
- Sharpening of a pencil.

2. When two or more substances react in such a way that there is formation of one or more new substances, the change is called a chemical change or a chemical reaction.

   Conversion of milk to curd is an example of chemical change because new substances are formed which have different composition and properties. The products formed are entirely different from the initial substance. Burning of paper, cooking of food, spoilage of food, ripening of fruits, digestion of food, rusting of iron, photosynthesis etc are chemical change.

3. Physical change
   - It is a temporary change that can be reversed easily.
   - No change occurs in the mass of the substances undergoing the change.
   - No new or different substance is formed. The composition of the substances remains unchanged.

   Chemical change
   - It is a permanent change that cannot be reversed.
   - Mass of the individual substances may either increase or decrease. However, the total mass of all the reactants is equal to the total mass of the products.
   - It results in the formation of at least one new substance. The constituent particles of the new substance are different from the constituent particles of the original substances.

4. We have noticed iron objects like iron nails or iron gates covered with a reddish-brown substance. This substance is rust. When iron is left exposed to moist air, it chemically reacts with oxygen and water in the air to form a powdery substance iron oxide (Fe_2O_3) which we call rust

   $4Fe + 3O_2 + H_2O \longrightarrow 3Fe_2O \cdot H_2O$

   iron oxygen water iron oxide (rust)

   Rusting occurs in the presence of both oxygen and water. The more humid the air, faster the rusting occurs. The rust slowly 'eats away' or corrodes the iron, leading to considerable loss.

5. When iron nail (ferrum) is dipped in copper sulphate (CuSo4) there takes reaction between them and Copper sulphate change its colour from blue to light green. This shows Iron is more reactive than copper, it can replace copper from CuSo4
6. Sea water contains large amount of dissolved salts. Since, the concentration of these salts is very high, the sea water can simply be evaporated to produce crystals of sodium chloride. But the crystals obtained in this manner are not pure, small in size and cannot be seen clearly. In order to obtain large crystals of pure substances, the solution has to be concentrated and then cooled. This type of crystallisation will yield prominent crystals.

Chapter-7 : Weather, Climate and Adaptation

A. 1. a, 2. c, 3. d, 4. b, 5. b, 6. c

B. 1. F, 2. F, 3. F, 4. T, 5. T, 6. F

C. 1. weather, 2. meteorologist, 3. the Sun, 4. Hygrometer, 5. millimetres

D. 1. Weather is the day to day condition of the atmosphere at a place with respect to the temperature, humidity rainfall, wind speed.
2. The lowest temperature of a place during a day is called the minimum temperature while the highest temperature of the place during a day is called the maximum temperature of that place for that day.
3. The measured amount of heat in a place or in the body.
4. During winter, animals go to sleep or hibernate in burrows or caves. Their body temperature goes down, they breathe slowly and their heart also beats slowly. During winter, they get the energy from fat stored in the bodies before winter. Such animals get up from their sleep in early spring season e.g., frog, bear and bat.
5. The camel hooves are well padded to enable it

to walk on sand. The camel has long eyelashes to protect its eyes from frequent sandstorms.

The camel stores fat in its hump, so that it can survive for a long period without food. At one go, a camel drinks over 40 litres of water. The animal's thick lips helps it to eat prickly cacti without pain.

E. 1. The weather reports are prepared daily by an agency of the government. Weather experts use computer technology and data from earth stations and satellites to predict the weather. This is known as weather forecasting.

2. Humidity is measured by an instrument called hygrometer.

3. Temporary adaptation is short term adaptation and is not inherited. For example, a bird adapted to live in the cage is a temporary adaptation.

4. The process of movement to warmer regions in winter and back to colder region in summer.

F. 1. Weather is the condition of the atmosphere at a particular time and place. Weather report and forecast change everyday. Today, the weather may be cloudy, sunny or rainy but it may change tomorrow. Weather may change from day to day, even from hour to hour.

Climate tells us what it is usually like in the place where we live. Bengaluru is known to have a mild climate, Chennai a humid climate, Kashmir a snowy climate and Cherrapunji a rainy climate.

The average weather pattern of a place taken over a long time, say 25 years is called the climate of that place.

It describes the total of all weather conditions occurring over a period of years in a given place. This includes average weather conditions, regular weather sequences like winter, spring, summer and autumn and special weather events like cyclones and floods.

There are a number of factors which affect the climate of a place. They are latitude, altitude, distance from the sea, ocean currents, direction of the wind and humidity. Human activities also affect the climate.

2. a. Maximum and minimum thermometer
   b. Rain gauge
   c. Hygrometer

3. They are latitude, altitude, distance from the sea, ocean currents.

4. Polar bear found in the Arctic region where it is very cold. They have a thick layer of fat in their bodies to keep them warm. Their soles are covered with fur to keep them warm. The white fur also helps the polar bears to blend with the snowy surrounding, so that they are not detected by the prey.

5. When female lays eggs, the males protects and comforts by sitting on them.

Chapter-8 : Soil

A. 1. c, 2. b, 3. b, 4. c, 5. c, 6. d, 7. b, 8. d

B. 1. T, 2. F, 3. T, 4. T, 5. T

C. 1. alluvial, 2. red, 3. soil profile, 4. horizon-A, 5. Reddish colour

D. 1. b, 2. c, 3. a, 4. e, 5. d

E. 1. Soil is the substance which makes up the surface of the earth.

2. These particles are very big and measure 2.0 to 5.0 mm in size.

3. Horizon-A contains a lot of material, e.g., decayed plant and animal remains which were decomposed by soil microbes. This decayed material is called humus and this layer is dark brown in colour.

4. The soil with large amount of clay particles in it is called clayey soil.

5. Black colour of soil indicates the presence of dead organic matter (Humus) and water in it. The soil that can hold water in it is called porous soil. e.g., loamy soil.

F. 1. • The soil with a mixture of humus, sand and clay is called loam or loamy soil.
   • It has good water-holding capacity.
   • It holds enough air for respiration of microbes, insects, worms and roots of plants.

2. • Alluvial soil is found along with the river banks.
   • It is transported by rivers for long distances.

3. Mountain soil is found in the Himalayan region and the north-eastern part of India.
4. There are six types of soils in our country :
   - red soil,
   - black soil
   - alluvial soil
   - desert soil
   - mountain soil
   - laterite soil
5. It deposits the soil at some other places. The soil erosion takes place in areas where land is not covered by vegetation.
6. - Long ago, the surface of the earth was very hard and rocky. As time passed, these rocks were broken into smaller pieces by violent earthquakes.
   - Pieces of molten rocks from the interior of the earth were thrown out by volcanic eruption. These molten rock pieces, called lava, were deposited at far-away places.
   - Water is also an important factor that breaks huge pieces of rocks into smaller pieces.
   - Living beings like microbes, algae, insects, worms, plants, animals and man all - directly or indirectly - play a role in the formation of soil, e.g., the roots of plants which enter the crevices of rocks, and form soil. Man also contributes in making of soil by digging land, breaking rocks, etc.
7. - The desert soil is coarse in texture because the fine layer on the top has been removed by wind.
   - It is sandy and porous.
8. The breaking of huge pieces of rocks into finer particles by various processes is called weathering. These processes are physical, chemical and biological.

   Weathering is a continuous process and it takes thousands of years to weather rocks into the fine grain particles that make the soil.

G. 1. Red Soil
   - The soil, which is red in colour due to the presence of iron oxide in it, is called red soil.
   - It is also called red latosol.

   Black Soil
   - The soil, which is black in colour due to the presence of iron and magnesium is called black soil.
   - It is also called regur soil.

   Alluvial Soil
   - Alluvial soil is found along with the river banks.
   - It is transported by rivers for long distances.

   Desert Soil
   - The desert soil is coarse in texture because the fine layer on the top has been removed by wind.
   - It is sandy and porous.

   Mountain Soil
   - Mountain soil is a very fertile soil.
   - It varies in the contents from place to place.

   Laterite Soil
   - Laterite soil is found in places where there is a rainy climate.
   - It is less fertile.

2. The texture of soil depends upon the size of its particle. There are three types of soil on the basis of particle sizes.

   Loamy Soil
   - The soil with a mixture of humus, sand and clay is called loam or loamy soil.
   - It has good water-holding capacity.
   - It holds enough air for respiration of microbes, insects, worms and roots of plants.

   Loamy soil has the highest humus content and sandy soil has the least. We will find that the soil at different places varies in colour, texture, water content and particles size.

   For example;
   - Reddish colour of soils indicates the presence of iron oxide in it.
   - Black colour of soil indicates the presence of dead organic matter (Humus) and water in it. The soil that can hold water in it is called porous soil. e.g., loamy soil.

   Depending on the geographic region, the type of soil will vary in its colour, texture and contents.

Sandy Soil

- The soil with about 60 per cent of sand-particles in it is called sandy soil. It has some clay also.
- It is porous. It does not retain water, i.e., the water-holding capacity of sandy soil is very poor.

Clayey Soil

- The soil with large amount of clay particles in it is called clayey soil.
- Its water-holding capacity is the highest among all soil.
- Wet clayey soil is sticky and its tilling becomes difficult. It gets water logged.
- It is rich in minerals. It is not good for plants.

3. Soil is formed by the actions of various factors, physical as well as biological. It takes several years for the formation of soil. Let us study the ways how soil is formed.
   - Long ago, the surface of the earth was very hard and rocky. As time passed, these rocks were broken into smaller pieces by violent earthquakes.
   - Pieces of molten rocks from the interior of the earth were thrown out by volcanic eruption. These molten rock pieces, called lava, were deposited at far-away places.
   - Water is also an important factor that breaks huge pieces of rocks into smaller pieces.
   - Living beings like microbes, algae, insects, worms, plants, animals and man all - directly or indirectly - play a role in the formation of soil, e.g., the roots of plants which enter the crevices of rocks, and form soil. Man also contributes in making of soil by digging land, breaking rocks, etc.

   The breaking of huge pieces of rocks into finer particles by various processes is called weathering. These processes are physical, chemical and biological.

   Weathering is a continuous process and it takes thousands of years to weather rocks into the fine grain particles that make the soil.

4. It is one of the most important natural resources for us. Its usefulness is stated below.

   As a medium for growing crops : Soil is the medium for the growth of plants and crops. Our food resources are also grown in soil; for example, we take our food from plants. Plants require soil to grow.

   Mineral source : Soil is having many minerals. These minerals are used in obtaining various materials. For example, iron and aluminium are obtained from their oxides present in soil.

   Water storage : Soil functions as a water storage medium. Rain water and river water percolate through it. The water that seeps into the soil gets stored as the underground water in lower layers of the soil.

   Natural habitat : It is the natural habitat for various microorganisms such as bacteria, fungi, insects, earthworm, etc.

Chapter-9 : Respiration in Organisms

A. 1. a, 2. b, 3. a, 4. a, 5. a, 6. c

B. 1. F, 2. T, 3. F, 4. F, 5. F

C. 1. external, internal respiration, 2. respiration, 3. breathing, 4. about 0.4% carbon dioxide, 5. inhalation, 6. exhalation

D. 1. b, 2. d, 3. a, 4. c, 5. f, 6. e

E. 1. The taking in of air rich in oxygen into our body is called inhalation.

2. Breathing is a physical process in which oxygen is taken in and carbon dioxide is given out.

3. $\underset{\text{Glucose}}{C_6H_{12}O_6} + \underset{\text{Oxygen}}{6O_2} \longrightarrow \underset{\text{Carbon dioxide}}{6CO_2} + \underset{\text{Water}}{6H_2O} + \text{Energy}$

4. $\underset{\text{Glucose}}{C_6H_{12}O_6} \longrightarrow \underset{\text{Ethyl Alcohol}}{2C_2H_5OH} + \underset{\text{Carbon dioxide}}{2CO_2} + \text{Energy}$

5. The chemical process in which substances mix with oxygen in the air to produce heat and light.

F. 1. a.
   - External Respiration or Breathing
   - Internal Respiration or Cellular Respiration

   b. Aerobic respiration and Anaerobic respiration

c. Lungs
d. Anaerobic respiration
e. Facultative and Aerotolerant

2. Anaerobic organisms and Aerobic respiration
3. Alcohol
4. $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$
   Glucose, Oxygen, Carbon dioxide, Water
5. Respiration

G. 1. All living organisms need oxygen to produce energy from the food they eat.
2. The human respiratory system consists of organs responsible for taking in oxygen for respiration and releasing carbon dioxide and water vapour, which are the waste products formed during respiration. The nostrils (the passage in the nose), trachea (windpipe), bronchi and lungs are the main organs of the respiratory system.

   Breathing in

   The taking in of air rich in oxygen into our body is called inhalation. The air around us is impure. Our lungs require air which is moist, warm and clean. As the air we breathe in passes through the nostrils, it is moistened by the slimy mucous present in the nose. Mucous is secreted by the inner lining of the nose. The air becomes warm by the blood circulating in the nose. The mucous and the hair present inside our nose trap dirt, dust particles and disease-causing germs and prevent them from entering the respiratory system. We do not get clear air if we breathe through our mouth instead of our nose. Therefore, we should always breathe through the nose. It will protect us from catching an infection.
3. Respiration is a process of breakdown of complex molecules in the presence of oxygen to release tons of energy required for the cell growth. Breathing is a process inhalation of air from surroundings and exhalation of air into surroundings. By breathing we can inhale oxygen required for the respiration process and by exhalation process we can exhale the carbon dioxide (by product) produced after respiration on process.
4. All living organisms need oxygen to produce energy from the food they eat.

   The needed oxygen comes from the air we breathe in.
5. Fish and many other aquatic animals have a special organ called the gill to breathe underwater. Gills help them to use dissolved oxygen in water. Gills are projections of the skin and are well supplied with blood vessels for exchange of gases.
6. $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$
   Glucose, Oxygen, Carbon dioxide, Water

   $C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + \text{Energy}$
   Glucose, Ethyl Alcohol, Carbon dioxide

Chapter-10 : Reproduction in Plants

A. 1. d, 2. a, 3. c, 4. a, 5. d

B. 1. T, 2. T, 3. F, 4. T, 5. T

C. 1. germination of seeds, 2. budding, 3. fragmentation, 4. tuber, bulb, 5. self, cross pollination

D. 1. It is the process by which a living being give rise to organisms of its own kind.
2. A small lump on a tree or plant that opens and develops into a flower or leaf.
3. A cell that starts the process of forming a baby person or animal, formed by the joining together of a male and female gamete.
4. Spores are small asexual reproductive bodies.

E. 1. All machines need energy to run. All automobiles need petrol or diesel to run. Petrol and diesel are burnt in the engine using oxygen present in the air. We need heat energy for heating and cooling. This energy is obtained by burning coal, L.P.G. etc. using oxygen of the air.
2. In budding a small bulb-like projection called bud forms on one part of the body of organism.
3. In fragmentation, the body of parent organism breaks up into two or more parts called fragments, each of which grows into a new individual. Spirogyra, a green

filamentous alga, reproduces by fragmentation.

4. The transfer of pollen grains from the anther to the stigma of the same flower or another flower of the same kind is called pollination.

   Types of pollination : If the pollen falls on the stigma of the same flower or to the stigma of another flower of the same plant, it is called self pollination. When the pollen of a flower falls on the stigma of a flower of another plant of the same kind (species), it is called cross pollination.

5. After the dispersal of seeds when the favourable conditions like proper moisture, sunlight, temperature, oxygen, water and nutrients from the soil are available, the seeds germinate and produce a baby plant or seedling. For the initial growth the stored food in the seed is used.

   As the time passes it grows into a mature plant and start making its own food by photosynthesis.

F. 1. Binary fission : This type of reproduction is commonly seen in unicellular organisms like bacteria. In it the parent cell divides into two equal halves. The nuclear material also divides into two parts. The two parts then grow into new individuals.

   Budding : In budding a small bulb-like projection called bud forms on one part of the body of organism. The bud grows gradually, detaches and finally grows into a new individual. Yeast, a single called fungus, reproduces by this method.

   A small outgrowth called bud develops on the parents yeast cell. The nucleus divides into two, one of these moves into the bud. The bud grows and finally gets detached from the parent cell. The bud grows into an independent yeast cell.

   Fragmentation : In fragmentation, the body of parent organism breaks up into two or more parts called fragments, each of which grows into a new individual. Spirogyra, a green filamentous alga, reproduces by fragmentation. The body of Spirogyra is made up of rectangular cells lying one above the other. The green patches floating on the surface of stagnant water bodies like ponds, ditches, etc are due to growth of Spirogyra only. When the Spirogyra matures, its each filament breaks up into two or more fragments. Each fragment then grows and forms new Spirogyra. This process is repeated again and again. When water and nutrients are available, Spirogyra grows and multiplies rapidly by fragmentation and covers a large area in a short period of time.

2. Vegetative Propagation by Leaves : Bryophyllum gives rise to new plant from the buds that grows along the margin or edge of the leaf. These buds detached from the parent plants and grow into new plants.

   Vegetative propagation by modified roots : Dahlia, asparagus, sweet potato have tuberous roots which are swollen due to storage of food. These roots have buds on them. When such swollen roots are buried in the soil they grow into new plants.

3. A typical flower consists of four whorls borne on a thalamus or stalk. These whorls from outside to inside are

   Calyx – Consisting of sepals
   Corolla – Consisting of petals
   Androecium – Consisting of stamens
   Gynoecium or pistil – Consisting of carpels.

   The stamens and the pistil are the reproductive parts of a flower. A stamen has an anther which is supported by a long stalk contains pollen sacs that produce pollen grains. Pollens are the male reproductive unit of the flower. Pistil is the female reproductive part of the flower. Each pistil consists of a swollen stigma at the top, a long tube called the style and a swollen ovary at the bottom.

   Some flowers are bisexual flowers that means they contain both the stamens and the pistil. They are also known as hermaphrodites or complete flower. For example, mustard and rose. Some are unisexual flowers that means they have either the stamens or the pistil. For example, cucumber, maize and watermelon.

4. The most common agents of pollination are
   • Wind • Water • Insects
   Pollination by wind : Pollen grains are light in weight and can be easily taken away by the wind from one flower to another.
   The wind-pollinated flower need not be
   - highly/brightly coloured
   - Strong Smelling
   - Producing nectar

   Pollination by water : Flowers of a water-borne plant may release pollen grains from its anther in water. These pollen grains are carried to the stigma of the flower of another plant of the same kind by water currents causing pollination. The plants such as Sea grass, Hydrilla and Vallisneria get pollinated through water.
   Pollination by insects : Insects cause pollination in flowers which produce nectar. Flower may be highly coloured or strong smelling to attract insects. When an insect gets the nectar, pollen visits another flower of the same kind, some of the pollen get transferred into the stigma of the flower. Thus the second flower gets pollinated.
5. Cutting : Cutting is portion of stem of a plant with some leaf and buds. When such a cutting is planted into moist soil, some roots grow out of the portion of the stem under the soil and grows into a new plant.
   The method is used for rose, mango, cactus, sugar cane.
   In this way a large number of plants can be grown from one plant in lesser time as compared to the plants grown from seeds. Also the plants produced are exact copies of their parents.
   Grafting : Grafting method is used to obtain desired varieties of plants, flowers and fruits.
   A cutting of the desired plant is inserted into a cut in the stem of a rooted plant of the same species. The cutting of the desired plant is known as scion and the rooted plant into which cutting has been fixed is called stock.
   Layering : This method is used in the propagation of rose and bougainvillea. Layering is the method in which roots sprout out from the lower branch that is bent to the ground and covered with moist soil. After some time new plantlets are produced. Further these plantlets are made to grow separately.
   Tissue Culture : In tissue culture technique, a small tissue from the shoot tip of a plant is taken and allowed to grow in an artificial medium. This culture medium is rich in nutrients and free from any harmful infection. Thus, in this method a small tissue is grown in culture medium so it is called tissue culture.

Chapter-11 : Transportation in Animals and Plants

A. 1. c, 2. c, 3. x, 4. a
B. 1. T, 2. T, 3. T, 4. F, 5. F
C. 1. iron oxygen interaction, 2. white blood corpuscles, 3. pulmonary, 4. artery, 5. urea and uric acid
D. 1. b, 2. e, 3. c, 4. d, 5. a
E. 1. The blood has two components – plasma and blood corpuscles.
   2. Red blood corpuscles (RBCs) are cells without nucleus. Their cytoplasm has oxygen carrying pigment called haemoglobin.
   3. There are three kinds of blood vessels — arteries, veins and capillaries.
   4. These are distributing chambers of the heart. There walls are thick. The right ventricle receives deoxygenated blood from right auricle and pumps it to the lungs for oxygenation. The left ventricle is the largest heart chamber and has the thickest walls. It receives oxygenated blood from left auricle and pumps it to the whole body.
F. 1. William Harvey
   2. The rhythmic contraction and relaxation of auricles and ventricles is known as heart beat.
   3. • Delivering oxygen to cells and picking up carbon dioxide.
      • Maintaining body temperature by transporting heat.
      • Transporti8ng cells to fight injection.
   4. Transpiration is the loss of water from leaves and other aerial parts of a plant into the air. It

occurs through stomata.

G. 1. Red blood corpuscles (RBCs) are cells without nucleus. Their cytoplasm has oxygen carrying pigment called haemoglobin.

2. Contraction of atrial chambers and then ventricular chambers are the two phases of a heart beat. These two phases of heart beat can be heard as lub and dub sounds. The heart beat sound is caused by the contraction of muscles and shutting down of valves.
   - In the lub phase, the ventricles contract and cuspid valves close.
   - In the dub phase, the pulmonary and aortic valves close.

3. Numerous biochemical reactions occur round the clock in all living cells. They produce a variety of waste products like carbon dioxide, ammonia and other nitrogen compounds. If they accumulate in the body, they may prove to be toxic. The process of removing toxic waste from the body is called excretion.

4. It is transported by Red Blood Cells (RBC) which contain haemoglobin for this purpose.

Chapter-12 : Moving Objects : Time and Motion

A. 1. c, 2. a, 3. c, 4. a, 5. a, 6. b

B. 1. T, 2. T, 3. F, 4. T, 5. F

C. 1. early, 2. Qutub Minar, 3. one-tenth, 4. curvilinear, 5. non-periodic, 6. ms-1

D. 1. It is a definite magnitude of a quantity, defined and adopted by convention or by law, that is used as a standard for measurement of the same kind of quantity.

2. The fundamental unit of length in the metric system, equal to 100 centimetres.

3. The standard unit of time is second. The unit second is denoted by the letter 'S'.

4. It is the standard international (SI) unit of the modimanic temperature.

E. 1. There were lines marked on the candle, which represented the hours. This is how one could see how many hours had passed since you lighted it. However, the rate of burning rate depended on currents of air and the variable quality of the wax.

2. Shadow clock was designed by Egyptians.

3. The standard unit of time is second. The unit second is denoted by the letter 'S'.

4. The continuous change in position of a body with respect to another is called motion.

5. The distance covered by a body in unit time.

F. 1. In earlier time people used time interval between sunrise to sunset or to the next sunrise, one full Moon to another full Moon, frame one season to another season etc for measuring the time. These time intervals however could not be used as the standard unit of time because:
   - These time intervals are long.
   - These time intervals change from place to place and time to time.

   Based on the periodic nature of these phenomena, ancient people made devices such as sundial, sand clock, water clock and candle clock etc.

2. Galileo, an Italian scientist discovered that if a weight suspended from a string made to swing its always completes one to and fro motion (oscillation) in exactly same time. He further found that the time for one oscillation can be changed by changing the length of the string. However, if the length of the string remains fixed the time taken to complete oscillation remains fixed. He called such arrangement a pendulum.

   A pendulum of about 25 cm length takes exactly one second for one oscillation. The pendulum in a clock swing continuously under the action of a wound up spring and controls the movement of its hands.

   The clocks and watches very much in use now-a-days are the digital and the electronic ones. In the digital ones, the elipse of each second is displayed in the form of changing digits on the face of the watch one just needs to read the figures on display 'to know the time'.

   Electronic watches and clocks make use of a suitable 'quartz' controlled mechanism to register time on the face of the clock. The dials, showing the time in these watches come in a variety of attractive shapes and sizes.

For measuring short time intervals in athletics, another kind of watch is used, called stop watch.

Stop watch is an improved form of a wrist watch. It can be started or stopped by pressing a button and measures time upto 10th part of a second.

3. Translatory Motion : In this motion, all the particles of a body move through the same distance in the same time.

   If the body moves in a straight line, its motion is rectilinear.

   If the body moves along a curved line, its motion is curvilinear.

   A movable car or train, movement of an aeroplane, a boy sliding down a slope, the motion of a drawer of a table are some examples of translatory motion. When you walked along a curved track, the motion is curvilinear.

   Circular Motion : In this motion, a body moves about a fixed axis without changing its position.

   This motion is called rotation. If the body as a whole moves round in a circular path, the motion is known as revolution.

   Oscillatory or Vibratory Motion : In this motion, a body moves to and fro about its mean position.

   A pendulum, a swing, vibration string, the leaves and branches of the plant are the examples of oscillatory or vibratory motion.

   Simultaneous Motion : There are some motions in which translatory and rotatory motion both take place simultaneously.

   The best example of this motion is the wheels of a bicycle or a screw being tightened.

   Periodic Motion : If the motion occurs again and again, it is said to be repetitive motion. The motion which repeats at regular interval of time is a periodic motion.

   The revolution of the earth around the sun, pendulum of a clock, heart beat, pulse, the vibrations of a stretched wire are the examples of periodic motion.

   In this type of motion, the time taken for one complete revolution or one complete to and fro motion is always the same.

   The beating of a drum is repetitive but not periodic. But, all periodic motions are repetitive motion.

   Non-Periodic Motion : Motion that is not concerned to period is known as non-periodic motion.

   All repetitive motion that does not take place at regular intervals of time are non-periodic motion. Other examples are: earthquake, landslide, storm, etc.

   Random Motion : The motion which is in haphazard manners in all possible directions is known as random motion.

   Examples, motion of the flies, ball in a cricket or hockey game, etc.

4. Uniform Speed : The speed of a body is said to be uniform only when it covers equal distances in equal intervals of time, no matter how small these intervals are.

   If a car travelling with a speed of 60 km h^{-1} covers one kilometre in each minute, then its motion is said to be uniform over one minute interval.

   Non-uniform or Variable Speed : The speed of a body is said to be non-uniform or variable if it covers unequal distances in equal intervals of time.

   Generally, the speed of vehicles such as cars, buses, scooters, etc, are non-uniform. They cover unequal distances in equal intervals of time because of traffic and road conditions. It is not convenient to study speed-distance relationship for a body moving with non-uniform speed. We use the term 'average speed'. The total distance travelled divided by the total time taken gives the average speed.

Chapter-13 : Electric Current and Its Effect

A. 1. c, 2. d, 3. d, 4. a

B. 1. T, 2. F, 3. T, 4. T, 5. T, 6. F

C. 1. produce, 2. insulator, 3. ampere, 4. galva nometer, 5. induced current

D. 1. The acid which is used in voltaic cell is called an electrolyte.

2. Simple voltaic cell consists of a glass vessel in which two rods, one of copper and other of zinc are dipped in the dilute sulphuric acid taken in glass vessel. Dilute sulphuric acid is called electrolyte and rods are called electrodes.
3. Button cells are the cells which are almost as small buttons. These cells are commonly used in small electronic devices such as quartz wrist watches, calculators and many digital items.
4. 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.

E. 1.
- In the construction of electric bell, electric motors, fans, telephones, etc.
- In television, it is used for deviation of electron beam.

2. The current so produced in a closed coil when magnetic lines of force rapidly changes within it is called induced current.
3. In 1865,G. Leclanche invented a new cell which removed the defects of simple voltaic cell. Dry cell is an improved form of voltaic cell. It is very convenient to use. It is used in torches, transistors, toys and clocks, etc. A single dry cell produce a voltage of 1.5 volts.
4. Electric current can be induced by changing magnetic fields. This is called electromagnetic induction.
5. If a magnet is moved near a conductor, then a current is produced in the conductor. It is also possible when a coil is moved near a magnet, electric current is induced in coil which is the reverse of first one and also true.
6. There are two types of charges. A body is said to be positively charged, if it has deficiency of electrons. If it has excess of electrons, it is negatively charged.

   If we take two spheres A and B. Sphere A has positive charge and sphere B has an equal number of negative charges. These charges are static in nature i.e., they do not flow.

   However, if sphere A and B are connected by a plastic coated wire then the electrons flow from sphere B to sphere A, that is from negative to positive. The flow of charge continues till the potentials of the two spheres become equal.

   The continuous flow of electric charge from higher potential (positive) to lower potential (negative) is known as electric current.

F. 1. The rate of flow of electric charge through a conductor per unit time is called electric current.

   Let the flow of charge in t second = Q

   Flow of charge in 1 second = $\frac{Q}{t}$

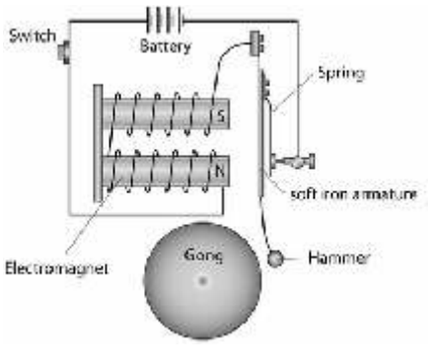
   The SI Unit of electric current is ampere. It is denoted by A.

   The direction of electrons is from negative to positive but conventional current is always taken from positive to negative.

   Current flow in the closed path. The arrangement of the closed path, in which the current easily flows is called electric circuit.

   An electric circuit has the following essential components :
   - Electric sources (cell, battery, etc.)
   - Electric appliances (these are the various type of devices for using the electric current)
   - Conductor
   - Switch or a key (for opening and closing the circuit)

2. 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.
   - In the construction of electric bell, electric motors, fans, telephones, etc.
   - In television, it is used for deviation of electron beam.
   - Electromagnetic separators are used for separating iron ore from other substances.

3. 

Electric Bell Circuit Diagram

4. Faraday took a solenoid and he connected the two ends of this by a galvanometer. When the north pole of a magnet is moved towards the coil rapidly, the galvanometer needle deflect. Deflection of needle indicates the presence of a current in the circuit.

   If the magnet is held stationary near the solenoid, the galvanometer's needle rest at zero, it means no deflection is shown or the absence of flow of electric current in the circuit.

   When the north pole of the magnet is moved away the solenoid, the galvanometer again show deflection but now this moment is in the opposite direction.

   This experiment is again repeated but at this moment, the south pole of the magnet moved towards and away from the solenoid and he observed the deflection in the galvanometer needle once again.

   After performing this experiment he concluded that whenever magnetic lines of force associated with a coil are changed, an electric current is induced in the coil. This process is termed as electromagnetic induction.

   It has also been found that if we increase strength of magnet or the number of turns in coil, the magnitude of the induced current increases. If the magnet is kept stationary and the coil is moved towards or away from the magnet, again an induced electric current is in the coil.

5. Induction is a phenomenon that occur when a charging magnetic field causes an electric current to be produced in a wire. The current so produced in a closed coil when magnetic lines of force rapidly changes within it is called induced current. Faraday discovered that if a magnet is moved near a conductor, then a current is produced in the conductor. It is also possible when a coil is moved near a magnet, electric current is induced in coil which is the reverse of first one and also true.

Chapter-14 : Light

A. 1. b, 2. a, 3. d, 4. c, 5. d

B. 1. T, 2. F, 3. T, 4. F, 5. F, 6. T

C. 1. luminous, 2. telescope, 3. more, 4. convex, 5. does not suffer any deviation

D. 1. Light is a form of energy that makes things visible. We are able to see everything around us clearly only when there is sufficient light.
   2. Light always travels in a straight line. This property of light is known as rectilinear propagation of light.
   3. Bouncing back of light in the same medium, after falling on a reflecting surface.
   4. A piece of special flat glass that we can look into in order to see ourselves or what is behind us.
   5. Right hand
   6. A spherical mirror is a mirror which has the shape of a piece cut out of a spherical shape.

E. 1. It bends towards the normal.
   2. It is mostly associated with light.
   3. Violet, indigo, blue, green, yellow, orange, red.
   4. n
   5. The line passing through the optical centre of the lens and perpendicular to both the faces of lens is called its principal axis.
   6. We use lenses in various devices:
      - Magnifying glass
      - Camera
      - Telescope
      - Compound microscope

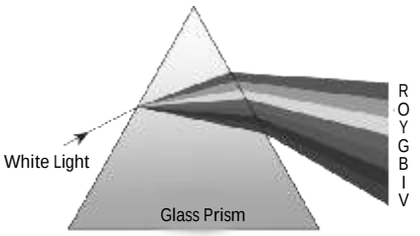
F. 1. Refraction is the phenomenon of bending of light from its straight path, at the surface of the separation of two media when light travels from one medium to another.

   If we take a glass slab on a white paper and trace the path of a light ray, it will be seen

parallel to the emergent ray.

This shows that it is displaced side way as result of refraction. The perpendicular distance produced between emergent ray and the incident ray is called lateral displacement.

2. • Ray passing through centre, continues straight without any deviation.
   • Ray parallel to principal axis, passes through focal point.
   • Ray passing through other focal point becomes parallel to optical axis.

3. 

A prism forms a spectrum

4. Sometimes, an eye is not able to see objects clearly or not able to see them at all due to certain eye defects.
   • Short sightedness or Myopia
   • Long sightedness or Hypermetropia

   A suffering eye of myopia cannot see distant objects clearly. This defect occurs because the eye lens becomes too strongly curved. This reduces the focal length of eye lens. Due to his defect, the image of the object is formed in front of retina. Due to this, the image is either not visible at all or distinctly visible.

   In order to see the objects, we require a concave lens of a certain focal length such that the parallel rays from infinity diverges the rays to bring it to focus at the retina.

   A suffering eye of hypermetropia can see distant objects clearly but cannot see near objects distinctly.

   This defect occurs because the eye lens gets stretches and this increase its focal length. This usually happens as we grow old, this time the muscle of the eyes lose their strength to control the curvature of the lens. As a result the image of nearby objects is formed behind the retina.

   To remove this defect the person is advised to wear spectacles fitted with convex lenses. These lenses bend the rays so as to focus them properly on the retina.

5. The objective forms a real, inverted image of the distant object at the focal plane of the objective. The real image of the distant object acts as a real object for the eye piece. The image lies at the focal plane in the way, that the final image is formed at infinity which magnified with respect to image. Eye piece forms a virtual, magnified and inverted image.
6. When a photograph is to be taken of an object, light should fall on the object. The distance between film and lens is adjusted to get sharp image on screen. Then screen is replaced by a photosensitive film. After the adjustment of the film, it is exposed to light for a very short time. The amount of light falling on the film is controlled by the aperture. This determines brightness of the image. Film speed is also taken care of, for getting a good photograph. Similarly, for moving object, expose time has to be small so as to get sharp photograph. The film obtained in this camera is known as negative. It is then passed through a chemical solution and then a positive print is obtained on a photosensitive paper.
7. The incident light enters into the eye through cornea and pupil. The eye lens is a convex lens and form a real, inverted and highly diminished image on the retina. The surface of retina consists of a large number of light sensitive cells. When light falls on them, they get activated and generated electrical signals. These signals are then sent to the brain by the optic nerves and the observer see the actual sized, erect image of the object.

Chapter-215 : Wind, Storms and Cyclone

A. 1. c, 2. b, 3. c, 4. d

B. 1. T, 2. T, 3. F, 4. F, 5. F

C. 1. phenomena, 2. cyclone, 3. exerted, 4. trade winds, 5. hot air

D. 1. Air is all around us and it exerts pressure on us. We can feel the force exerted by air on our

face when we sit on a fast riding motorbike.

2. Winds that move from east to west are called trade winds.
3. Winds that move from west to east are called westerlies.
4. Storm with heavy rainfall, thunder and lightning.

E. 1. Earthquake, Tsunami
2. Anemometer
3. Hurricane, Typhoon
4. We might be aware that moving air is called wind. Air moves from the region where the air pressure is low. The greater the difference in pressure, the faster the air moves.

F. 1. Air is all around us and it exerts pressure on us. We can feel the force exerted by air on our face when we sit on a fast riding motorbike.

A number of activities can be performed to illustrate the fact that high speed winds are accompained by a decrease in air pressure. This is basically due to a principal called Bernoulli's principal

2. Strong wind is called storm. Different types of storms are caused by violent air currents and are accompanied by heavy rains, high speed winds and lightning. The storms may occur on land or over the seas.

Thunderstorm : Storm occurs due to disturbance of atmosphere accompanied by strong wind, thunder and lightning. Storm associated with heavy flood-producing rainfall, thunder and lightning is called thunderstorm.

It mostly occurs in hot and humid tropical area like India. Thunderstorm can have severe weather conditions associated with them like strong wind, hail, lightning, tornado, thunder and heavy rain. Thunder is the sound heard after a flash of lightning. Thunderstorms form when moist, unstable strong wind is lifted up into the cooler upper regions of the atmosphere. Lifting up of this wind results in condensation and formation of cloud. The condensed wind may fall as rain or freeze and then fall as hail-stones along with the release of heat.

Lightning : Lightning is a bright flash of electricity produced by a thunderstorm and is very dangerous. Lightning is an electric current. Up in the sky, within a thundercloud, raindrops and hailstones collide with each other due to strong rising winds. These collisions create static electricity and the thunder clouds get charged. Due to this static electricity huge sparks are formed between the clouds or between a cloud and the ground. These huge sparks flash across the sky as lightning. Lightning heats the air that comes in its path so quickly that it makes a loud booming sound. This is the thunder. Lightning is seen before the loud sound of thunder is heard.

Cyclone : A cyclone is a strong wind storm. It is caused by difference in air pressure in the atmosphere. Cyclone is dangerous as it is violently rotating windstorm. The warm, moist air begins to spiral and becomes a strong, circling, wind storm. In the centre of a cyclone, there is a calm area called the 'eye'.

Cyclones can change direction suddenly, which makes it very difficult for meteorologists to forecast what will happen. Cyclone brings heavy rain and causes high waves. Cyclone can cause severe damage. Cyclone can move at up to 360 kilometres per hour, with heavy rain. The wind and rain together cause lots of damage when the cyclone crosses over coastal lands. When cyclonic winds reach speeds of more than 64km/h, they are officially called tropical storms.

Thunderstorms are common, in tropical regions like India, but they rarely turn into cyclones. The eastern coast of India is more at risk due to cyclone than the western coast.

Cyclone is known by different names in different parts of the world. It is referred to as a hurricane in America and as typhoon in Japan and Philippines.

The wind speed and wind direction, temperature and humidity are the factors that contribute to the formation of cyclone.

There are several reasons for the formation of cyclone.

Hurricane

Violent winds, rain, waves and storm tides make hurricanes one of the most dangerous natural disasters. A large hurricane can stir up more than a million cubic miles of the atmosphere every second, causing 15-30 cm of rainfall on land. Some hurricanes bring lots of rainfall and cause major flooding with storm surges and high surf. As they can move rapidly and erratically, the path the winds will take is hard to predict precisely.

Tornadoes

Tornado is a small but very powerful twisting mass of air that causes lot of damage. Tornadoes may form within cyclones. A tornado is a dark funnel shaped cloud that reaches from the sky to the ground. The diameter of a tornado can be as small as a metre and as large as one kilometre or even wider. The funnel of a tornado sucks dust, debris and everything near it at the base (due to low pressure) and throws them out near the top.

3. Cyclone is dangerous as it is violently rotating windstorm. The warm, moist air begins to spiral and becomes a strong, circling, wind storm. In the centre of a cyclone, there is a calm area called the 'eye'.
4. Cyclones can change direction suddenly, which makes it very difficult for meteorologists to forecast what will happen. Cyclone brings heavy rain and causes high waves. Cyclone can cause severe damage. Cyclone can move at up to 360 kilometres per hour, with heavy rain. The wind and rain together cause lots of damage when the cyclone crosses over coastal lands. When cyclonic winds reach speeds of more than 64km/h, they are officially called tropical storms.

Chapter-16 : Water : A precious Resource

A. 1. b, 2. b, 3. c, 4. a

B. 1. F, 2. T, 3. F, 4. F

C. 1. water, 2. 3%, 3. affect, 4. storage tanks

D. 1. Water for domestic use is obtained from various sources such as:
   - Underground water from wells, hand-pumps, etc.
   - Surface water from lakes, rivers, etc.

   2. Glaciers, Icecaps
   3. The movement of water through the gaps between soil particles is called percolation.

E. 1. The domestic need of water is looked by municipality of the town/city in urban areas like Delhi, Mumbai, etc. Water is collected from lakes, rivers and it is cleaned and purified and then pumped by big motors to overhead storage tanks.

   Water is supplied through pipes to houses from storage tanks.

   2. Water covered part of the Earth is called hydrosphere (Hydro/Hudor means water). In nature, water exists or is found in different forms. 71% of Earth is covered with water.

   Hydrosphere consists of water in all its different natural forms.
   - Liquid form of water
   - Solid form of water
   - Vapour/Gaseous form of water

   3. Lakes, rivers, seas and oceans

F. 1. Scarcity of water affects plants : Plants are very sensitive to scarcity of water. As they remain fixed at a place, they cannot move from one place to another in search of water. If the soil has less water or the plants do not get water, they show following signs:
   - First the plant wiltes. (If the plant does not recover from wilting, it dries.)
   - The plants dry and die.

   Scarcity of water affects animals

   Scarcity of water also affects the animals. The animals that face the scarcity of water move from one place to another in search of water. If their need for water is not fulfilled, they die.

   During droughts, it is observed that many animals and cattle die. This results in loss of life.

   Scarcity of Water Affects Human

As water is needed for cooking food, drinking and other daily activities, scarcity of water affects human beings also. People living in areas/regions of extreme scarcity of water should follow these points:

- People should save water by using different rainwater harvesting techniques.
- People should use water carefully and judiciously. Every drop of water is precious to them.

Some solutions to minimise water wastage and the scarcity of water are:

- Do not waste water in home, school, party or anywhere.
- Close the tap tightly to avoid dripping of water.
- Use less water for all the purposes.
- Instead of using house-pipes to clean scooters, cars, floors, use mopping cloth, wet cloth, etc.
- Plant trees for getting more rain clouds.
- Rainwater harvesting is to be practised.
- Rainwater must be directed and stored in pools.
- Recycle the used water.

2. The fall of water table takes place because of :
   - Less/scanty rainfall in the area.
   - Deforestation of the area.
   - Less seepage of water (due to less rainfall, concrete roads, streets, etc.)
   - Excessive use of groundwater for industries, constructions, wastage, etc.
   - Increasing of human population and demand for supplying water.
3. Do yourself

] 4. Do yourself

Chapter-17 : Forest : The Green Lifeline

A. 1. a, 2. d, 3. c, 4. a,

B. 1. important, 2. recycling of nutrients, 3. forest, 4. deforestation, pollution, 5. plants

C. 1. conservation, 2. deforestation, 3. canopy, 4. wild animals, 5. forest floor, 6. decomposers, 7. tribals

D. 1. A forest is a large uncultivated land area densely covered with various types of trees, shrubs and herbs. It also has many types of tall grasses, canes, creepers and climbers.
2. The plants with a life span of two years are called biennials.
3. Using the process of photosynthesis, green plants capture solar energy from sunlight in energy-storing chemical compounds that make their food. Almost all the energy needed by living beings on the Earth comes ultimately from the Sun through green plants (known as producers).
4. Animals and nongreen plants obtain nutrients from the green plants. They are called consumers. It means all animals depend on plants for food and energy.

E. 1. It is the topmost layer of crown of leaves and branches of very tall trees. When viewed from above, the canopy appears as a green cover forming a roof or umbrella over the forest land.
2. To slowly be destroyed by natural chemical processes.
3. The plants with a life span of one year are called annuals.
4. The causes of deforestation are

   Increased demand of fuelwood, paper and timber.

   Increased demand of land for industries, houses, roads, agriculture and railway tracks.

   Increased mining activity.

   Lowering of water table causes plants and trees to wilt and die.

F. 1.
   - Forests purify air and provide clean and fresh air for breathing to all living beings.
   - Forests regulate climate by reducing temperature and help in rainfall.

2. Animals obtain food from plants : You know green plants are autotrophs. Using the process of photosynthesis, green plants capture solar energy from sunlight in energy-storing chemical compounds that make their food. Almost all the energy needed by living beings on the Earth comes ultimately from the Sun through green plants (known as producers).

Animals and nongreen plants obtain nutrients from the green plants. They are called consumers. It means all animals depend on plants for food and energy.

Animals obtain oxygen from plants : Plants release oxygen during photosynthesis as a by product. This oxygen is utilised by animals during respiration for releasing energy.

3. The causes of deforestation are

Increased demand of fuelwood, paper and timber.

Increased demand of land for industries, houses, roads, agriculture and railway tracks.

Increased mining activity.

Lowering of water table causes plants and trees to wilt and die.

4. Food, wood, rubber, gum, medicines

G. 1. It is the topmost layer of crown of leaves and branches of very tall trees. When viewed from above, the canopy appears as a green cover forming a roof or umbrella over the forest land.

2. The natural home or environment of an animal, plant or other organism.

3. The decomposed organic matter that forms the topsoil, rich in nutrients and blackish or brownish in colour.

4. An organism, especially a soil bacteriun, fungus, or invertebrate, that decomposes organic material.

5. Large scale cutting of trees to clear a land area for agriculture, housing or industrial use.

6. The process of loss of top layer of naked soil either being washed away by rains or blown away by air.

7. The process of becoming a desert or of making an area of land into a desert.

8. The existence of a number of different kinds of animals and plants which together make a good and healthy environment.

H. 1. Because green plants release oxygen during photosynthesis. This oxygen is used by animals including man for respiration. Forests maintain balance of oxygen and carbon dioxide in the atmosphere. If forests get depleted, the ratio of oxygen and carbon dioxide will get disturbed and will cause a threat to life.

2. • Forests help in reducing pollution.
   • Forests provide animals a place to live (shelter).
   • Forests provide us food, wood, rubber, gum, resin, non-edible oils, honey, bee wax, lac, bamboos, fuel, medicines, etc.

3. Plants remove carbon dioxide from the air and use it in photosynthesis. They release oxygen into the air during daytime. Also by holding soil particles together, they decrease the dust contamination of air. These particles form Suspended Particulate Matter (SPM) in the atmosphere.

4. • Trees bind the soil and control soil erosion.
   • Trees make the soil fertile by recycling the nutrients.

Chapter-18 : Wastewater Management

A. 1. c, 2. d, 3. a, 4. c, 5. b

B. 1. T, 2. F, 3. T, 4. F, 5. T

C. 1. impurities, 2. sewage, 3. sludge, 4. ozone, 5. aerobic

D. 1. The drainage system carries the dirty water away from the house.

2. Dirty water, drains, house, swer

E. 1. Dirty water, wastewater and toilet water all are carried away from your house through drains. These drains open into a network of pipes outside the house called sewers. From here, they are connected to bigger drains that carry it out of the colony or city. This is sewer system or sewerage. It is covered drainage system. You can see manholes located at 50-60 m covered by iron lids in streets or roads. These are openings used by man to clean the sewer system.

2. The water stands there. It pollutes and emits foul smell. Mosquitoes lay the eggs there and breed. This increases their population. Mosquito bites cause diseases like malaria, dengue, chikungunia and filaria in human beings.

The water spreads on the paths, streets and

spoils the streets all around. It contaminates ground water.

3. • Water is carried to pits directly.
   • Water does not come out or overflow.
   • These keep the surroundings clean.
4. Drainage system is needed for carrying away the dirty water from the houses, schools, offices and other buildings. This is done for keeping the surroundings of the buildings clean. If it is not done, the wastewater will stand and emit foul smell and also be the breeding place for mosquitoes. Thus, it will affect the health of people living there.

F. 1. The physical process of cleaning the sewage involves filtration, settling/sedimentation and skimming. To remove the physical impurities wastewater is passed through bar screens that act as filters (just like your fingers standing on way of flowing water or the screens on the drains openings jali). This removes big substances like papers, polythenes, sticks, leaves, rags, cloth, etc. This step is called filtration process.

The filtered water is allowed to slow down and the impurities like pebbles, grit, sand and dust are allowed to settle down in settling tanks. This is called sedimentation/settling process. These wastes settle down due to weight/gravity.

Water then passes to another settling tank where solid wastes like faeces settle at the bottom of the tank. This is called sludge. It is removed with a scraper. Water having oil and grease which float on the water surface is removed by skimmer.

All these processes give clarified water from sewage (dirty liquid wastewater).

2. People defecate in open, on land, near waterbodies, fields and so on. These are the sources of disease-causing microbes. These microbes reach water sources (underground, surface water, drains with leaking water pipes and into well) through rainwater. This is called water pollution and the water is contaminated. People who use such a water get diseases. These diseases are called waterborne diseases such as cholera, typhoid, dysentery, hepatitis, meningitis and polio.

Sanitation at Public Places : Large quantity of waste is generated at public places like railway platforms, bus stops, parks, schools, hospitals, fairs, zoos, etc. It must be disposed of properly to avoid spread of any epidemic of diseases. If dustbins are not available, the wrappers must not be thrown on roads, in open, etc. carry it from homes. Urination in open must be avoided.

Alternative Arrangement for Sewage Disposal : Public toilets and on-site disposal sewage systems are available such as septic tanks (for places where no sewerage system, for example, villages, small towns, slums, isolated buildings), chemical toilets and composting pits.

On-site human waste disposal technology involves the flow of wastes to biogas plant through covered drains. The biogas produced is used to produce electricity.

Vermiprocessing Toilet : Special types of earthworms have the capacity to convert the wastes into manure. These worms are now being used to convert human wastes into vermi cakes which can be used as a manure. Such toilets need less water for waste disposal and are economical also.

BOOK-8

Unit-I Food

Chapter-1 : Crop Production

A. 1. c. wheat, 2. a. produce, 3. d. ploughing, 4. a. kharif

B. 1. F, 2. F, 3. F, 4. F, 5. T, 6. F

C. 1. crop plants, 2. product, crop produce, 3. fertilizers, 4. water, 5. of putting seeds

D. 1. Rabi crops are those crops which are generally sown in winter season i.e., October to December and harvested in March.

2. Tea and Coffee
3. Horticulture is the growing and production of vegetables and fruits.
4. Apiculture is the practice of keeping bees in their colonies for obtaining honey.
5. Cow, buffalo, hen, duck, goat.

E. 1. Produce is the product which is obtained from a crop.
2. Crop plants are those plants which is obtained from a crop.
3. Crop plants are those plants which are grown by the farmers in the field.
4. Kharifcrops are those crops which are generally sown during mousoon season from June to July are harvested in September and October.
5. The process of turning and loosening the soil using a plough is called ploughing.

F. 1. (a) It helps in lossening the soil so that it can hold more water and air.
(b) The loose soil also helps in the growth of earthworms and microbes which make it easy to mix the fertilizers and manures in the loose soil.
(c) It aerates the soil. The roots can thus breathe easily.
(d) It helps in easy penetration of the roots of seedlings.
(e) Nutrients-rich soil is brought up from lower levels or soil. So, the plants can use these nutrients.
(f) It helps in removing the weeds by uprooting them.

2. Sources of Irrigation : Water is supplied to fields from a number of source-rain, wells, tube wells, lakes, ponds, rivers, canals and dams in necessary to have adequate drainage in irrigated fields.
3. Manufactured chemicals fertilizers though more concentrated and efficient are expensive and more likely to cause excess run off and pollution. The use of fertilizers results in a higher crop yield. However, nutrients in the fertilizers may be washed away due to rain or irrigation. Use of fertilizers over a long period of time may affect the fertility of soil.
4. Sometimes, continuous growing of crops makes the soil barren or infertile. It needs to be left uncultivated for some time so that it can region its nutrients and fertility. This process of leaving soil uncultivated for one crop season is called following.
5. Growing legume plants in crop rotation is very significant :
Wheat crop uses nitrogen in the form of nitrates which leads t the deficiency of nitrogen in the soil. The roots legumes have many small swelling parts called roots nodules which contains nitrogen-fixing bacteria called Rhizobium. These bacteria convert free atmospheric nitrogen into nitrates. This enriches the soil with nitrogen and increases its fertility.

HOTS Questions

1. The drawbacks of seed being unveil distributed in a field while sowing are that the seeds may grow in clusters at one place and at another place there may be none.
2. No, we do not expect to find felly grown crop plants in a nursery because the plants grown in nursery are later transplanted in fields. A fully grown plant cannot be transplanted easily.
3. No, basically crop rotation is done to enrich the soil with nutrients.

Chapter-2 : Micro-Organism

A. 1. a. Rhizobium, 2. d. Bacteria, 3. b. Bacteria, 4. b. Algae, 5. b. Alcohol

B. 1. F, 2. F, 3. F, 4. F, 5. T

C. 1. microscope, 2. virus, 3. mould, 4. penicillium, 5. bacteriophage

D. 1. The study of microbes or micro-organisms is known as microbiology.
2. Living organisms are those organisms which have life in them.
3. Cyst is a tough shell formed around micro-organanisms which enables them to survive in extreme environmental conditions of heat or cold.
4. Coccus is a spherical shaped bacteria.

E. 1. Air, water and soil are three habitats of micro-organisms.

2. Some of the bacteria that require oxygen their growth are called aerobic bacteria those do not need oxygen are called anaerobic bacteria.
3. Food poisoning causing bacteria are Clostridium botulinum, Bacillus cereus, etc.
4. Mostly fungi grow in moist places. They grow on bred, leather, pickles, cooked food, rotten fruits and vegetables. Some fungi are also found in the body of plants and animals.
5. Fungi cause diseases in plants, e.g., loose smut of wheat, potato blight.
6. Chlamydomonas is a unicellular alga. Volvox is a multicultural alga.
7. Protozoa are found in fresh water, sea and moist habitats such as, damp soil.
8. Protozoa reproduce both asexually and sexually. Asexual reproduction happens by budding, binary fission, multiple fission, cyst formation.

   Sexual reproduction also occurs by conjugation. In conjugation two individuals take part in reproduction.

F. 1. Five manor categories of micro-organisms are :

   a. Bacteria, b. Algae c. protozoa d. fungi e. viruses

   We can distinguish them with the help of their features which are as given :

   Bacteria : They are among the smallest and oldest organisms on our planet and are found in four different shapes : rod-shaped (bacilli), spherical (cocci), curved 9commas), and spiral (spirilla) Lactobacillus and Streptococcus are examples of bacteria.

   Algae : They are a group of simple plants. Chlorella, Chlamydomonas, and diatoms are examples of microscopic algae.

   Protozoa : They are a group of animal-like, single-celled organisms. Amoeba, paramecium, and Euglena are examples of protozoa.

   Fungi : They are a group of diverse organisms that lack chlorophyll and feed on decaying matter. Yeast and moulds are examples of microscopic fungi.

   Viruses : They are so small that they cannot be seen using ordinary light microscopes and are usually studied with the help of powerful microscopes called electron microscopes.

2. Useful effects of bacteria : Bacteria plays a very important role in dairy, medicine, agriculture and various industries.

   Some beneficial actions are as follows :

   The bacteria lactobacillus promotes the formation of curd. These convert the milk sugar lactose into lactic acid. The lactic acid turns the milk into curd.

   Bacteria make meat soft by breaking down tough muscle fibres.

   Anaerobic bacteria decompose animals waste to biogas which is used as a domestic fuel.

   A few free living bacteria like azotabacter and clostridium are able to pick up nitrogen from the soil, air and convert it into organic nitrogenous compounds like amino acids. This is called nitrogen fixation.

   Some bacteria like Rizobium (found in root nodules of leguminous plants) absorbs free nitrogen from the air and convert it into nitrogenous compounds. These legumes being rich in proteins are used in crop rotation and green manuring.

   Many antqibiotics such as streptomycin, chloromycetin, duremycin, polymycin are obtained from filamentous bacteria.

   Some bacteria promote the process of forming in leather industry.

   Harmful effects of bacteria : Some harmful actions of bacteria are as follows :

   1. Many bacteria pllute water and make it undrinkable causing disease like cholera, dysentery and jaundice. Micro-organisms that cause diseases are called pathogens.
   2. Many bacteria cause food poisoning. They produce toxins (poisons) in the food

products. Food poisoning causing bacteria are Clostridium botulinum, Bacillus cereus, etc.

3. Some bacteria spoil food. Lactobacillus cause the curdling of milk. Milk, fruit juice and other food materials get spoiled after some time due to bacterial action.
4. Bacteria also cause many diseases in human beings, animals and plants.

3. Reproduction in Bacteria : Most bacteria multiply generally by transverse binary fission in which a fully grown bacteria cell divides into two equal sized cells, after developing a transverse wall, the two daughter cells separate and redivide after maturity. A bacterium can create a duplicate of itself within a short period (20 minutes). Under favourable conditions sexual reproduction is also observed.

   Reproduction in Fungi : Fungi reproduce by vegetative, asexual and sexual vegetative reproduction which occur by budding, fragmentation and fission.

   In sexual reproduction, fungi reproduce by binary fission, budding or by spore formation.

   Sexual reproduction in fungi occurs under favourable conditions. It involves the formation and union of two gametes or their nuclei.

4. a. Bacteria : Uuseful effects of bacteria : Bacteria plays a very important role in dairy, medicine, agriculture and various industries.

   Some beneficial actions are as follows :

   The bacteria lactobacillus promotes the formation of curd. These convert the milk sugar lactose into lactic acid. The lactic acid turns the milk into curd.

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   Many antibiotics such as streptomycin, chloromycetin, duremycin, polymycin are obtained from filamentous bacteria.

   Some bacteria promote the process of forming in leather industry.

   b. Fungi : useful fungi : Yeast is used in making bread, cakes, idli and dosa, as it is rich in vitamin B.

   Yeast is added to molasses (a waste from sugar industry) to obtain ethyl alcohol.

   Yeast is used for preparing wines from fruit juices.

   Some fungi such as mushrooms are directly used as food. It should be noted that only some varieties of mushrooms are edible.

   Some medicines are prepared from fungi, penicillin is made from penicillin notatum.

   They are helpful in decomposing organic waste.

   Yeasts are used to produce vinegar.

   c. Algae : Blue green algae are the first colonizers of barren areas.

   Blue green algae create suitable conditions for the growth of other organisms.

   Many blue green algae provide food to several aquatic animals. Spirulina is used as human food.

   Nostoc, Anabaena are the blue green algae which can also fix the atmospheric nitrogen into the usable compounds, so used as fertilizers.

   Some blue green algae (Lyngbia) produce antibiotics.

   Some blue green algae change the colour and taste of water making it unifit for drinking.

   Some blue green algae kill the mosquito larvae and thereby prevent the spread of malaria.

HOTS Questions

1. Packets of potato chips are filled with nitrogen gas because it prevents the chips from oxidizing, which is part of which makes them go state.
2. This is done to prevent the growth of micro-organisms which can cause many disease in us.
3. Development of resistance against an antibiotic in bacteria is an adaptation to the serene conditions (presence of antibiotic) that occur due to single or double mutations. Evolution is a series of changes (mutations) in an organism that result in the origin of new organism different from the previous one, that is why evolution takes time whereas adaptation of bacteria against an antibiotic does not.

Unit-II : Materials

Chapter-3 : Synthetic Fibres and Plastics

A. 1. a. Nylon, 2. b. Polythene, 3. b. Rayon, 4. d. Cotton

B. 1. F, 2. T, 3. T, 4. T, 5. T, 6. T

C. 1. synthetic, 2. wrinkle, 3. polymerization, 4. natural

D. 1. Natural fibres are those fibres which are obtarned from natural sources such as plants and animals. Cotton, Jute, silk are natural firbres.
2. Synthetic fibres are man-made fibres which areobtained from coal, petroleum, and natural gas.
3. Rayon is called regenerated fibre.
4. Plastic is a synthetic polymer that can be moulded or shaped in any form.

E. 1. Polymerization is the process by which synthetic fibres are made from simple molecules. The two types of polymerization are addition polymerization and condensation polymerization.
2. Rayon was the first synthetic fibre.
3. Plastics are synthetic materials made from a wide range of organic polymers such as polyethylene, PVC, nylon, etc., which can be moulded into shape while soft, and then can set into a rigid or slightly elastic form.
4. use of Rayon
   (i) It is used in the manufacturing of fabrics like sarees.
   (ii) It is used for making dresses aprons and caps, when mixed with cotton (50%-50%).
   (iii) It is used in medical field for making gauze (for making bandages) and lint (for dressing wounds).

F. 1. Amonomea is a small molecular sub unit that can be combined with similar subunits to form danger molecules. Examples of monomers are monosaccharedes (simple sugars), anuno acids and nucleotides.
   A polymer is a large molecule made up of chains of repeating basic molecular units called monomers. Many polymers are named by their basic monomer unit with the prefex poly. Poly vinylchloride (PVC) is the polymer of viny/chloride. Examples of polymers are polysaccharides, polypeptides and proteins and nucleic acids.
2. Rayon resembles silk and acrylic resembles wool.
3. Advantages of synthetic fibres :
   The fibres have high tensile strength, a property due to which they withstand heavy loads without breaking.
   The fibres have elasticity, a property by which they regain their original shape after stretching or compression.
4. Nylon : (i) It is used for making fishing nets, tyre cords climbing ropes, parachute fabrics, bristles for tooth-brushes and paint brushes.
   It is used in the production of textiles like sarees, shirts, neck-ties, socks and other garments.
   Melamine :
   (i) Melamine is used to produce thermosetting plastic.
   (ii) It is used as insulation and soundproofing material.
   Bakelite :
   (i) it is used for making electrical switches and plugs.
   (ii) It is used for making combs.

HOTS Questions

1. Yes, rayon is a synthetic fibre, thus, it also burns easily and sticks to the body.
2. Cotton is a plant product and paper is also made from plants. So, when cotton is burnt, it smells like burning paper. While wool and hair both are form animals, hence on burning they smell similar.
3. The property of not getting infected by natural process make plastics both very useful and an environmental hazard.
4. No, clay is not a polymer. It is natural material.
5. This is so because nylon can catch fire easily.

Chapter-4 : Metals and Non-metals

A. 1. c. Carbon, 2. a. Cu, 3. d. Au and Pt, 4. d. Na_2O

B. 1. F, 2. F, 3. T, 4. T, 5. T, 6. F

C. 1. conductors, 2. iron, 3. noble, 4. tin, 5. 100%, 6. higher

D. 1. Metal is an element which forms cation by losing electrons.
2. Non-metals are those elements who form anions by gaining electrons.
3. Ores are the minerals from which metals can be extracted at a profit.
4. Lustre is the shining property of the metals.
5. Carat is the unit of purity of gold alloys. It is a unit of mass equal to 200 mg.

E. 1. 118 elements are known to us.
2. Sodium
3. Hydrogen gas
4. Iron

F. 1. a. Physical State : Metals are generally solid at room temperature. Mercury and Gallium are exceptions as they are liquid at room temperature.

b. Melting and Boiling Points : Metals have, generally, high melting and boiling points. Among metals, potassium, sodium, mercury and gallium have low melting and boiling points as exception.

- Zn (Zinc) : (i) Zinc is used in dry cells.
  (ii) It is used in coating iron sheets to rusting of iron. The process is known galvanizing of iron.
  (iii) It is used in the preparation of useful alloy such as brass and German silver.
- Fe (Iron) : (i) Iron is used to make pipes, sinks, storage tanks, railings, cylinders, etc by the process of casting.
  (ii) Articles, such as nails, chains, wire nets, agricultural tools, etc are made of iron.
  (iii) Steel is used in construction of buildings, ships, bridges, railway lines, etc. Stainless steel is used to make utensils, knives, etc.
- Ma (Sulphur) : (i) Sulphur is used in the manufacture of compounds like sulphuric acid.
  (ii) It is used in the production of matches dyes, and gun powder.
- An (Gold) : (i) It is a bright yellow metal with specific shine. Like silver it is also ductile and malleable.
  (ii) Gold is used in making ornaments and jewellery.
  (iii) Gold is also used in making ayurvedic medicines.
  (iv) Gold is used in electroplating of surfaces.
- Ag (Silver) : (i) Silver is mainly used in making jewellery.
  (ii) Silver is also used in making coins, utensils and other show pieces for decoration.
  (iii) The silver bromide (chloride and iodides) are used in making photographic plates, because these salts are highly sensitive to light.
  (iv) Silver foils are used in ayurvedic medicines.
- Cu (Copper) : (i) Copper is widely used to make electric wires and cables. Copper coils are used in several electrical appliances.
  (ii) It is also used to make heating utensils, car radiators and calorimeters.
  (iii) It forms useful alloys.

3. Al > Zn > Fe > S > P
4. An alloy is a homogeneous mixture of two or more metals or a metal and a non-metal.

   Uses of Alloys

   Alloys have tremendous uses in variety of fields.

   The ornaments are made of 22 carat, i.e., 22 part gold and 2 part copper and silver. Spacecrafts, aircrafts, various types of machines, steel utensils, coins are made of alloys. Surgical instruments, laboratory instruments, body of many types of vehicles are made of alloys.
5. The metals which do not react with mild acid and alkalies are called noble metals. Apart from very little chemical reactivity, noble metals occur in nature in free state. The important noble metals are silver, gold and platinum.

   Gold :

   (i) It is a bright yellow metal with specific shine. Like silver it is also ductile and malleable.

   (ii) Gold is used in making ornaments and jewellery.

   Silver :

   (i) Silver is mainly used in making jewellery.

   (ii) Silver is also used in making coins, utensils and other show pieces for decoration.

   Platinum :

   (i) Platinum is used in making costly ornaments and watches.

   (ii) It is also used as catalyst in most of the reaction, mainly in reducing carbon monoxide pollution.

HOTS Questions

1. This is so because silver is an expensive metal.
2. This is so because metal have the property of sonority whereas wood does not have it.
3. No, in that case it can't be used in displacement reactions.

Chapter-5 : Combustion and Flame

A. 1. b. Combustible substances, 2. b. Water, 3. d. Kerosene, 4. b. Water, 5. a. 800°-1000°C

B. 1. T, 2. T, 3. T, 4. F, 5. T

C. 1. v., 2. i., 3. ii., 4. iii., 5. iv.

D. 1. Combustion, oxygen, 2. Heat, 3. kindling temperature, 4. incomplete, 5. 1200°C

E. 1. Water

   Reason : It is a non-combustible substance. Rest are combustible substances.

   2. Alcohol

   Reason : It is not a fuel-Rest are fuels.

   3. Carbon monoxide

   Reason : It is deadly poisonous gas. Rest are not.

F. 1. The lowest temperature up to which a substance must be heated before it catches fire is called its ignition temperature.

   2. The combustion in which the substance gets completely burnt to form the highest oxide of the substance is called complete combustion.

   3. Luminous flame : It is a burning flame which is brightly visible. Much of its output is in the form of visible light, as well as heat or light in the non-visible wavelengths.

   4. The flame is the visible (light-emitting) gaseous part of a fire.

G. 1. Combustion is the process of burning of a substance in the presence of air with the evolution of heat and light.

   Combustion burning of a substance in presence of oxygen to produce heat.

   2. The substances which do not burn in air or oxygen are called non combustible substances.

   For example, water, glass, cement, sand etc, are non combustible substances.

   3. In order to control fire we should :
   - Remove the combustible substance.
   - Cut off the supply of air.
   - Cool down the combustible substance below its ignition temperature.

   Fire can be very destructive.

   4. Rapid Combustion

   The process in which a substance combines chemically with oxygen at a temperature above its ignition temperature with the evolution of large amount of heat and light in a short t1ime is called rapid combustion or

burning.

Spontaneous combustion

Sometimes a substance suddenly bursts into flames without any external sources of ignition. Such combustion is called spontaneous combustion.

H. 1. Some important terms related to combustion are as follows :

Combustible Substances

The substances which burn in air or oxygen are called combustible substances.

For example, petrol, LPG (cooking gas), wax, kerosene, paper, cloth, wood, coal etc. are combustible substances.

Non combustible substances

The substances which do not burn in air or oxygen are called non combustible substances.

For example, water, glass, cement, sand etc, are non combustible substances.

Supporter of Combustion

A substance which helps combustion (or burning) is called a supporter of combustion.

For example, during the combustion of carbon, oxygen (or air) is a supporter of combustion.

If the supply or supporter of combustion is cut off, the combustion (or burning) stops.

Ignition Temperature

Each combustible substance must be heated to certain temperature before it could catch fire. The lowest temperature up to which a substance must be heated before it catches fire is called its ignition temperature.

Ignition temperature is also called kindling temperature.

2. The following conditions are necessary for the combustion or burning to take place :

The presence of a combustible substance (or a fuel)

The presence of a supporter of combustion.

Initial heating to raise temperature of the combustible substance to its ignition temperature.

3. 1. Rapid Combustion

The process in which a substance combines chemically with oxygen at a temperature above its ignition temperature with the evolution of large amount of heat and light in a short time is called rapid combustion or burning. Burning of hydrocarbon fuels, e.g., LPG, kerosene, petrol etc is rapid combustion.

2. Spontaneous combustion

Sometimes a substance suddenly bursts into flames without any external sources of ignition. Such combustion is called spontaneous combustion. A substance called white phosphorous gets ignited spontaneously at room temperature during summer when the temperature rises to about 35°C. White phosphorous is therefore stored in water.

3. Incomplete combustion

The combustion reaction that takes place in the presence of insufficient quantity of oxygen (or air) is called incomplete combustion.

For example, when carbon is burnt in insufficent (limited) quantity of air, carbon monoxide is formed.

carbon + oxygen carbon monoxide

Carbon monoxide is a deadly poisonous gas. Therefore, incomplete combustion is waste of energy and hazardous.

4. Complete combustion

The combustion in which the substance gets completely burnt to form the highest oxide of the substance is called complete combustion. Combustion in the presence of sufficient oxygen or air is complete combustion.

For example, burning of carbon to carbon-dioxide (CO_2) is complete combustion.

Carbon + oxygen (from air)

(C) (O_2) carbondioxide

4. The various zones of a candle flame are as given below :

Outer Zone : This zone also known as non-luminous zone is the zone of complete

combustion. The ample presence of oxygen aids in complete combustion.

The middle zone (Luminous zone) : This is the zone where the wax vapour starts burning. Here the flame is yellowish as the oxygen is not available in plenty in this region. The wax vapours do not burn completely. The temperature here is about 1200°C.

The innermost zone (Dark zone) : This zone is dark black in colour. This zone consists of unburnt wax vapours. This zone of the candle flame is least hot. It has a temperature of about 800-1000°C.

HOTS Questions

1. This is so because the density of water is more than density of oil so oil floats on water and gets regular supply of oxygen which will keep the fire burning.
2. This is so because only if the foam type fire extinguisher has lower density than the oil, the bubble of the fire extinguishes can float over the oil and cover the oil surface, cutting the oxygen supply to the oil from the atmosphere, thereby putting off the fire.

Unit-III : The World of the Living

Chapter-6 : The Cell

A. 1. d. Mitochondria, 2. c. Amoeba, 3. a. Mushroom, 4. a. Chloroplast, 5. b. Chlorophyll

B. 1. T, 2. F, 3. T, 4. F, 5. T

C. 1. minute, 2. 2 billion, 3. unicellular, 4. organelles, 5. mitochondria

D. 1. A magnifying glass is a convex lens that is used to produce a magnified image of an object.
2. Cell wall is a regid layer of polysaccharides lying outside the plasma membrane of the cells of plants, fungi and bacteria.
3. Cytoplasm is a jelly like fluid that fills up the part of the cell between the cell membrane and the nucleus.
4. Vacuole is a flute-filled space enclosed in a membrane. Vacuoles store excess water, useful minerals, pigments, and many other substances.

E. 1. This means at the level of the cell. In other words it means to talk about biological structures and processes at the complexity level of the cell.
2. A cell is the basic unit of structure and function of an organism.
3. Certain organisms consists of only one (single) cell. The single-celled organisms are called unicellular.
4. Some organisms consist of cells numbering from a few to billions. Such organisms are called multicellular.

F. 1. Discovery of the cell was made by an English scientist, Robert Hooke in 1665. He observed thin slices of cork (bark of a tree) under his crude microscope. He found that the cork was made of box-like compartments, forming a honeycomb structure. He named these box-like compartments as cells. What Hooke observed as boxes (or cells) were actually dead cells.
2. Plant cells have organelles called plastids present in the cytoplasm. They are of different colours and types. Green coloured plastids are called chloroplasts. They contain the green coloured pigment chlorophyll which provides green colour to the leaves. You know that chlorophyll is essential for photosynthesis.
3. The three basic parts of a cell are cell membrane, cytoplasm, and nucleus.

   Cell membrane : It is the outer covering of a cell. It is a porous membrane through which selected substances can enter or leave the cell. The cell membrane is also called plasma membrane.

   Cytoplasm : It is a jelly-like fluid that fills up the part of the cell between the cell membrane and the nucleus. Several organelles are embedded in the cytoplasm.

   Nucleus : It is considered to be the brain of the cell. Nucleus is surrounded by a membrane called the nuclear membrane and is filled with a semi-solid substance called the nucleoplasm. Thread-like structures called chromosomes are present in the nucleoplasm. Chromosomes carry genes, which transfer the characteristics of a cell to

the new cells that are formed during cell division.

Also present inside the nucleus is a round granule called nucleolus, which contains a network of fibrous material called chromatin fibres.

4. Chloroplasts are organelles that conduct photosynthesis, where the photosynthetic pigment chlorophyll captures the energy from sunlight. Converts it and stores it in the energy-storage molecules ATP and NADPH while freeing oxygen from water in plant and algal cells.

HOTS Questions

1. No, there will be no difference in the length of the nerve cells in rat and a giraffe.
2. Due to their tendency to change their shape, WBC can squeeze theonselves through walls of blood vessels and get into intercellular spaces to fight against germs.

Chapter-7 : Reproduction, Growth and Development in Animals

A. 1. b. Budding, 2. a. Sperm duct, 3. c. Uterus, 4. a. Larva

B. 1. F, 2. F, 3. F, 4. F, 5. T

C. 1. The offspring produced is identical to the parents.
2. Each daughter cell receives one nuclei.
3. The animals which lay eggs are called oviparous.
4. The animals which give birth to young ones are called viviparous.
5. The formation of the zygote marks the beginning of a new individual.

D. 1. Binary fission is the division of a single entity into two or more parts and the regeneration of those parts to separate entities resembling the original.
2. Zygote is the cell formed by the union of a male sex cell (a sperm) and a female sex cell (an ovum).
3. An embryo is an early stage of development of a multicultural diploid eukaryotic organism.
4. A sperm is a single cell which consists of cell membrane, cytoplasm, and nucleus. It is shaped like a tadpole. It has a head , a middle piece, and a long tail.

E. 1. Asexual Reproduction

In this type, a single parent reproduces one or more of its own kind without the help of any other kind. Yeast, Amoeba, Hydra, etc reproduce by asexual reproduction. The off springs produced by asexual reproduction are called clones.

Sexual Reproduction

For sexual reproduction, both the parents (male and female) are needed to produce individuals of the same kind. Frog, fish and human beings reproduce by sexual reproduction method.

2. Animals reproduce to maintain their number and also for the continuation.
3. Zygote is the product of fusion of the nuclei of the sperm and egg. Whereas foetas is actually formed by multiple divisions of zygote. It is the stage of the embryo which nearly resembles a human being.
4. Birds, insects and reptiles.

F. 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 individual resembles its parents in all the basic features.

Reproduction helps in

1. the continuity of life.
2. increasing the population of any species.
3. the evolution of the most favourable variations over a period of time.

Reproduction is essential for the existence of any species. In the absence of it, a species would became extinct.

2. Binary fission in Amoeba : First of all, the nucleus of parent cell divides into two daughter nuclei. This is followed by the splitting of parent body. Each half receives one daughter nucleus and forms a daughter organism. Thus, two daughter organisms are formed from one organism.

Budding in Hydra : In budding, a new organism is formed as an outgrowth from the parent body. In Hydra, a small bulge appears from the

lower part of the body. This grows into a bud, detaches from parent body and develops into a young Hydra.

3. The zygote undergoes repeated cell divisions to form the embryo. The embryo gets embedded in the uterus wall, where further development will occur. Gradually, the embryo divides and different cells are formed which then perform specialized functions. This is called cell differentiation (or cell maturation). The cells then form tissues and organs. At about 6 to 8 weeks, the embryo reaches the stage where it can be recognized. This stage is called foetus. The foetus develops completely in about 40 weeks, after which the child birth occurs. This period is called the gestation period.
4. Sexual reproduction takes places by two methods :
   (i) Some animals lay eggs.
   (ii) Some animals give birth to their young ones.

   The animals which lay eggs are called oviparous animals, while the animals which give birth to young ones are called viviparous animals.

HOTS Questions

1. No metamorphosis means to completely change ones previous form.
2. This is so because a large number of their eggs get destroyed by various reasons.
3. It is necessary for frogs and fishes to lay so many eggs so that some of then survive and hatch into new organisms.
4. No, a woman with blocked fallopian tube cannot give birth to child because the egg cannot reach the uterus, and the sperm cannot reach the egg, preventing fertilization and pregnancy.

Chapter-8 : Reaching the Age of Adolescence

A. 1. b. dal, chapati, milk, vegetables,
   2. a. regulates growth and metabolism,
   3. a. adrenalin, 4. d. pituitary

B. 1. endocrine, 2. ovary, 3. Mammary, 4. follicle, hrmone.

C. 1. THYROID 2. INSULINE

D. 1. Endocrine glands are gland of the endocrine system that secrete their products, hormones, directly into the blood rather than through a duct.
   2. Insulin controls the sugar level in blood.
   3. Pituitary gland is called the master endocrine gland.
   4. Estrogen is responsible for female sexual characters testosterone maintain male sexual characters.

E. 1. Puberty is the onset of sexual maturity in humans. Adolescence is the period of transition from a child to an adult.
   2. During puberty and adolescence period the reproductive organs mature and start functioning. In addition to the above some changes take place both in boys and girls which are visible externally as well. These changes are termed as secondary sexual characters.
   3. The secondary sexual characteristics of a female during adolescence are as follows :

      Development of breasts takes place, mensturation starts.

      Lower region below the waist starts broadening.
   4. During adolescence, the body undergoes several changes. These changes mark the beginning of puberty. At puberty, the boys and girls start becoming capable of reproduction. The period of puberty ends when an adolescent becomes fully mature for reproduction.

F. 1. Girls and boys should take many precautious during the age of adolescence.

   One must bathe regularly and keep the pubic region neat and clean, otherwise it could lead to bacterial or fungal infection. Girls must maintain cleanliness especially during the menstrual period. Regular exercise, playing, dancing or yoga help build stamina. It ensures longevity, improves concentration power and boosts confidence level.

   Adolescence is the age of formation of ideas, opinions and independent thought process.

Adolescents must spend time in constructive activities and have healthy means of recreation. They must also be aware of bad effects due to the use of tobacco, alcohol and drugs. Human beings are also vulnerable to sexually transmitted diseases such as AIDS which is spread by using infected needles, blood transfusion from an infected individual, through infected mother to her baby by breast feeding or by having sexual contact with an infected individual.

2. Following changes take place in the body during puberty :

   Changes in Body shape

   During puberty, the pattern of growth differs in girls and boys.

   In boys : The chests and shoulders become wider as compared to girls. The body also appears more muscular than girls.

   In girls : The growth of muscles is not as much as in boys. The body shows curves in certain parts. The breast region enlarged. The region below the waist becomes wider and broader.

   Change in voice

   At puberty there is change in voice.

   In boys : The voice becomes hoarse and heavy due to the extra growth of voice box or the larynx. In most of the boys, you can see the growing voice box in the neck region just below the chin. This is called Adam's Apple.

   In girls : The Adam's apple is not visible at all. It means, the voice box does not grow as much as in boys. On this account, the voice in girls becomes high pitched and shriller.

3. At the onset of puberty, every month, an ovum gets matured in either of the ovaries of females and is released into the fallopian tube. this is called ovulation. It occurs in anticipation of tfertilisation. In case the ovum is not fertilized, it degenerates and, along with the lining of the uterus, additional blood vessels are shed off as menstrual blood through the vagina. This is called menstruation. This is will happen every 28-30 days in a female who has attained sexual maturity.

   The beginning of menstruation or the first menstrual cycle is known as menarche. The sequence of events involving maturation of an ovum, ovulation and menstrual flow constitutes a cycle called the menstrual cycle. the menstrual cycle comes to an end at the age of about 45-50 years and this phase in the life of the female is called menopause. Menopause marks the and of the reproductive phase in the life of a female.

4. The body cells of every human individual, whether male or female, possess 23 pair of chromosomes. Of these 23 pairs, 22 pairs of chromosomes are similar in all respects. However 23rd pair is different. The chromosomes of 23rd pair are called sex chromosomes. In females, these chromosomes are 22 + XX pairs of chromosomes and in males they are 22 + XY pairs of chromosomes. When female gametes (eggs) are produced, each egg contains 22 + X and 22 + X chromosomes. The males on the other hand produce male gametes (sperms) having 22 + X and other having 22 + Y chromosomes. During fertilization, the sex of the unborn gets decided as shown in the given figure. From this it is clear that all children will inherit an X chromosome from their mother regardless of whether they are boys or girls. Thus, the sex of the children will be determined by what they inherit from their father.

   A child inheriting an X chromosomes from the father will be a girl and the one who inherits Y from the father will be a boy.

HOTS Questions

In males it is testosterone hormone whereas in females it is estrogen hormone.

Chapter-9 : The Study of Biodiversity

A. 1. d. Extinct species, 2. a. Endangered species, 3. d. 1972, 4. c. Dinosaur, 5. c. Endangered plants and animals

B. 1. F, 2. T, 3. T, 4. T, 5. F

C. 1. hot spots, 2. 1986, 3. animals, 4. habitat, 5. ozone

D. 1. Biodiversity : The variety and variability of all animals, plants and microorganisms found on the earth.

   2. Vulnerable species are naturally rare or have

been locally depleted by human activities to a level that puts them at risk.

3. The species that have no living members present on earth are called extinct species, like cheetah in India, dodo in Mauritius, etc.
4. Kanha National Park is located in Madhya Pradesh.

E. 1. It is essential to conserve biodiversity because any damage to it can threaten the whole life support system including the humans.

2. Bahitat destruction affect wildlife in a big way. It pose a threat to their survival.
3. The causes of extinction of wild animals are as given :

   Pollution : Pollution of air, water, and land adversely affects many plants and animals.

   Climatic changes : Natural and human activities have led to global climatic changes. Species that are not able to adjust to the changing climate become extinct.

   Killing of animals : Many animals are killed for their meat, skin, and other body parts.

   Natural disasters : Earthquakes, floods, droughts, cyclones, tsunamis, and hurricanes also contribute to the reduction of plant and animal species in many areas.
4. During adolescence, the body undergores several changes. These changes mark the beginning of puberty. At puberty, the boys and girls start becoming capable of reproduction. The period of puberty ends when an adolescent becomes mature for reproduction.
5. The Red Data Book provides all the information on the threatened species of plants and animals. The list of rare and/or endangered species along with the relevant information from all over the world is called IUCN Red List.

F. 1. The factors that are posing serious threat to the long established biodiversity are :

   (i) Increase in population : The uncheck rise in human population is one of the major cause for the loss of bio-diversity.

   (ii) Deforestation and overgrazing : Large scale cutting of trees for construction work, agricultural purposes, industrial purposes, and overgrazing by the increased population of animals also harm bio-diverstiy.

   (iii) Industrialisation and urbanisation : Increased industrialisation and urbanisation has caused increased air and water pollution. It is feared that in the next 2-3 decades about 25% of the biodiversity will be endangered.

   (iv) Poisoning of biodiversity : The excessive wastes from homes, agriculture and industries has caused pollution of air, water and soil. This has led to the loss of biodiversity.

   (v) Habitat destruction : Due to industrialisation, deforestation, construction of dams, mines etc, a large number of habitats has been destroyed. This also had led to the loss of biodiversity.

2. The preservation and careful management of plant and animals species in order to prevent their extinction is called conservation. Conservation is necessary for the following reasons :

   Plants and animals are important to each other, to human beings as well as to the environment in which they live. All the components of our environment maintain and ecological balance. Different organisms are dependent on each other directly or indirectly.

   Plants are a source of food (cereals, vegetables, pulses, fruits, nuts, oils, tea, coffee and spices), medicines, fodder, fibres, timber, fertilizers, rubber, etc.

   Plants are a source of food (cereals, vegetables, pulses, fruits, nuts, oils, tea, coffee and spices), medicines, fodder, fibres, timber, fertilizers, rubber, etc.

   Animals provide a number of products such as meat, fish, egg, milk, honey, ivory and silk.

   Biodiversity is also important in the following wasy :

   - help to regulate climate, rainfall and wind

- Purify air and water Help in cycling of nutrients
- Help to preserve fertile soil
- Form food chains and foodwebs; thereby maintaining a balance in the availability of food to all life forms :

3. (i) Project Tiger is a centrally sponsored scheme launched in 1973 by the Indian Board of Wildlife to :

   Ensure maintenance of available population of tigers in India.

   Preserve the areas of such biological importance as a national heritage for the benefit, education and enjoyment of the people.
4. Endangered species are those that are considered in imminent danger of extinction. The Sikkim stag, the turtles (green), vultures, dolphins, crocodiles and tigers headed ducks are examples which have become endangered species in recent times.
5. A national park is a habitat for particular wild animals species where foresting, grassing or cultivation is prohibited.

   A wildlife sanctuary is generally species oriented where cutting of trees for timber and other forest is permitted with specific instructions so that the well-being of wild animals does not suffer.

HOTS Questions

1. Yes Cutting of forests pose a great threat to diversity. To conserve biodiversity as well as forests we should banned the cutting down of trees.
2. In a zoo animals are kept in captivity whereas in a wildlife sanctuary, they roam freely in natural conditions.
3. This is not a good thought. A sapling may not grow into a fully grown tree in all the/cases. Thus, in the long run the number of trees in the forest may decrease substantially.

Things To Do

PUZZLE

1. Which endangered animal is the symbol of Word Wildlife Fund (WWF) ? To get the answer, solve this puzzle and read the circled letters.

   1. SHEEP 2. PEACOCK
   3. CENGUIN 4. CROCODILE
   4. BEAE

Unit-IV : Moving Things, People and Ideas

Chapter-10 : Force, Friction and Pressure

A. 1. d. All of these, 2. d. Newton, 3. a. Gravitational force, 4. d. Left direction, 5. a. Frictional force, 6. d. Iron, 7. c. Glass, 8. b. Muscular force

B. 1. F, 2. F, 3. F, 4. F, 5. F, 6. T, 7. T, 8. F, 9. T, 10. T

C. 1. Spring balance, 2. muscular, 3. Friction, 4. increases, 5. contact, 6. Glass-U-tub, thistle funnel, 7. area, 8. Pointed, 9. Pascal, 10. Sliding

D.

Column A	Column B
1. Earth revolving around the Sun	e. Gravitational force
2. A force applied by touching	a. Contact force
3. Force between two charged objects	f. Electrostatic force.
4. Bloating of the tube of a cycle-tyre	b. Air pressure
5. Force applied per unit area	d. Pressure
6. Pressure that balances blood and fluid pressure in our body	c. Atmospheric pressure

E. 1. It is a kind of force. Others are examples of force.

   2. It is an example of contact force. Rest are types of non-contact force.

F. 1. Force is defined as a push or pull acting on a body which tends to change its state of rest or of motion.

   2. If two forces are acting on an object in the same direction, the net force on it also acts in the same direction.

      If two forces act on an object in the opposite directions, the net force acting on it acts along the direction of the larger force.

   3. The force which acts on a body either directly or through some connector is called contact forces.

4. Force of friction :
   Is the force which slows down the motion of a moving body which is in contact with the another body. This force always opposes the motion.
5. Gravity is a force that attracts a body towards the centre of the Earth, or towards any other physical body having mass.

G. 1. Few examples where force is applied as a pull are : opening a door; lifting a pen; opening a drawer; grabbing something from the ground; and pulling a vehicle or an object.
2. Kilogram force is the force required to vertically lift a body having a mass of 1 kg. Simply we can say, the force of gravity acting on 1 kg mass is one kgf.
3. Following are the four effects a force can produce :
   1. It can change the direction of a moving object. For example, while playing table tennis, a player hits the ball with his racquet and changes its direction. Another example can be, when we move a strolley bag, we can easily change its direction by applying force.
   2. It can change the speed of moving object. For example, when we ride a bicycle, we can change the speed of the bicycle by applying force on pedals.
   3. It can change the shape of the object. For example, while making a pizza base, the dough is flattened to get a flat pizza base. The clay can also be moulded into any shape.
   4. It can stop a moving object or even move a stationary object. For example, when we give acceleration to a car, we are applying force, and as a result, the car moves. Similarly, when we apply brakes, again, using force, the car stops.
4. Following are the advantages of friction.
   (i) In the absence of friction, a nail cannot be fixed into the wall. So, friction helps in fixing the nails.
   (ii) Without friction it is not possible to walk. There is very little friction between banana skin and ground, that is why we slip easily.
   (iii) Friction between the matchstick and the side of the matchbox helps in igniting the matchstick.
   (iv) Cars, buses and scooters can move due to the friction between tyres and the road.
   (v) Writing on paper is possible because of the friction between paper and the pen.
   (vi) Brakes of bicycles, scooters, buses, etc work because of the friction between brake shoe and the wheel.
   (vii) Parts of machines move on each other because of friction. In the absence of friction they would slip.
5. Cutting instruments are sharpened because due to the sharpening of the cutting edge, the area of cross section decreases and hence, the pressure exerted by the edge increases and facilitate thing.
6. A barometer is used to measure atmospheric pressure.

H. 1. The force produced by a machine is called mechanical force. Machine does not produce force on its own. Thus, we must supply it with some kind of energy to produce force. The energy of petrol is used to produce the force which is used to run a motor car engine. Energy of moving air (wind) is used to produce the force which rotates the wind turbines for grinding wheat. Sail boat also used the energy of wind to produce the force which moves the boat. Flowing water has kinetic energy. This energy is used to produce necessary force which runs the electric generators to produce electric current.
2. According to modern theory, the friction is due to intermolecular interactions of two surfaces at the point of actual contact.
   When a body is placed on the surface of another body, then due to friction in their surfaces, the area of actual contact is very small as compared to the area of their surfaces. At the points of actual contact the molecules are very close to each other and strongly attract each other resulting in

interlocking of both surfaces. When we attempt to move one body over the other, the bonds of attraction oppose the motion and this opposing force is called the force of friction. That is why the force friction is measured by external force required to break the bonds of attraction between two surfaces in actual contact.

3. The relation between force and pressure is as given :

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

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

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

   '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.

4. Streamlining refers to a design that presents very little resistance to a flow of air or water, increasing speed and ease of movement.

   All automobiles, aeroplanes and space launch vehicles are specially designed to minimize the effect of friction of air.

5. When the external force is increased slowly, the value of static frictional force also increases and a stage comes when the body is just about to move. As external force is slightly increased from this value, then the body starts sliding over the surface. The force of friction which acts when the body is just at the verge of sliding on the surface is called limiting fractional force or limiting fraction.

   The laws of limiting fraction are as given under :

   (i) Limiting friction acts in the direction opposite to the direction of applied force and always opposes the motion of object.

   (ii) Limiting friction depends on the nature of surface in contact with each other.

   (iii) Limiting friction is independent of area of contact between two surface.

   (iv) Limiting friction increases with the increase in the weight of the body and vice versa.

HOTS Questions

1. The gravitational force of the Earth is greater than that present between you and the building; this is the reason the Earth will pull you with a large pores and you will not be pulled towards building.
2. Heavy vehicles have broad tyres because broad tyres have large area of contact and less pressure on the ground. Because of this, heavy vehicles (like tractor) can move even on soft roads and fields without sinking.

Chapter-11 : Sound

A. 1. c. Sounds, 2. b. time period, 3. c. Hertz, 4. c. 300, 5. c. 340 m/s

B. 1. T, 2. F, 3. T, 4. T, 5. F

C. 1. characteristics, 2. oscillations, 3. oscillation, 4. noise

D. 1. Sound is produced by any vibrating material body and is felt by us only when these vibrations reach out our ears.
   2. The maximum displacement of a vibrating body from its mean position on either side of the mean position, is called its amplitude.
   3. Sound travels through air at about 300 metres per second (m/s).
   4. Noise is an unpleasant sound.

E. 1. We can explain this with the help of given activity.

   A vibrating body produces sound.

   Take a wide stripe or a metal scale and hold its one end firmly on the table with your hand. Flick the free end of the scale with the other hand. Let it go. The free end of the ruler vibrates and produces some sounds.

   2. Characteristics of sound are as given below :

   The amount of energy that flows normally per unit area across the surface at a given point is called the intensity of sound. It is measured in

watt/m2 (wm2). Loudness is related to the intensity. Loudness of a sound depends on the amplitude of vibration. Vibrations of small amplitude produce soft sounds. The greater the force exerted to produce the vibrations, the greater is the amplitude produce loud sounds.

Intensity level is expressed in decibels (symbol : db).

Frequency and pitch

We know that frequency means number of oscillation per second. And a high pitch sound has a high frequency and a low pitch sound has a low frequency.

Sound of high pitch are women's voice or shrill voices and sounds of buzzing mosquitoes.

Sound of low pitch are men's voice, roar of a lion or the beating of drum.

Quality or timbre

Quality or timbre is the characteristic of sound by means of which you can distinguish between two notes of the same intensity and pitch but produced by two different instruments, for example, we can find out whether a given sound is being produced by a sitar or a violin.

3. A medium is required for sound to travel. Sound vibrations need a material to travel through. The material is called the medium. If there is no medium, vibrations cannot reach us.

   The particles in air carry the sound vibrations through changes in pressure. Sound travels slower in gas than in liquids and solids because the particles are further apart so they collide less often. Sound can travel through solids, liquids and gases.

4. Some methods of controlling noise pollution are as follows :

   Planning land use or reduce noise : For example, making tree-lined buffer zones between residential colonies and roads with heavy traffic; locating noise-producing factories far away from cities.

   Reducing noise emissions by developing low-noise products, for example, better silencers for automobiles.

   Measures such as screens and enclosures around machinery to obstruct the path of noise. This helps people working in and living near factories. Ear plugs for people working in high noise-producing industries.

   Measures at home such as double-glazed glass in windows to keep out noise.

   Control over recreational noise, such as use of loudspeakers. Certain areas such as hospitals and educational institutes to be declared no-horn zones.

   Increasing public awareness by providing factual information of the harmful effects of noise from blowing horns, loud music and TV, so that people themselves reduce noise generation.

HOTS Questions

1. We can only see an explosion that occurs on the moon. We cannot hear it. This is so because there is no air on the moon, and sound needs a medium to travel.
2. The blind-folded person can guess by the sound that which player is closest to him.

Unit-V : How Things Work

Chapter-12 : Electrolysis and Its Applications

A. 1. a. Distilled water, 2. d. All of these, 3. a. Electrolysis, 4. d. All of these

B. 1. T, 2. T, 3. F, 4. F, 5. T

C. 1. Electricity that moves from one place to another is called current electricity.
   2. A continuous and unbroken circuit is needed for the electricity to flow through.
   3. Positively-charged ions are called cations.
   4. Gold and silver plating is done on jewellery and gift items.
   5. At anode : Cu (s) ® Cu2 + (aq) + 2e goes in the solution.

D.

Column A	Column B
1. Cathode	c. Negative electrode
2. Electrolyte	d. The liquid that conducts electricity and undergoes

decomposition.

3. Electroplating — a. The process used for coating metal objects with a thin layer of a precious metal.
4. Electrolytic cell — e. Used to carry out electrolysis
5. Ion — b. An atom or a molecule with electric charge.

E. 1. The materials which allow electric current to pass through them are called good conductors of electricity. On the other hand, materials that do not allow electric current to pass through them easily are called poor conductor of electricity.
2. Electric current is the flow of electrons.
3. A conduction tester is a device used to determine whether a substance is a good or poor conductor of electricity.
4. The method of purifying metals by using electricity is called electrorefining.
5. The process of depositing a thin layer of any superior metal over an object of a cheaper metal, with the help of electric current is called electroplating.

F. 1. To test the conduction of electricity through liquids.

Take the conduction tester you have made and insert the two free ends of the wires of tester in different liquids such as salt solution, sugar solution, honey, tap water and distilled water. After testing, it was found out that tap water and solutions of acids, bases and salts are good conductors of electricity as bulb glows in their case.

2. Take a beaker a fill with acidic water in it. Jain two electrodes positive and negative. Now join the electrodes with bulb by wire. You will observe that the bulb glows. This proves the conduction of electricity through acidic solution.
3. The chemical effect of electric current is the phenomenon of causing chemical changes by passing electric current. When on electric current. When an electric current is passed through a solution of a substance or in its molten state, the substance undergoes a chemical and breaks up into its constituents.
4. To study the chemical effect of current on water.

Take out two carbon rods from the two discarded cells. Instead of carbon rods you can also take two iron nails. Clean the metal caps on carbon rods with sandpaper. Wrap one or two rounds of copper wires around the metal caps and join the other ends of the wires to the two terminals of the battery. The carbon rods or iron nails are called the electrodes. Now take a beaker half filled with water. To it add a teaspoonful of salt or lemon juice to make water more conducting. Immerse the two electrodes in this solution.

When electric current is passed through water, oxygen gas bubbles are produced at the electrode connected to the positive terminal of the battery and hydrogen gas bubbles are produce at the electrode connected to the negative terminal of the battery.

It can be checked that the gases evolved are hydrogen and oxygen. Where did these gases come from? What does this indicate? The gases come from waterelectric current breaks up water into its constituent gases, hydrogen and oxygen. This observation, therefore, shows that electric current has a chemical effect on water.

(NOTE : The amount of salt added should be very small. If a concentrated solution of salt in water is electrolysed, hydrogen and chlorine gases are evolved, instead of hydrogen and oxygen.

This activity shows that an electric current can bring about a chemical change.

The process of breaking up of an electrolyte, chemically on passing an electric current through it is called electrolysis.

HOTS Questions

1. LED uses less electrical energy than an electric bulb.
2. No, mercury is not an electrolyte.
3. When copper sulphate is dissolved in water,

the ions dissociate and conduct electricity.

4. Yes it is true that copper conducts electricity through electrons, whereas salt solution conducts electricity through ions. The common thing is any material with free movement of electrons conducts electricity. Ion is an atom or molecule having total number of electrons not equal to total number of protons. Ions are charged prticules either positive or negative. Electrons are negatively charged particles. In copper there are no ions but electrons are present and the flow of these electrons help to conduct electricity and in salt solution ions are present.

   Negative ions move towards the abode and positive ions moving towards cathode simultaneously help electrons to move freely around the circuit which in turn tead to electrical conductivity.

Chapter-13 : Lightning and Earthquakes

A. 1. a. C.F. Richter, 2. c. Richter scale, 3. a. Seismic focus, 4. d. All of these, 5. b. Electric charge

B. 1. T, 2. F, 3. F, 4. F, 5. T

C. 1. lightning, 2. lightning conductor, 3. seismograph, 4. harmless, 5. symmetrical

D. 1. Plate joint is a place where two tectonic plates meet each other. It is a weak zone which can easily give way to earth quakes.

2. Seismic zones are the fault zones where earthquakes originate.

3. The earthquake of magnitude between 0 and 3.5 are often called micro-earthquakes.

4. Earthquakes of measure 7 or above on Richter scale are called major earthquakes.

E. 1. An earthquake is a sudden shaking or trembling of the Earth which lasts for a very short time. It is caused by a disturbance deep inside the Earth's crust.

2. We should not stand under a tree during lightning because.

   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 us.

3. Benjamin Franklin.

4. Lightning conductor

F. 1. The clouds get charged when water and ice particles move rapidly inside the clouds. As the particles move, they become oppositely charged and separate. Due to some reasons unknown till now, the positively charged particles move the upper part of the cloud and the negatively charged particles rest at the lower part of the cloud. The negative particles at the bottom of the cloud grow bigger and bigger and get attracted to the positive charges on the ground.

   When attraction between the opposite charges becomes strong, electricity (electrons) flow from the clouds to the ground. Though the air in between the clouds and the ground is a poor conductor of electricity but the attraction between the opposite charges on the cloud and the ground becomes so large that the air has to give way to the lightning strike. Lightning lasts only for a fraction of second, but is energy-filled and very hot. The heat of lightning causes thunder. As the hot electrical discharges passed through air, it heats up the air. The suddenly heated air expands quickly and creates the loud noise that we call thunder.

2. There are about 20 plates (or tectonic plates) along the surface of the earth that move continuously and slowly past each other. When the plates squeeze or stretch, huge rocks form at their edges and the rocks shift with great force, causing an earthquake.

   As the plates move, they put forces on themselves and each other. When the force is large enough, the crust is forced to break. When the break occurs, the stress is released as energy which moves through the earth in the form of waves, which we feel and call an earthquake.

3. A lightning conductor is made up of a thick metal (copper) strip. One end of this metallic strip is fixed over the highest point of the building pointing towards the sky. The top end of the lightning conductor is shaped like a spike. The lower end of it is joined to the metal

plate that is buried deep in the ground.

If lightning strikes, it hits the conductor rather than the building, and the electric charges pass down the metal strip into the ground through the plate. If the metal strip was not present the charge would pass through the walls of the building, causing damage to the materials and making the walls unsafe.

4. To minimise the dangers of lightning, following precautions must be followed :

   During lightning and thunderstorm, 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, sit low on the ground. Keep your hands around your knees with your head between the hands.

   Electrical appliances like computer, 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. 1. If you are indoors, drop down to the floor. Take cover under a study desk, table or other furniture. Hold on to it and be prepared to move with it. Hold the position until the ground stops shaking and it is safe to move. Stay clear of windows, fireplaces, and heavy furniture or appliances that may fall over. Stay inside to avoid being injured by falling glass or building parts. If you are in a crowded area, take cover where you are. Stay calm and encourage others to do likewise. If you are in bed, do not get up. Protect head with a pillow.
   6. If you are driving a car, stop if it is safe, but stay inside your car. Stay away from bridges, overpasses and tunnels. Move your car as far out of the normal traffic pattern as possible. If possible, avoid stopping under trees, light posts, power lines or signs.

HOTS Questions

1. Taller buildings are closer to the clouds. The buildings have metallic pole and structures which provide a low resistance path for electric discharge. Hence, the taller buildings are in great danger of being struck by the lightning.
2. This is so because the moisture present in the air carries away the charge.
3. This is so because these type of houses does not sway or break off easily. They are also flexible as well as strong.

Chapter-14 : Light and Vision

A. 1. b. Dispersion, 2. a. Less than 90°, 3. d. Between F and O, 4. a. Less than the real depth, 5. c. Higher in medium X than in medium Y, 6. a. Convex lens, 7. c. red

B. 1. F, 2. T, 3. F, 4. T, 5. F, 6. T, 7. T, 8. F, 9. T, 10. T

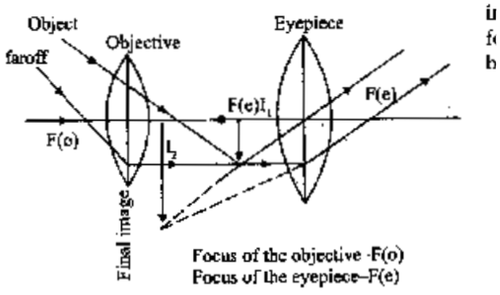
C. 1. If light travels from water to air, it bends towards the normal.
2. A thin lens has a bigger focal length.
3. The far point of a hypermetropic eye is at a 80 cm distance from the eye.
4. An astronomical telescope forms an inverted image of an object.
5. Concave lens is used to correct myopia.
6. A ray of light passing through optical centre point does not undergo any deviation.
7. Refraction is the ratio of speed of light in vacuum to that in a medium.
8. The speed of light in transparent substances is lesser than that in air.
9. The ability of the eye to focus on near or distant objects is called power of accommodation.

10. As light travels from a denser medium to a rarer medium, it bends away from the normal.

D. 1. Rays are portions of lives which start at a point and goes off in a particular direction to infinity.
2. A beam of light is a directional projection of light energy radiating from a light source.
3. The ability of a material to refract light is called its optical density.
4. Raman effect states that when a beam of light is scattered by a transparent liquid, the scattered light contains a frequency of very low intensity not present in the incident radiation.
5. The separation of white light into its constituent colours by a prism is known as dispersion.

E. 1. The speed of light in air is 299, 792 km/s, in water it is 255,000 km/s and in glass it is only 180,000 km/s.
2. Laws of refraction state that : The incident say, reflected say and the normal, to the interface of any two given mediums; all lie in the same place. The ratio of the sine of the angle of incidence and sine of the angle of refraction is content.
3. Cameras, telescopes, microscopes and binoculars.
4. A microscope is an optical instrument used to examine the details of tiny objects, such as bacteria, cells, viruses, composition of rocks, etc.
5. 'Least distance of vision' is the closest some one with 'normal' vision can comfortably look at something. 25 cm is the least distance of vision for normal human eye.
6. The eye allows us to focus the images of all objects on retina irrespective of their distance from the eye. The power of eye lens to change its focal length is called power of accommodation.

F. 1. In the sky, after rain, each drop of water acts like a prism and when the white light of the sun falls on them, it splits into its component colours, i.e., VIBGYOR. This is because they bend by different amounts while passing through drops of water. Red light bends the least, violet bends the most. The rays of each colour, while emerging, take slightly different paths, thus being distinct. It is this band of distinct colours that we see as a beautiful rainbow.
2. A real image is always inverted whereas a virtual image is always erect. A real image is formed when the rays of light after reflection or refraction actually meet at some point whereas a virtual image is formed when the rays of light after reflection or refraction appear to meet a point. A real image can be obtained on a screen. A virtual image cannot be obtained on a screen.
3. If we join a number of quadrilateral and two triangular prisms to obtain a smooth and composite form as a single piece which can focus light, this piece is called a convex lens. A convex lens is thicker in the middle and thinner at the edges.

   A convex lens, by virtue of its shape, can focus, i.e., bring together, all rays to a point on the other side of the lens.
4. If we join a number of quadrilateral prisms to obtain a smooth and composite form as a single piece which can diverge light, this piece is called a concave lens.
5. 

HOTS Questions

1. A spectrum is formed due to the breaking up of light into many other light rays due to variation in wavelength. But a monochromatic ray won't break so there will be no spectrum. The same say will pass as it is.
2. As rays of all colours emerge in the same direction i.e., the direction of the incidence of white light, there is no dispersion.

Chapter-15 : Stars and the Solar System

A. 1. d. 4.3 light years, 2. Ursa Major, 3. d. Venus, 4. b. asteroids

B. 1. T, 2. F, 3. F, 4. F, 5. T

C. 1. constellation, 2. Mars, 3. stars, 4. satellite, 5. Juptier

D.

1.	Inner planets	b.	Venus
2.	Outer planets	d.	Saturn
3.	Constellation	a.	Great Bear
4.	Satellite of the Earth	c.	Moon

E. 1. A star twinkles whereas a planet does not twinkle.

2. Stars give out heat and light because they are made of gases which burn and undergoes chain reactions to emit heat and light.

3. The sun and the celestial bodies which revolve around it form the solar system. It consists of large number of bodies such as planets, comets, asteroids and meteoroids.

4. Venus is the hottest planet because unlike Mercury it has its own atmosphere that is rich in greenhouse gases such as carbon dioxide. The greenhouse effect make its atmosphere extremely hot.

5. You can locate the pole star with the help of Ursa major with the given activity.

Find the constellation Ursa Major in the sky on a clear moonless night. You can easily found it during summer at about 9 pm. Look towards the northern part of the sky and identify Ursa Major by its shape of ladle/spoon. Look at the sky stars at the end of Ursa Major. Imagine a straight line passing through these stars. Extend this imaginary line towards the north direction about five times the distance between the two stars. The line will lead to the pole star. The Pole star is not bright. Observe the Pole star for some time.

F. 1. Difference between stars and planets.

	Stars		Planets
1.	Stars emit their own light but appear less bright than planets.	1.	Planets get light from the Sun and reflect it but appear brighter than stars.
2.	When seen from the Earth, the stars twinkle.	2.	Planets do not twinkle.
3.	Massive in size.	3.	Much smaller than stars.
4.	Made up of hot gases.	4.	Most planets are made up of rocks.
5.	Have very high temperature.	5.	Have low temperatures.

2. I. Ursa major (Great Bear)

One of the most famous constellations which you can see during summer time in the early part of the night is Ursa Major. There are seven prominent stars in this constellation. It appears like a big ladle (spoon). There are three stars in the handle of the ladle and four in its bowl.

II. Orion

Orion is one of the most magnificent constellations in the sky. It can be seen during winter in the late evenings. It also has seven or eight bright stars and several faint stars. Orion is also called the Hunter. It Indian name is Mriga. Four bright stars mark its belt. Other faint stars complete the picture of the hunter.

3. I. Venus : Venus is about the same size as the Earth and is the closest planet to the Earth. It appears bright due to its cloudy atmosphere, which reflects almost 75 per cent of the sunlight that falls on it. It is the brightest planet in the night sky. Sometimes, Venus appears in the eastern sky 1 to 3 hours before sunrise. Sometimes, it appears in the western sky 1 to 3 hours after sunset. Therefore it is often called a morning star or an evening star, although it is not a star.

II. Saturn : It is the second largest planet. It is seen in the sky with unaided eye as a bright yellow planet. Three wide rings surround this planet. These rings are not visible with the unaided eyes but can be seen with the help of a small telescope. These rings are made of ice and dust. Saturn has a density less than that of

water and that makes it the least dense planet among the planets. It also consists mainly of hydrogen. It is very cold. Saturn has a large number of moons.

4. Meteoroids are chunks of rocks (fragments of comets or shattered asteroids) floating in space which occasionally enter the Earth's atmosphere. At that time it has a very high speed. They experience a lot of friction of air and the friction heats them up. They glow and appear like stars but they burn to give a large amount of heat and light energy, which appears as a streak of light which is called a meteor. They evaporate quickly. That is why the bright streak lasts for a very short time.

   However, some meteors are so large that they do not completely burn and evaporate before they reach the Earth's surface. The unburnt part of a meteor that reaches the Earth is called a meteorite.

5. Artificial satellites are useful to us in following five ways :

   They are :

   I. used in remote sensing (collecting information from a distance) collecting information about the other planets, stars and other celestial bodies.

   ii. used in weather forecasting, i.e., in predication of storm, rainfall, snowfall, etc.

   iii. used in long distance communication such as in telephones, fax, internet, etc.

   iv. in transmitting television and radio signals

   v. used in agricultural monitoring, i.e., crop disease, crop failure, etc.

HOTS

1. No, on Venus it will be the opposite because unlike the Earth, Venus rotates from east to west on its axis.
2. Equal to our age.
3. No, we cannot light a five on the moon to light a fire, we need oxygen and there is no oxygen on the moon.
4. If the planet Saturn is inserted in water, it will float. This is so because it has a density less than that of water.

Unit-VII : Natural Resources

Chapter-16 : Intervention of Human

A. 1. b. Wood, 2. b. LPG, 3. b. Coke, 4. b. Conservation, 5. a. CNG

B. 1. T, 2. T, 3. T, 4. T, 5. F

C. 1. important, 2. forests, trees, 3. fossil, 4. fossil, 5. Coal gas, 6. rock oil, 7. compressed natural gas.

D. 1. We need to conserve our forests because they are very important to us. They regulate our temperature, reduce air pollution and give us a large number of useful products. The Earth would be lifeless without forests.

   2. A fuel is a material that can be used to produce heat. The fuels possess stored potential energy. When they are burnt, a considerable amount of this energy is released or in the combined state.

   3. The slow process of conversion of dead vegetation into coal is called carbonization.

   4. Petroleum is a natural resource formed by the dead organisms living in the sea. Millions of years ago a large number of dead marine animals living in sea flowed down to the sea bed. For a long period of time, layers of sand and clay got accumulated on them. Tremendous pressure and heat slowly converted the dead remains to petroleum and natural gas. Thus, petroleum and natural gas were formed from compressed organic matter.

   5. We can prevent energy crisis by the following :

E. 1. The steps for conservation of forests are :

   We should not cut trees unnecessarily. People should be made aware of the utility of forests and trees. They should be encouraged to plant trees.

   Cutting of trees from the forests should be done by the permission of the government and illegal cutting should be declared offensive.

   Only those trees should be cut which are dead or are very old trees.

   Cattle should not be allowed to graze in the forest. When animals graze, they pull the grass from its roots, but if that grass is cut manually, it is cut from above the soil area,

roots again give rise to new grass. This prevents soil erosion and solve the purpose of the people also.

People should not be allowed to kindle any kind of fire in the forest. Fire destroys trees and grass in the forest.

We should look for alternatives of the wood like metals or plastics for making furniture, doors and windows.

2. The process of recycling of paper includes the following step :
   (i) Sorting : Paper is first sorted and any plastic, metallic or other contaminants are removed from it.
   (ii) Making pulp : The sorted paper is sent to the pulper where it is heated with warm water and chemicals. Here the paper breaks down into tiny pieces and strands of cellulose fibres which are free from lignin.
   (iii) Filtering and deinking : The pulp obtained from the pulper has only 1.0 to 1.5% fibre. Kaolin and other additives are added to the pulp to enhance the properties of paper. The pulp is then filtered through a number of sieves to remove impurities such as coatings, contaminant, etc. Sometimes, the pulp is deinked to remove printing ink from it. The dinked pulp is then bleached to make the end produce white.
   (iv) Rolling and drying : The pulp, now free from any contaminant, is mixed with wood fibre also called virgin fibre to provide strength and smoothness. It is then passed through wire screens where water is drained out and sheets of paper start forming. Thee sheets are passed through a series of rollers and dryers which squeeze, press and smoothen the watery sheets to get the desired finish.
3. Various uses of coal are as following :

   Coal is used to generate electricity world wide as it is the largest source of fuel.

   Coal is used to form many products such as coke, coal tar.

   Coal is used to make steam for heating.
4. Various use of petroleum are as given under :

   Kerosene is used as a fuel for stoves lamps and also in jet aircraft.

   Diesel is used as a fuel for heavy motor vehicles and electric generators.

   Lubricating oil is used in several lubricating purposes.

   Paraffin wax is used in candles, vaseline and ointments.

   Bitumen (Asphalt) is used for making roads and paints.

   Petrochemicals obtained from petroleum are used in the manufacture of detergents, polyester and nylon fibres, polythene and other man-made plastics.
5. Nowadays natural gas is widely used for cooking. Natural gas is compressed and stored under high pressure in hard cylindrical or spherical containers, for distribution. It is then known as Compressed Natural Gas or CNG. It is distributed to homes and industries through pipes. In India, such a network of pipelines is found in Vadodara in Gujarat and in some parts of Delhi. CNG is now used as a fuel in transport vehicles such as trucks, auto-rickshaws, taxi cabs, vans and heavy duty vehicles like buses. It is also used to run central heating and cooling systems and cloth dryers. It is used for generating electricity through gas turbines and steam turbines.

   Natural gas is also used as a starting material for manufacturing a number of chemicals and fertilizers.

HOTS Questions

1. Coal and petroleum are classified as non-remunerable resources because they take millions of years in their formation.
2. It is advised to use a clean domestic fuel because it prevents pollution as well as respiratory diseases.

Chapter-17 : Pollution-Air and Water

A. 1. b. Asthma, 2. b. nitrogen, 3. c. Biological treatment for the sewage should be carried out.
4. c. Carbon monoxide, 5. c. Heavy metal ions, 6. d.

Reverse osmosis

B. 1. F, 2. T, 3. F, 4. F, 5. T

C. 1. The air is also required for the process of combustion (burning) of fuels.
2. SPM stands for suspended particulate matter.
3. Air pollution has the most adverse effect on the human respiratory system.
4. The water we use at home is mainly supplied by rivers.
5. Water is boiled at 100°C for at least 10 minutes to kill the pathogens.

D. 1. Minute solid particles suspended in air are known as suspended particulate matter or SPM. Unburnt carbon particles given out during the burning of fuels of from the exhausts of vehicles, and fine particles of cement given out from a cement factory are examples of SPM.
2. It consists of minute particles of silica, alumina, oxides of iron, calcium and magnesium besides heavy metals like lead, arsenic, copper and cobalt that are very toxic.
3. Stomata are the small pores present on the leaves of the plants. These help in breathing.
4. Acid rain may be defined as the rain water containing sulphuric acid (H_2SO_4) and nitric acid (HNO_3) which are formed from the oxides of sulphur, nitrogen and carbon present in the air as pollutants.

E. 1. The harmful effects of air pollution are as following :
(i) On human beings : They suffer from respiratory diseases like bronchitis, asthama, lung cancer etc.
(ii) On animals : The cattle, pigs, dogs and chicken are particularly effected especially by hydrogen sulphide.
(iii) On plants : The plants have small pores called stomata on their leaves. These help in breathing. The pollutants block these pores when they get deposited on leaves. This leads to death of plants.
(iv) On atmosphere : The concentration of carbon dioxide and other gases like carbon monoxide, hydrogen sulphide etc is increasing. This is resulting in the increase of temperature causing global warming. It is very harmful as it can melt the polar ice causing floods and submerging all coastal areas.
(v) On monuments and buildings : Acid rain and smog can damage historical monuments.

2. Harmful Effects of Acid Rain
Acid rain is harmful in many ways.
Buildings made from lime stone, marble, dolomite, mortar and slate got weakened on reaction with acid rains.
Acid rain adversely affects the aquatic animals. It increases the acidity of water in lakes. It causes death of many species such as salmon fishes.
Acid rain cause corrosion of metallic surfaces.
Acidic water is dangerous for plants. Leaf pigments are decolourised, acid effects green pigment (chlorophyll) of plants.

3. Sea water is not fit for drinking becaue it contains a large amount of salt dissolved in it.

4. Water can be purified at home by the following methods :
Alum is added in water containers and water is left undisturbed for few hours. The suspended impurities settle down through the process known as loading. The clean water is then separated by decantation.
Water is boiled before drinking. If water is boiled for about 20 minutes at about 100°C, the germs present in it are killed.
Water filters with porcelain candles are used. Once water passes through these candles the impurities are filtered out and clean water flows through the candles.
These days UV (ultraviolet) filters are attached to the taps. The germs present in water are killed by UV rays.

F. 1. The agents that pollute our environment are called pollutants. These include substances (e.g., smoke), chemicals (e.g., gases, metals, salts) or factors (e.g., heat, noise). These are generally waste products or by-products. Thus, a pollutant is a substance present in the environment in concentrations that are

harmful to the environment and to living organisms. Pollutants can be.

2. The trapping of the sun's heat energy by carbon dioxide and other gas molecules (nitrous oxide, methane, chloroflurocarbons etc) is known as greenhouse effect. Carbon dioxide and other gas molecules are present in the atmosphere. They allow these sun's heat to reach the earth's surface and trap it here. This enables to keep the earth's surface warm. During the day, the heat radiation emitted by sun are of very short wavelength. As a result, these can easily pass through the atmosphere and reach the earth's surface. They get absorbed here.

   The earth radiates heat radiations at night. As they are of long wavelength, they cannot pass through the atmosphere and reflected back by clouds and carbon dioxide molecules. So, the radiations get trapped and keep the atmosphere warm.

   Since last few years, the activities of man like combustion, deforestation have increased. These have resulted in increased concentration of carbon dioxide molecules in the atmosphere. As a result, more heat is being trapped causing an increase in the atmosphere temperature. This is called global warming. So greenhouse effect is the progressive gradual warning of the earth's atmosphere. Apart from carbon dioxide which is the main greenhouse gas, the proportions of other gases have also increased. Proportion is combustion of fossil fuels i.e. coal, petroleum and natural gas. Aerosols also cause the green house effect as they also have the capacity to absorb radiations apart from scattering and reflecting them.
3. Some of the ways to prevent air pollution are :
4. The characteristics of drinking (potable) water :

   Drinking water should be
   - Colourless
   - Odourless

   It should also be free from
   - Any suspended impurities
   - Any harmful germs
   - Large quantity of salts
   - Any harmful salt such as nitrates, cyanides, urea etc.
5. The suspended impurities present in a sample of water can be removed by sedimentation and decantation :

   Sedimentation : Sedimentation is a natural process in which water is allowed to stand undisturbed in large tanks called settling tanks for a few hours. This allows the mud, sand and other suspended particles to settle down. The solid particles that settle at the bottom of the tanks are called sediments. The clean or pure water is then transferred into a clean container.

   Decantation : Decantation is the process of separating a solid from a liquid by transferring the liquid carefully from one container to another, leaving the solid behind.
6. Chlorine is added to the filtered water before supplying it to the people in city because it is effective against many pathogenic bacteria that spread harmful diseases. For instance, the use of chlorine has greatly reduced the instances of water-borne diseases because it is effective against almost all bacteria and viruses.

HOTS Questions

1. Yes, acid rain does affect crops. Due to it leaf pigments are decolourised and it reduces the amount of chlorophyll which is necessary for the plant to make food.
2. This is so because CNG is a clean non-polluting fuel. Also due to metro, people are not using their vehicles for transportation, there by reducing the amount of exhaust of poisonous gases.
3. The ground water found near the surface of the Earth is more likely to be polluted as pollutants can easily mix with N.
4. Afforestation increases the vegetation cover on the surface. Trees control air, water and soil pollution.

5. No, there is a difference between the both. Pure water is completely pure and has no minerals dissolved in it. But potable water has minerals dissolved in it therefore it is fit for drinking.