

Nutrition in Plants

I. Answer the following questions:

- Ans.**
1. The process of obtaining and consuming food by living organisms is called nutrition. The food we eat consists of Carbohydrates, fats, protein, vitamins and minerals. These components of food are called nutrients. The process of nutrition is important for living beings because, nutrition is the process of how the body uses food to provide energy, to support growth and maintain body functions.
 2. There are two types of nutrition :
 - (i) **Autotrophic (auto-self; troph-a feeder) :** The mode of nutrition in which organisms make food themselves from simple substances is called autotrophic nutrition. Therefore, plants are autotrophs.
 - (ii) **Heterotrophic :** Animals and most other organisms take in readymade food prepared by the plants. They are called heterotrophs (heteros = other).
 3. 'Photo' means light and 'synthesis' means manufacture. Thus, photosynthesis is a process by which green plants prepare their food, by using carbon-dioxide and water in the presence of chlorophyll and sunlight. When the sun light falls on chlorophyll molecules, the energy is absorbed. The chlorophyll molecules then release the energy. This energy makes carbon-dioxide and water to combine form making food, which is stored in the plants in the form of starch. For this following test can be done.
 4. There are some plants which feed on animals. These plants are called carnivorous plants. The venus flytrap and pitcher plants are good examples of cornivorous plants. They have traps for catching insects. The leaves of a Venus flytrap are composed of two lobes hinged together in the middle. On the surface of each lobe are there trigger hair and the outer edges of the lobes are fringed with stiff spikes. When two hair of it are touched, the trap is sprung there by trapping the insect. After a few hours, the lobes push inwards, crushing the insects's body. Pitcher plants have a flap at the top of the trap to prevent too much rain from entering. In some cases, the flaps and the lid of the trap are brightly coloured to attract insects. The nectaires are situated inside the pitcher. The insects while crossing a very slippery surface, to reach them, fall into the liquid at the bottom of the pitcher.
 5. Heterotrophs use different ways for obtaining their food. Heterotrophic nutrition is classified as follows :

- (i) **Saprophytic** : Heterotrophs that feed on the dead and decomposed bodies of living things are called saprophytes. Some plants like mushroom, moulds and yeast live on dead and decaying organic matter and belong to a group of fungi they are called saprophytes.
- (ii) **Parasitic** : Heterotrophs living on other organism's bodies and deriving food from them are called parasites. The organism from which the food is derived by the parasite is called host. Parasites can be both partial or total.
- (iii) **Symbiotic** : In this mode of heterotrophic nutrition, two different organisms live together benefiting each other. Such a relationship is called symbiosis.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. Saprophytes, 2. Venus-flytrap, 3. Oxygen, 4. chlorophyll, 5. Phloem, 6. trace, 7. water-vapour

III. State whether the following are 'True' or 'False':

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

IV. Match the statements in column 'A' with those in column 'B':

Ans. 1. (i), 2. (j), 3. (e), 4. (c), 5. (a), 6. (b), 7. (f), 8. (h), 9. (g), 10. (d)

V. Name each of the following:

Ans. 1. Two types of nutrition	Autotrophic	Heterotrophic	
2. Two inorganic substances	Water	Carbon-dioxide	
3. Two saprophytes	Fungi	Mushrooms	
4. Two heterotrophs	Bacteria	Fungi	
5. Two parasitic plants	Mistletoe	Cuscuta	
6. Two carnivorous plants	Venus-flytrap	Pitcher Plant	
7. Two things needed for photosynthesis	Sunlight	Water	
8. Two things which xylem conducts to the leaves	Water	Mineral	
9. Two macronutrients	Carbon	Calcium	
10. Two micronutrients	Iron	Copper	

VI. Tick (✓) the correct option in the following:

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

VII. Differentiate between the following pairs of words :

- Ans.**
1. Saprophytes feed on the dead and decomposed bodies of living things while Parasites live in or on other organism bodies and derive food from them.
 2. The mode of nutrition in which organisms make food themselves from simple substance is called autotrophic nutrition while in Heterotrophic nutrition animals and most other organisms take in readymade food prepared by the plants.

3. Xylem conducts water and minerals from the roots through the stem to the leaves. While Phloem conducts prepared food from the leaves to different parts of the plant by plants.
4. Some minerals that are required by plants in very large quantity are called macronutrients whereas those minerals are required in very small quantity for the healthy growth in plants are called micronutrients such as iron, copper, zinc.

VIII. Give one word for the following :

Ans. 1. Saprophyte, 2. Chlorophyll, 3. Transpiration, 4. Phloem, 5. Symbiotic

2

Nutrition in Animals

I. Answer the following questions:

Ans. 1. According to their feeding habits, animals are divided into the following categories :

(i) **Herbivores** : Rabbit, hare, cow, sheep, goat, horse, deer, zebra, giraffe, elephant, etc., eat only plants and plant products. They eat green, leaves, vegetables and fruits.

Animals which eat plants and other plant products are called herbivores or plant eating animals.

(ii) **Carnivores** : Tiger, lion, leopard, wolf, etc., kill small animals like rabbit, sheep, goat and bison and eat their flesh. Animals which eat the flesh of other animals are called carnivores or flesh-eating animals.

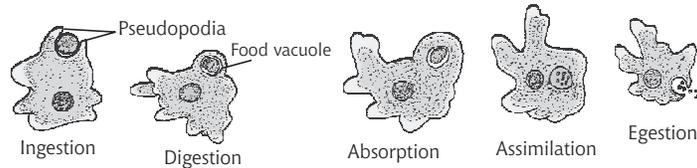
(iii) **Omnivores** : There are some animals which eat both plants and animals, they are called omnivores. Dog, eat, bear, peacock, crow, monkey, hen, cock and also human beings are omnivores.

(iv) **Scavengers** : Vultures, jackals, fox, hyenas, etc., are called scavengers because they feed on dead and rotten animals.

2. Nutrition in Amoeba

An amoeba is a unicellular organism. It lives in water. All the steps of nutrition in an amoeba are carried out by a single cell. In order to move around, the amoeba changes its shape and size to form pseudopodia (pseudo : false; podus : feet). Amoeba feeds on small microorganisms. To catch its prey, the pseudopodia are thrown around the microorganism. The food particles and some water are held within a food vacuole. The food vacuole is a structure where the food is digested also. It is absorbed and assimilated as the food. Vacuole move inside the body of amoeba.

The undigested food is released out of the body. The process of egestion takes place from any part or the surface of the body of amoeba.



3. The main steps of holozoic nutrition in animals are :

- (i) **Ingestion** : This is the process of taking in food. It includes two steps : capturing of food and eating it.
- (ii) **Digestion** : The ingested food is broken down into small units to obtain energy to carry on life processes. This process of breaking down of the bigger constituents of food into simple and smaller units, is known as digestion. This process includes both physical and chemical digestion. In physical digestion the big sized food particles are broken down into small units as far as possible. In chemical digestion, the complex substances are converted into simple and absorbable substances.
- (iii) **Absorption** : The simple substances resulted from the process of digestion are absorbed by the cells of the body.
- (iv) **Assimilation** : The body cells make use of absorbed substances in the formation of the constituent of protoplasm and in obtaining energy for them. This process is known as assimilation.
- (v) **Egestion** : In this process, the undigested food is removed or eliminated from the body.

All the above steps of nutrition take place in all animals, including simplest unicellular amoeba or the highly complex human beings.

4. Human beings are multicellular animals. In such organisms there are different tissues, organs and organ systems which carry out different functions in the body. In human beings, all the five steps of nutrition are carried out by different organs. The digestion system in humans is responsible for the ingestion, digestion, absorption, assimilation and egestion.

The lips, jaw, teeth, tongue and hands help in the process of ingestion. After ingestion, the food is broken down into simple substances that can be used by the body. It takes place in the digestive tract or alimentary canal.

5. The main parts of the digestive system are as follows :

- (i) Mouth (ii) Oesophagus or Food pipe (iii) Stomach (iv) Small Intestine (v) Large intestine.

6. To show the effect of saliva on starch. Do the following :

Take two test-tubes and put some pieces of potatoes in each of them. Add

water and label them as A and B. Add some saliva from your mouth to test-tube B. Now leave both the test-tubes in a test-tube stand undisturbed for 30 minutes.

Add 2-3 drops of iodine solution to both the test-tubes. You will observe that pieces of potatoes in the test-tube A turn blue-black, while those in test-tube B do not.

This is because the starch present in the potatoes pieces in test-tube B has been acted upon by amylase present in the saliva.

7. Energy from Food

We need energy for doing our various life activities. This energy is obtained from food. The oxygen we breathe in helps in this way. It breaks down the food absorbed in our body to release energy. This process of the breaking down of absorbed food by oxygen to release energy is known as respiration.

Digested food is absorbed in the blood. Blood helps in the transportation of the absorbed food from one part of the body to another, where they are required. The group of organs through which blood passes throughout the body, forms the circulatory system.

8. Ruminant is the name given to a grazing animal that chews its cud and has split hoofs. Animal such as cows, ox, sheep, deer etc. are ruminants.

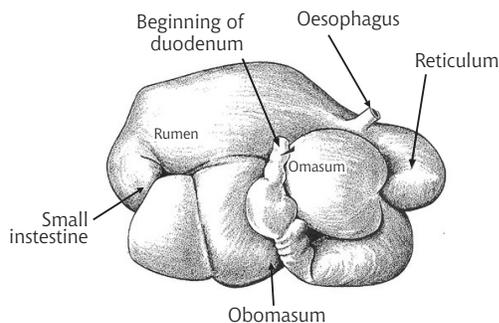
Most of ruminants have a four-chambered stomach—rumen, reticulum, omasum and obomasum such a stomach is called a compound stomach.

In ruminants the food enters the first cavity called rumen or paunch which is the largest chamber of the stomach. From here, the food enters the

second chamber, called the reticulum. In these two chambers of the food gets softened and formed into soft masses called cuds. When the animal rest, the muscles of the reticulum send the soft masses of food back to the mouth to be chewed and mixed with saliva. The animal chews the food thoroughly with a

roundish motion of the jaw. This is called the chewing of the cud. Now the cud passes through the rumen and reticulum to the third chamber called the omasum.

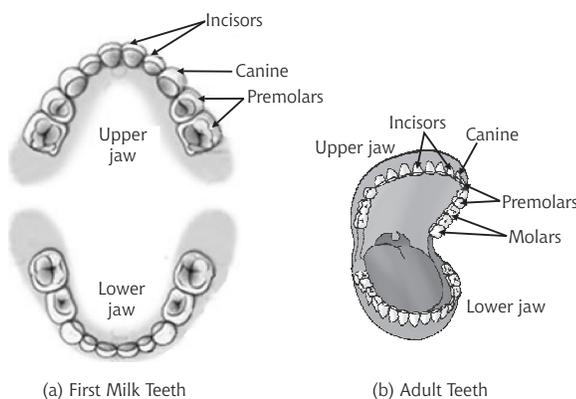
From here, the food enters the last chamber, called the obomasum. Here the food is mixed with the digestive juices. From the obomasum, the food passes into the intestine for the complete digestion.



9. Human teeth have four different kinds of teeth. They have two sets of teeth during their life time—primary teeth and permanent teeth.

Primary teeth are also called deciduous or milk or baby teeth. They begin to break down through the gums at the age of about 6 months. There are 20 milk teeth, 10 in each jaw. Each jaw has 4 incisors, 2 canines, 4 premolars and no molars.

The permanent teeth begin to erupt after the milk teeth start falling out. The first permanent tooth appears when a child is about 6 or 7 years old. Between the age of 6 and 12, milk teeth are replaced by permanent teeth. The last permanent teeth erupt after the age of 17 years



There are 32 permanent teeth, 16 in each jaw. Each jaw has 4 incisors, 2 canines, 4 premolars and 6 molars. The last molars in each jaw appear very late and are called wisdom teeth.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. mouth, 2. fats, 3. epiglottis, 4. intestine, 5. Large, 6. primary, 7. Molars, 8. ingestion, 9. pseudopodia, 10. ruminants

III. Match the statements in column 'A' with those in column 'B':

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

IV. State whether the following are 'True' or 'False':

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

V. Name each of the following:

Ans. 1. Fox, Jackal
 2. Ox, Sheep
 3. Rumen, Reticulum, Omasum, Obomasum
 4. Incisor, Canine, Premolar, Molar
 5. Diastema
 6. Incisors
 7. Molar
 8. Bile juice, pancreatic juices
 9. Mouth, foodpipe, stomach, Small intestine, large intestines
 10. Mucus Amylase

VI. Give the functions of the following :

- Ans.**
- 1. Stomach :** Stomach is a muscular bag where the food is chewed and broken down to smallest pieces in the form of semi-solid, creamy liquids.
 - 2. Small Intestine :** Enzymes present in the small intestine act on the food and complete the process of digestion.
 - 3. Large Intestine :** In the large intestine liquids and salts are absorbed and the final waste product is passed out by the body through the anus as faeces.
 - 4. Rumen in Ruminants :** Its main function is to ferment the food, there by breathing down the ruffages.
 - 5. Saliva :** Saliva acts on starch and changes into sugar called maltose. It also helps in digestion.
 - 6. Bile :** Bile makes the digestion of fats easier by breaking them into tiny droplets.
 - 7. Hydrochloric acid :** Hydrochloric acid helps to kill any bacteria in the food.

VII. Define the following terms:

- Ans.**
- (i) Enzymes :** An enzyme in the saliva of the mouth starts the process of breaking down the food.
 - (ii) Digestion :** Digestion is the way in which the food we eat must be changed into simpler substance that are easily used by the body.
 - (iii) Assimilation :** The body cells make use of absorbed substances in the formation of the constituent of protoplasm and in obtaining energy for them. This process is known as assimilation.
 - (iv) Ruminants :** Ruminant is the name given to a grazing animal that chews its cud and has split hoofs.
 - (v) Chewing the Cud :** The animal chews the food thoroughly with a roundish motion of the jaw. This is called the chewing of the cud.
 - (vi) Constipation :** If too much water is absorbed by the intestine, the faecal matter remains in the intestine for a longer time period. This results in drying and hardening of the faeces. Such condition is called constipation.

VIII. Tick (✓) the correct option in the following:

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

Fibre to Fabric

I. Answer the following questions:

- Ans.** 1. No one know exactly, why and when people started wearing clothes. By the end of the Old Stone Age, people had invented the needle which was

used to sew skins together into clothing. They had started making yarn from the thread-like parts of some plants and from fur or hair of some animals. They had also learned to weave yarn into cloth.

There are two kinds of clothing materials-natural and artificial. Fur, leather, cotton, silk, wool and flax are natural fibres. Cotton, silk and wool are most widely used for clothing.

Artificially manufactured materials are paper, plastic and rubber. These materials are less expensive than natural fibre and have certain advantages over natural ones.

2. Hair which grows from the bodies of sheep and other animals, or thread or cloth made from this are called wool.

Wool is the fibre produced from the outer coat of sheep. It has scales which overlap and it is crimped. Both the scaling and crimping make it possible to spin. They enable the individual fibres to attract each other so that they stay together. Because of the crimp, wool fabrics have a great bulk to retain air, which causes the product to retain heat. Insulation also works both ways. Because of these qualities of wool, it is useful for winter.

3. Processing of wool take place in the following steps :

- (i) **Shearing** : Removal of fleece from the sheep is called shearing. The person who removes the fleece is called shearer. The shearer remove the fleece in one piece so that its various parts can be indentified for sorting and grading.

- (ii) **Sorting and Grading** : Putting of wool indifferent groups according to the quality, is called sorting and grading.

- (iii) **Making yarn** : The wool is carded, after its dried. Carding process involves passing the wool through rollers. The teeth of rollers arrange the fibres into a flat sheet called a web. The web is then formed into strands known as slivers. The slivers are stretched into thinner strands called roving. Spinning machines then twist them into yarn.

- (iv) **Making Fabric** : Yarn is knitted or weaved into a variety of fabrics by wool manufactures. The wool fabrics undergo a finishing process and give them the derived look and feel. After the finishing process, the fabric is made into clothing.

4. Sheep breeding means improving the quality of sheep by crossing its different varieties. Its main purpose is to improve the quality of sheep to get the desired quality and quantity of fleece.

All the domestic breeds of sheep are descended from two different kinds of wild sheep. By breeding, their coarse hair was replaced by a soft coat. Depending on their fleece, there are mainly five groups of sheep. They are fine-woolled sheep, long-woolled sheep, crossbred-woolled sheep, medium-woolled sheep and coarse-bread sheep.

5. Properties of Wool :

- (i) Wool insulates against heat and cold.
- (ii) It is fire resistant and resists dirt.
- (iii) It insulates against noise.
- (iv) It returns to its original shape after being stretched or creased.
- (v) It can be dyed very easily.

Uses of Wool :

- (i) Wool is mainly used for making woollen garments like sweaters, gloves, socks, mufflers, etc., which keep the body warm in winters. It is also used for carpets and felts.
 - (ii) Felt is used to absorb odours and noise in heavy machinery and stereo-speakers.
 - (iii) Wool is also used to cover cloth diapers.
 - (iv) Wool can also be recycled or manufactured. It is used for making cheap woollen clothes. Shoddy is an example of such type of wool.
6. Silk was first discovered and developed in ancient times in China. The interesting stories about the history of silk are based partly on fact and partly on legend and myth. The tale which persists is that about 2640 BC, a Chinese empress, Si-Ling-Chi watched the glistening amber cocoons that little worms were spinning on the mulberry leaves. She unwound one of the threads on a cocoon and found that it was a very long strand of shiny material.
- For 2500 years, the Chinese kept the secret of how silk was made. Later, silk was also developed by Japan. Legend says that the Japanese carried off four Chinese maidens, who knew the secret of silk, along the mulberry shoots and silk moth eggs. Today Japan is the leading producer of silk.
- Europeans knew about the secret of producing silk in about 550 A.D. Two monks told Emperor Justinian of Constantinople that they had learnt the secret of silk. The Emperor sent them back to China to get some eggs and mulberry leaves. They brought the eggs and mulberry leaves hidden inside their hollowed-out walking-sticks. Now silk is also produced in India, Spain, Italy and Sicily.
7. Rearing of silkworms includes many steps. First of all the Bombyx Meri is treated with a great deal of care. It is reared under controlled temperature, away from external enemies such as mosquitoes, flies and other insects. The rearing of silkworms is mostly done in the following stages :
- (i) **Production of caterpillars :** In it the fertile eggs are first of put in cold storage. Then early next spring, the farmer put the eggs in a incubator at a suitable temperature for hatching. About 20 days later, the eggs hatch into tiny caterpillars.
 - (ii) **Development of caterpillars :** In this state the worms grow to

about 70 times their original size and shed their skin four times while growing.

(iii) Spinning the cocoon : The fully grown silkworm stops eating and spin its cocoon.

In this way the rearing of silkworm gets completed.

8. The silk is processed under the following stages :

(i) Reeling : After killing the pupae, the farmers roak the cocoon boiling water to loosen the threads. Threads from several cocoons are unwound at one time. The melted sericin glues several silk filaments into a single thread, which is wound into a reel.

(ii) Throwing : Throwing is the process in which the raw silk is strengthened by a series of processes. Throwing is increasing the twist and adding strands and twisting them together.

(iii) Boiling Off : After throwing, the workers boil the silk in a hot soap solution to remove the sericins. Boiled-off silk is usually milky-white.

(iv) Dyeing and Weaving : Silk fabrics can be dyed either before or after weaving. Silk fibres are woven on looms like cotton and wool.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. mulberry, 2. Bombyx Mori, 3. Silk, 4. Wool, 5. quality, 6. Yolk, 7. shearing, 8. Silk, 9. dyed, 10. Merino

III. State whether the following are 'True' or 'False':

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

IV. Match the statements in column 'A' with those in column 'B':

Ans. 1. (d), 2. (g), 3. (f), 4. (e), 5. (c), 6. (b), 7. (a)

V. Name each of the following:

Ans. 1. Cotton, Wool
2. Paper, Rubber
3. Nylon, Arcylic
4. Sheep scab, Ticks
5. Bombyx Mori, Muga
6. Thrown Singles, Crepe, Tram, Organ-zinc
7. Silk
8. Silk
9. Sericulture
10. Scarpic

VI. Tick (✓) the correct option in the following:

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

I. Answer the following questions:

- Ans.**
- Heat energy is the energy which is transferred from one body to another due to a difference in temperature between them. Temperature is the degree of hotness or coldness of a body. A Thermometer works on the principal that substances expand on heating and contract on cooling.
 - Different scales for measuring temperature are as follows :**
 - Celsius Scale :** Celsius scale was formerly known as the centigrade scale. There are 100 degrees between the reference temperatures, which are 0°C to 100°C . $^{\circ}\text{C}$, is the symbol for degree celsius.
 - Kelvin Scale :** The Kelvin scale, devised by Sir Lord Kelvin is based on the fact that the lowest temperature is 273 degrees below 0°C . The unit on the Kelvin scale is the same size as a celsius degree and is called a Kelvin, denoted by the letter K. The ice point is 273 K and steam point is 373 K on this scale.
 - Fahrenheit Scale :** The Fahrenheit scale was devised by Fahrenheit of Danzig. The ice point is 32°F and the steam point is 212°F on this scale.
 - Clinical Thermometer :** A doctor uses a clinical thermometer to take a patient's temperature. The normal temperature of the human body is 37°C . The marking on the clinical thermometer scale is from 35° to 43°C , because the human body temperature does not rise above 43°C or fall below 35°C .



Clinical Thermometer

There is a constriction in a clinical thermometer which prevents mercury in the stem from moving back into the bulb, when the thermometer is taken out from the patient's mouth.

To measure the temperature of a patient's body, the thermometer is usually put beneath the patient's tongue and left for about a minute. Then it is taken out from the mouth and is read.

- Heat energy is transferred from one to another due to a temperature difference between them.

Different modes of Heat Transfer : Heat can be transferred from one object or substance to another in the three different ways, there are :

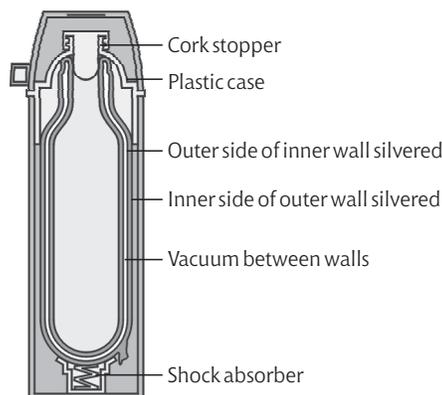
- Conduction
- Conviction
- Radiation.

- (i) **Conduction** : Conduction is a process of heat transfer in which heat travels from molecule to molecule, from the hot and to the cold end. It usually takes place in solids.
 - (ii) **Convection** : Convection is a process by which heat is transmitted in liquids and gases by the actual movement of the heated particles.
 - (iii) **Radiation** : Radiation is a process of heat transfer in which a material medium is not necessary.
5. The substances through which heat is easily conducted or in which the rate of conduction is fast, are called good conductors of heat. For example, silver, copper, iron, aluminium etc., are good conductors of heat. On the other hand, the substances which do not conduct heat easily or in which the rate of conduction is very slow, are called bad conductors of heat or insulators. Wood, leather, asbestos and paper bad conductors of heat. All gases and liquids (except mercury) are poor conductors of heat.
6. Convection is a process by which heat is transmitted in liquids to gases by the actual movement of the heated particles.

Application of Convection :

- (i) **Ventilators** : Convection currents can be set up in order to replace the hot and impure air in a room with fresh air. The rooms are provided with ventilators near the ceiling. The warm and impure air exhaled by us rises up and moves out through ventilators. The fresh air through the open windows, replaces it and keeps the rooms cool and fresh.
 - (ii) **Thermals** : During daytime, the earth is warmed by the heat of the sunlight. Air near the ground is warmed also and starts expanding and becoming less dense. The lighter air rises up. The rising air is called a thermal.
 - (iii) **Sea Breeze and Land Breeze** : During daytime, the land gets warmed more quickly than the sea. So, the air above the land rises. It is replaced by the cooler air over the sea causing a sea breeze. At night, the land gets cooled more quickly than the sea. So, the air above sea is warmer than the air over the land. The air blows towards the sea, causing a land breeze.
 - (iv) **Radiation** : All objects around us radiate heat to the surroundings. They do not heat up the medium through which they travel. The higher the temperature of the object, the more heat it radiates. Radiation is a process of heat transfer in which a material medium is not necessary.
7. **A Thermos Flask (Vacuum Flask)**
In 1872, a Scottish scientist named Sir Dewar invented the vacuum-insulated thermos flask. This flask is used to keep hot things (liquids) hot and cold things cold.

A thermos flask consists of a double-walled vessel of glass and a plastic stopper. Both glass and plastic are poor conductors of heat. This prevents heat loss by conduction. When the mouth of the flask is closed, warm air cannot go out and hot air cannot come in. Thus, convection currents cannot be set up. Also, there is air in between the double-walled glass. Both conduction and convection require molecules in order to take



Thermos Flask

place. The inner side of the outer wall and the outer side of the inner wall are silvered. Any radiant heat that leaves or enters the flask is reflected back. This prevents loss of heat due to radiation. Thus, cold things remain cold and hot things remain hot for a longer period in a thermos flask.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. temperature, 2. 0°C , 3. good, 4. Convection, 5. 37°C , 6. conduction, 7. same, 8. more

III. State whether the following are 'True' or 'False':

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

IV. Match the statements in column 'A' with those in column 'B':

Ans. 1. (h), 2. (d), 3. (a), 4. (c), 5. (e), 6. (b), 7. (g), 8. (f)

V. Name each of the following:

Ans. 1. (i) Celsius Scale, (ii) Kelvin Scale, (iii) Fahrenheit Scale
 2. (i) Conduction, (ii) Convection, (iii) Radiation
 3. Mercury 4. Evaporation
 5. (i) Clinical (ii) Laboratory 6. Thermometer

VI. Tick (✓) the correct option in the following:

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

5

Acids, Bases and Salts

I. Answer the following questions:

Ans. 1. A substance which when dissolved in water, gives hydronium ion as the only positively charged ion, is called an acid.

Classification of Acids according to their different properties :

(a) On the basis of Sources :

- (i) **Organic Acids** : The acids which are derived from plant or animal products are called organic acid.
- (ii) **Inorganic Acids** : Acids which are derived from minerals are called inorganic acids.

(b) On the Basis of Strength

- (i) **Strong acids** : The acids which dissolve in water to give a large number of positively charged hydrogen ions, are called strong acids.
- (ii) **Weak Acids** : The acids which dissolve in water to give a small number of positively charged hydrogen ions are called weak acids.

(c) On the Basis of Concentration :

- (i) **Concentrated acids** : The acids which contain very little amount of water are called concentrated acid.
- (ii) **Dilute Acids** : The acids which contain a large amount of water are called dilute acid.

2. Important applications of hydrochloric, sulphuric and nitric acids are as follows :

(i) Hydrochloric acid (HCl) :

It is used :

- (a) in the manufacture of liquids used for cleaning wash-basins, floor tiles and metal surfaces.
- (b) for making glucose from starch.
- (c) in textile industry for bleaching purposes.
- (d) for making glue.

(ii) Sulphuric acid (H₂SO₄) :

It is used :

- (a) in the manufacture of fertilizers, drugs, dyes, detergents, paints and explosives.
- (b) in the manufacture of synthetic fibres.
- (c) in textile, paper and leather industries.
- (d) in petroleum refining.
- (e) in the batteries of cars, buses trucks and inverters.

(iii) Nitric acid (HNO₃) : It is used

- (a) in the manufacture of some dyes, perfumes, medicines and artificial silk.
- (b) in the manufacture of explosives, plastics and fertilizers.
- (c) in the purification of gold and silver.

3. The main characteristics of acids are as follows :

- (i) Most acids are sour in taste.
- (ii) All acids turn blue litmus red.
- (iii) All acids turn methyl orange solution to pink colour.

- (iv) They are generally good conductors of electricity.
 - (v) Most of the mineral acids have a corrosive action in the skin.
 - (vi) Most of the acids are soluble on water.
4. The substances which react with acids to form salts and water only are called bases :

Some of the are formed in the following ways :

- (i) Calcium is burnt in oxygen to form white calcium oxide.

$$2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$$
- (ii) Magnesium on burning in Oxygen forms magnesium Oxide.

$$2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$$
- (iii) Sodium reacts with oxygen to forms sodium oxide.

$$4\text{Na} + 2\text{O}_2 \rightarrow 2\text{Na}_2\text{O}$$
- (iv) Potassium reacts with oxygen to form potassium oxide.

$$4\text{K} + 2\text{O}_2 \rightarrow 2\text{K}_2\text{O}$$

Properties of Bases :

- (i) Bases are bitter in taste.
 - (ii) They turn red litmus paper blue.
 - (iii) They turn methyl orange solution to yellow colour.
 - (iv) They turn phenolphthalein solution to pink colour.
 - (v) They have a soapy touch.
 - (vi) Bases in their aqueous solution are good conductors of electricity.
 - (vii) Two bases, sodium hydroxide (NaOH) and potassium hydroxide (KOH) have a powerful corrosive action on the skin. They should be treated with care.
5. A natural substance formed by the reaction of an acid and alkali is called a salt. Salts are formed by acids reacting with metals, metal oxides, metal carbonate or metal bicarbonates.

The name and chemical formula of some important salts :

- (i) Acidic Salts
 Sodium hydrogen Sulphide : NaHS
 Sodium hydrogen carbonate : NaHCO₃
 - (ii) Basic Salts
 Magnesium hydroxychloride : Mg(OH)Cl
 Calcium hydroxy chloride : Ca(OH)Cl
 - (iii) Normal Salts
 Sodium Chloride : NaCl
 Sodium sulphate : Na₂SO₄
6. (i) $\text{MgO} + \text{H}_2\text{O} \rightarrow \text{Mg}(\text{OH})_2$
 (ii) $2\text{HCl} + \text{Mg}(\text{OH})_2 \rightarrow \text{MgCl}_2 + 2\text{H}_2\text{O}$
 (iii) $\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$
7. Hydrochloric acid — HCl
 Carbonic acid — H₂CO₃

Sulphuric acid — H_2SO_4
Nitric acid — HNO_3
Sulphurous acid — H_2SO_3
Phosphoric acid — H_3PO_4

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. Acids, 2. alkalies, 3. lactic, 4. Sodium, 5. acidic, 6. bleaching

III. State whether the following are 'True' or 'False':

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

IV. Following statements are wrong. Rewrite them correctly.

Ans. 1. Sodium chloride is a hydrated salt. **Common**
2. ~~All~~ acids are bitter in taste. **Most, sour**
3. All acids contain oxygen. **Hydrogen**
4. Lead and nitrogen are the only elements present in lead nitrate. **Nitrate**
5. Organic acids are formed when a ~~non~~ metallic oxide dissolves in water. **Metallic**
6. Copper chloride can be made by the reaction between copper oxide and sulphuric acid. **Hydrochloric**

V. State whether following properties are those of acids, alkalies or both :

Ans. 1. acids, 2. alkalies, 3. alkalies, 4. both, 5. alkalies, 6. acid

VI. Match the statements in column 'A' with those in column 'B':

Ans. 1. (b), 2. (d), 3. (e), 4. (f), 5. (c), 6. (a)

VII. Name each of the following:

Ans. 1. Litmus, Phenolphthalein.
2. Hydrochloric acid
3. Carbonic acid
4. Citric acid
5. Citric acids

VI. Tick (✓) the correct option in the following:

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

6

More About Chemical Changes

I. Answer the following questions:

Ans. 1. The characteristics of an element are : (i) Element is made up of only one kind of atoms. (ii) Most of the elements are in the solid form. (iii) It cannot be broken down into two or more parts by any chemical means. (iv)

Elements are classified into two groups according to the physical properties of them.

2. Characteristics of Compounds

- (i) A compound is a pure substance, chemically formed by the union of two or more elements in a definite proportion of mass.
- (ii) It is homogeneous.
- (iii) It has new and distinct properties as the original components lose their individual properties.
- (iv) All samples of a compound are identical in composition and have the same properties throughout.
- (v) Generally, heat or light energy is evolved or absorbed in the formation of a compound. For example, a candle burns to form carbon-dioxide and water vapour with the liberation of heat and light energy.

3. **Chemical Reaction** : A chemical reaction is a process which changes one or more substances into new ones with the release or absorption of energy. For example, when an iron object is exposed to air containing moisture, a reddish brown coating called rust is formed on its surface. It is because when iron comes in contact with moist air, a chemical reaction takes place. Iron reacts with the oxygen of air in the presence of moisture forming iron oxide or rust.

Chemical Equations : A chemical equation represents what happens during a chemical change in the form of symbols.

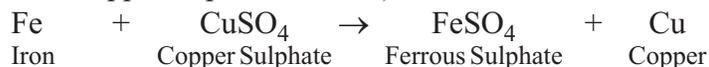
Example : When carbon burns in air, it produces carbon-dioxide. Here, carbon and oxygen are 'reactants' and carbon-dioxide is the 'product' formed by the reaction. The following equation represents the above reaction :



Carbon Oxygen Carbon-dioxide

4. The main types of chemical reaction :

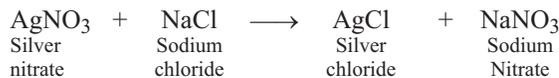
- (i) **Displacement Reaction** : When a more reactive elements displaces a less reactive elements from its aqueous salt solution the reaction which takes place is called chemical displacement. For example : Iron (more reactive element) displaces copper (less reactive element from copper sulphate solution)



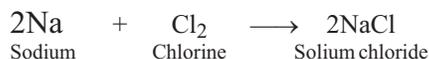
- (ii) **Decomposition Reaction** : In reaction where a single compound breaks down into two more simple elements are called decomposition reaction. For example :
When an electric current is passed through water, it decomposes into hydrogen and oxygen gases.



(iii) Double decomposition Reaction : In this type of reactions, two compounds exchange atoms or group of atoms. For example : Silver nitrate and sodium chloride solutions form silver chloride and sodium nitrate.

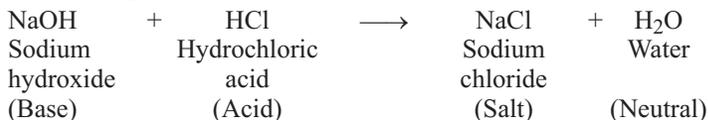


(iv) Combination Reaction : Combination, also called synthesis takes place when two or more substance combine to form only one new substance. For example : Sodium and chlorine combine to form sodium chloride.



(v) Neutralization Reaction : Neutralization reactions is type of double decomposition reaction in which an acid and a base combine to form a salt and water.

For example :



5. Salinity is the saltiness or dissolved salt content of a body of water. It is normally associated with the sea water which is saline in nature as large quantities of salts get dissolved in it.

Crystallization : The process of separating a pure substance in the form of crystals from its hot saturated solution by cooling is called crystallization. The process of crystallization is used to purify solid substances.

Crystals of different substances of certain minerals have different and well-defined shapes. Different substances give crystals of different shapes and colours.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. water, 2. symbol, 3. Metal, 4. ppt, 5. acids

III. State whether the following are 'True' or 'False':

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

IV. Write the following as balanced chemical equations. Also identify the type of reaction in each case :

Ans. 1. $\text{CuCO}_3 \longrightarrow 2\text{CuO} + 2\text{CO}_2$ **Decomposition**
2. $2\text{Na} + \text{Cl}_2 \longrightarrow 2\text{NaCl}$ **Combination**
3. $2\text{Zn} + \text{O}_2 \longrightarrow 2\text{ZnO}$ **Combination**

4. $\text{Na}_2\text{O} + \text{H}_2\text{O} \longrightarrow 2\text{NaOH}$ **Combination**
 5. $\text{S} + \text{O}_2 \longrightarrow \text{SO}_2$ **Combination**
 6. $2\text{HgO} \longrightarrow 2\text{Hg} + \text{O}_2\uparrow$ **Decomposition**

V. Tick (✓) the correct option in the following:

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

Unit – 3 Natural Phenomena

7

Natural Phenomena

(Wind : Thunder and Lightning and Cyclones)

I. Answer the following questions:

- Ans. 1. The moving air is called wind. When the sun warms the earth, the air above it expands. Due to this, the air pressure in a particular region drop. The cooler and the heavier air then starts moving towards this low air-pressure region. This blowing air from high pressure region to low pressure region is called the wind. This is how winds are formed.
2. A thunderstorm is caused by violent air currents inside the thunder (cumulus) clouds. The moist and warm air inside the clouds rises up. Sometimes, the water vapour present in it rapidly condenses to form tiny droplets of water, which freeze to form small particles of ice. During the condensation and freezing, a large amount of heat energy is released. This energy further pushes up the air at a high speed. Water and ice particles rub against each other in rapidly rising air. This builds up a negative electric charge in the clouds. This electric charge is then released by the clouds with the stroke of lightning. The lightning heats the surrounding air to a temperature of $30,000^\circ\text{C}$, which is five times hotter than the surface temperature of the sun. The heat released by lightning makes the air expand very, very faster than the speed of the sound. This in turn produces a crash or thunder, similar to the sound produced by supersonic aeroplanes.
 Lightning and thundering usually occur almost simultaneously but we hear the thundering after a lapse of time. This is due to the fact that the speed of light is much more than the sound.
3. Consequences of lightning and heavy rainfall are as follows :
 Lightning causes serious damage to animals and humans caught in a thunderstorm. It can cause fire and destroy buildings. It can also damage electronic equipments such as, television and computers etc. Moreover, lightning can burn trees and combustible items causing a serious fire. It happens due to intense heat produced by the flow of huge amount of

charge between the clouds and object concerned.

Heavy rainfall may result into floods, which takes a large group of people in its grip and sometimes entire towns or village are wiped out.

4. A cyclone is formed by the continuous movement of air. It can be shown as given below :

In general, air masses that form over land are dry and those that form over oceans are humid. Air masses that form in northern region are cold and those that form in region close to the equator are warm. When these air masses move and meet, the air in them does not mix easily. The boundary between two air masses becomes sharp and distinct. Boundaries separating air masses are called fronts. If a cold air mass invades warmer air, a cold front is formed. Rain bringing clouds are formed and bring heavy rains. The air behind a cold front brings cool and dry weather.

When a warm air mass pushes into an area of cold air, a warm front is formed. Thick clouds, which bring light rains, are formed. The weather changes in a warm front are not as peculiar as the weather changes follow a cold front.

At the Polar front, often a smooth flow of winds passes each other. The difference in temperature between land and sea surfaces can create a disturbance and form a small wave or bridge in the Polar front.

The cold air moves around into the warm air and from a cold front. The warm, moist air is squeezed upward leaving cold air only near the ground. Lifting of the warm, moist air causes a storm centre with dark clouds and heavy precipitation. A storm centre formed in this way is called a cyclone.

5. Cyclones affect property and human lives in a big way. Many cyclones travel in land causing various damage to crops, settlements and human lives. Near the coastal regions, they cause torrential rains, flooding it with huge sea-waves which cause very large destruction of life and property.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. year, 2. faster, 3. heat, 4. typhoon, 5. cold, 6. extra-tropical, 7. cyclone

III. State whether the following are 'True' or 'False':

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

IV. Name each of the following:

Ans. 1. Wind, 2. Hurricane, 3. Anemometer, 4. Polar Front,
5. Crash or Thunder, 6. Fronts

V. Match the statements in column 'A' with those in column 'B':

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

VI. Tick (✓) the correct option in the following:

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

I. Answer the following questions:

Ans. 1. Soil is the granular material that forms the top layer of the land on the earth's crust.

Formation of Soil

Soil is formed by the weathering of rocks. Weathering is the natural process of breaking down of huge pieces of rocks into fine particles of soil. In the very beginning, rocks covered the major surface of the earth. Soil formation begins with the breakdown and wearing down of rocks and other material on the earth's surface. It is a slow and continuous process the effects of which are not seen easily. Rocks, are broken down by two types of weathering.

- (i) **Physical Weathering** : The breaking down of rocks into smaller pieces by the forces of weathering without changing the chemical composition of the rocks, is called physical weathering.
- (ii) **Chemical Weathering** : The breaking down of rocks into smaller pieces with the change in the chemical composition of rocks, is called chemical weathering.

The initial product of weathering is called parent soil.

2. As soil forms, it develops separate layers called horizons. The sequence of horizons is called soil profile. There are three main horizons in the soil profile :

(i) A-Horizon, (ii) B-Horizon and (iii) C-Horizon.

(i) **A-Horizon** : The top layer of mature soil, where most of the plants grow is called horizon A. It is made up of a large variety of minerals or naturally occurring chemicals which form rocks.

(ii) **B-Horizon** : The layer just under horizon A is called horizon B. It is usually lighter in colour than the upper layer. Most of the minerals in horizon A seep down in horizon B.

(iii) **C-Horizon** : The bottom layer of the soil is called horizon C. It is very hard and is made up of broken rocks. This layer represents transition zone between the earth's bedrock and horizon A and B.

3. Composition of soil is different in different types of soils. It depend on the types of rocks from which it is formed. Basically all soils contain the following constituents :

(i) Living organisms : Tiny plants and animals like scorpions, centepedes, millipedes, earthworms, etc. are found in the soil.

- (ii) **Air** : Air is present in spaces between the soil particles. It is also needed for organisms living in the soil.
 - (iii) **Humus** : It is completely decomposed organic matter of plants and animals. Humus acts as a manure. It helps in binding the loose soil grains together and makes the soil more fertile.
 - (iv) **Water** : Water enters the cracks in the rocks and freezes. Frozen water (ice) makes the rocks expand and deepens the cracks.
 - (v) **Mineral Particles** : These are gravel, sand and clay. These particles determine the type and texture of the soil.
 - (vi) **Salts** : Salts such as, nitrates, sulphates, phosphate, carbonate etc., are of potassium, magnesium, sodium and iron.
4. Weathering is the natural process of breaking down at huge pieces of rocks into fine particles of soil.

Agents of Weathering : A number of agents that work to break down the parent soil even further are as follows :

- (i) **Wind** : Strong and powerful winds hit the rocks and make strange shapes of them. They roll the rocks with great force and break the rocks. Heavy winds throw small traces of sand on the rocks and chip off tiny pieces from them. Rocks are broken into smaller rocks and stones by the continuous blowing of wind.
- (ii) **Sun** : In many places, rocks are heated by the sun until they become very hot and expand. At night they become cool and contract. Repeated expansion and contraction of this kind may cause rocks to crack and break apart.
- (iii) **Water** : In nature, water seeps into cracks in rocks. During winters, this water freezes. When this happens, the crack is enlarged a little. During the daytime, the ice may melt, and freeze again when the temperature goes down below 0°C. This expands the rocks further. Eventually the rocks break up.

Plants and Animals : Mosses and lichens produce certain acids which are capable of dissolving the minerals in the rocks. These acids may seep into rocks and dissolve some of the minerals. Gradually, the rocks break down into smaller pieces.

5. Soil is the most important natural resource available to man. It is considered valuable resource because of the following reasons :
- (i) It is an excellent medium in which all plants grow. Without soil plants could not have established themselves on the land.
 - (ii) Soil is the natural habitat for various organisms. Mice, moles, slugs, snails, beetles, ants, termites and other small animals live in the soil. As they move around, they stir up the soil so that there are more pores for air and water. The most useful organisms in the soil are

earthworms. They help to improve the fertility of the soil. Other animals in the soil are bacteria, algae, fungi, nematodes (parasitic unsegmented worms). Bacteria are decomposers that help in the decay of all plant and animal remains.

- (iii) Soil is the store-house of a large number of minerals. Plants get minerals and water from the soil. These mineral are used in a number of industries.
 - (iv) It is used for the construction of buildings, roads, dams, bridges and industries etc.
 - (v) Soil is used as a natural raw material for making bricks, mortar, pottery and other materials. It is also used in making huts and sheds.
 - (vi) Rain water seeps through the soil and accumulate above the bedrock. This underground water is pumped out for various purpose.
6. The process of removal of soil particles from its original place or the carrying of soil particles from one place to another place, is called soil erosion. Soil erosion can be prevented in the following ways :
- (i) Deforestation should be strictly banned. Rather more trees should be planted. Afforestation should be undertaken not only in areas already cut, but also additional areas should be brought under plantation.
 - (ii) To maintain the soil in its natural form, it is good to grow different crops. Crop rotation helps to maintain the fertility of the soil.
 - (iii) To reduce the effect of strong winds in the fields, trees should be planted along the boundaries of the fields.
 - (iv) On the sloping areas in hills, strip cropping should be practised, thereby reducing the steepness of the slopes and checking soil erosion.
 - (v) Proper drainage and irrigation arrangements should be made in the fields.
 - (vi) Agricultural land should not be left uncultivated for a long time period to prevent soil erosion.
 - (vii) Trees like bamboos and eucalyptus should be planted. These trees work as soil binders by not allowing topsoil to run down with the flow of water. The roots of these trees hold the soil firmly together.

(viii) Conservation tillage can be used. It involves leaving stems and roots from the previous crop in the field. The stems and roots help to hold the soil in place between the time one crop is harvested and another crop is planted.

(ix) On slopes of hills, contour farming or terrace farming should be practised to prevent direct loss of topsoil due to water running down the slopes.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. Black, 2. horizon-B, 3. topsoil, 4. Loamy, 5. 0.064, 6. iron oxide

III. Write whether the following statements are 'true' or 'false':

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

IV. Match the statements in column 'A' with those of column 'B':

Ans. 1. (h), 2. (f), 3. (c), 4. (e), 5. (d), 6. (g), 7. (b), 8. (a)

V. Tick (✓) the correct option in the following:

Ans. 1. (d), 2. (a), 3. (a), 4. (d)

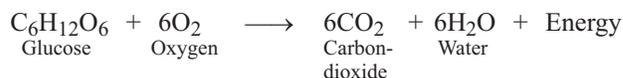
Respiration in Organisms

I. Answer the following questions:

Ans. 1. Respiration is a process by which living organisms take in oxygen to release energy and then remove the waste products like carbon-dioxide and water. Respiration can be divided into two phases. External respiration or breathing and Internal respiration.

2. **Types of Respiration :** On the basis of the presence or absence of oxygen, respiration is divided into two types : Aerobic respiration and (ii) Anaerobic respiration.

(i) Aerobic Respiration : Aerobic respiration occurs in the presence of oxygen. In this process, the food is oxidised to produce energy. Carbon-dioxide and water are produced as by-products. The chemical reaction involved is represented as :



This process involves exchange of gases only. The exhaled air has more carbon-dioxide than the inhaled air.

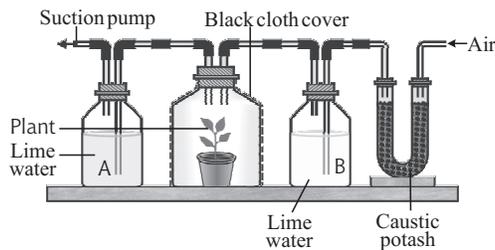
(ii) Anaerobic Respiration : Respiration which takes place without oxygen is called anaerobic respiration. Yeast and some bacteria respire anaerobically. Yeast is used in making bread. Do you know how holes in the bread are made? When yeasts respire anaerobically, they give out carbon-dioxide. This gas while escaping makes the dough rise and leaves holes in it. When the dough is baked, the holes in the bread can be seen. The bacteria which decompose organic matter and form manure is also anaerobic. Vinegar, curd, wine and alcohol are made as a result of the anaerobic activity of bacteria and yeasts.

In anaerobic respiration the food is not completely oxidised. The equation involved is as follows :



3. To show that CO₂ is produced by green plants during respiration :

Cover a potted plant under a bell-jar wrapped in a black paper. Fix up a two-holed cork in the mouth of bell-jar and fix two bent glass tubes in these holes. Dip the other ends of the tubes in bottles A and B containing lime water. Connect one flask to the aspirator and other to a U-shaped tube containing caustic potash. The air from the atmosphere passes through caustic potash so that CO₂ of air get absorbed in the caustic potash. This air free from CO₂, then passes through lime water in bottle B and reaches to the plant. Here, oxygen of the air is used by the plant in respiration and carbon-dioxide is given out, which when passes through bottle A, turns the lime water milky.



Carbon-dioxide is produced by green plants during respiration.

4. To show that heat is given out during respiration :

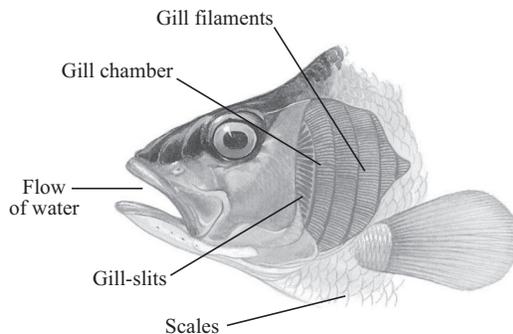
Take some pea or bean seeds into two equal amounts. Take first group of seeds and soak them in water for a day so that they begin to germinate. Boil another group of seeds to kill them. Now take two vacuum flasks 'A' and 'B'. Put germinating seeds in flask 'A' and the killed ones in flask 'B'. Do not fill the flasks fully. Insert a thermometer in each flask and seal their mouths with cotton wool.

Note the temperature of each flask. Support each flask upside down and leave them undisturbed for a few hours.

After few hours, you will observe that the thermometer of flask 'A' shows higher temperature, whereas there is no change in the temperature of the other one. This indicates that germinating seeds give out heat, whereas killed ones do not.

5. Respiration in fish :

Aquatic animals like fish have special structures called gills. The gills have a network of thin-walled capillaries. Gills are enclosed on each side of the head of a fish. To get oxygen dissolved in water, fish gulps water through the mouth and pumps it over the gills. Water



Respiration in a Fish

passes into the gill chamber through gill slits. In each chamber, water passes over the filaments. They absorb oxygen from the water and replace it with carbon-dioxide formed. The water then passes out through the gills opening and the process is repeated.

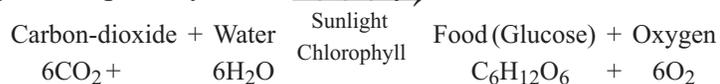
Respiration in Frog : Frogs breathe through their gills when they are young tadpoles. In the adult stage they develop lungs. They breathe through lungs and moist skin both. The skin of frogs is moist and has blood vessels. The exchange of gases takes place through the thin walls of blood vessels.



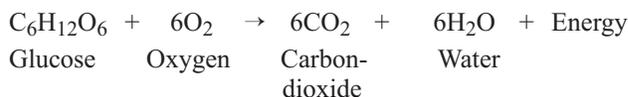
Frog

6. Respiration and Photosynthesis in Plants

Green plants make glucose by combining with water and carbon-dioxide through the process of photosynthesis. They get energy from the sunlight to complete this process. The energy is trapped by chlorophyll. Glucose, which is made, contains some of this energy. Actually, respiration is just opposite to photosynthesis. Photosynthesis can be written as :



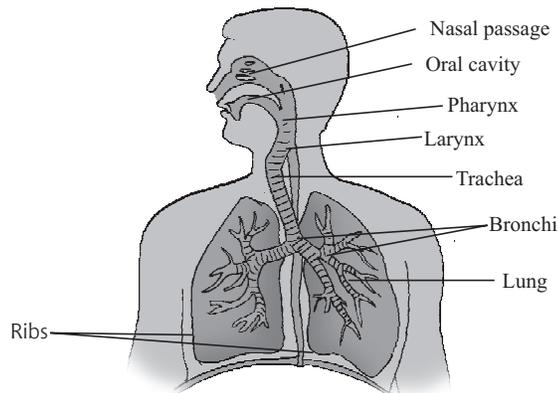
When a plant needs energy it releases it from the glucose in the same way that an animal does, by respiration. Process of respiration can be written in the form of a chemical equation as follows :



This reaction seems like photosynthesis going backwards. Photosynthesis makes glucose and respiration breaks glucose down.

7. Respiration in Human

beings : In human beings, breathing is carried out by a well developed respiratory system. Air is sucked into the lungs through a series of cavities and tubes which together make up the respiratory system. The lungs are most important organs which help human beings in respiration.



Human Respiration System

The main organs on human respiratory system as follows : (i) Nose (ii) Pharynx (iii) Larynx (iv) Trachea or Windpipe (v) Bronchi (vi) Lungs (viii) Alveoli.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. physical, 2. cell, 3. bronchi, 4. anaerobically, 5. Larynx, 6. two

III. Match the statements in column 'A' with those in the column 'B':

Ans. 1. (f), 2. (d), 3. (a), 4. (c), 5. (b), 6. (e)

IV. Write whether the following statements are 'true' or 'false':

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

V. Name each of the following:

Ans. 1. Maize, Wheat
2. Bronchi, Bronchioles
3. Aerobic respiration, Anaerobic respiration
4. Lungs
5. Lungs, Chest Cavity
6. Insect (grasshopper)

VI. Tick (✓) the correct option in the following:

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

VII. Differentiate between:

Ans. 1. Respiration is a slow process which occurs in a series of steps while Combustion is a fast process which occurs in a single step.
2. Breathing is a physical process involving exchange of gases while respiration is a chemical process in which food is oxidised to release energy.
3. In Aerobic respiration occurs in the presence of oxygen while in Anaerobic respiration occurs in the absence of oxygen.

4. In photosynthesis, the energy which does into the reaction is light energy. In respiration the energy which comes out is chemical energy. Also in photosynthesis oxygen is released as a by-product whereas in respiration, carbon-dioxide is released as a by-product.

10

Circulatory and Excretory Systems in Animals

I. Answer the following questions:

Ans. 1. Blood is a special kind of tissue which flows through blood vessels like the arteries, veins and capillaries. In general, a pump circulates a liquid called blood to all parts of body. The pump is called heart. The blood carries materials needed for metabolism. It also carries material which are harmful for the body and must be removed. Thus, blood work as an exchange agent between internal tissues and the environment. This is how blood circulatory system works.

Composition of Blood : Blood contains red-blood cells (R.B.C.), white blood cells (W.B.C.) and platelets flowing in a straw coloured liquid called plasma. Plasma makes 50-60% of the total volume of blood. It consist of 90% water and the remaining 10% contains proteins, salts, hormones and waste products.

Function of the blood :

- (i) The main function of the blood is to transport oxygen and nutrients to the body tissues.
 - (ii) It removes waste products from the body.
 - (iii) It controls the body temperature. It carries heat from one place to another and equalizes the body temperature.
 - (iv) It maintains water balance to constant level, distributing uniformly over the body.
 - (v) It kills the harmful bacteria and organisms which can harm the body.
 - (vi) It forms a clot at the site of injury and thus, prevents further loss of blood.
 - (vii) It transports hormones.
 - (viii) It maintains fluid balance.
2. The heart is a hollow, muscular and conical organ. The human heart is about the size of your closed fist. It is placed inside the chest, well-protected by the ribs. It beats and rests alternately due to the contraction and relaxation of heart muscles. You can feel the pumping action of your

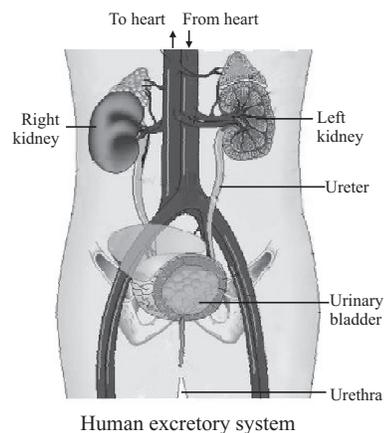
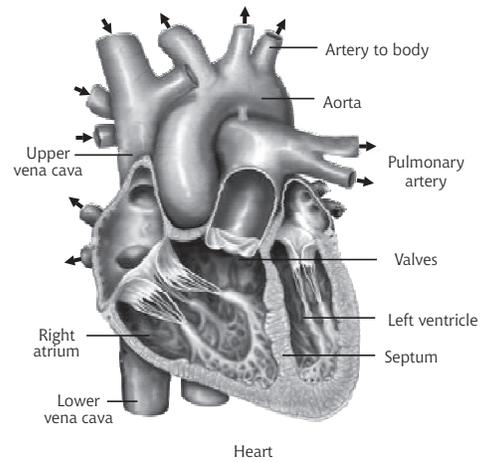
heart, if you put your hand on the centre of your chest, slightly towards the left. The heart is divided into four chambers : two upper and two lower. The upper chambers are called auricles or atria (left atrium and right atrium. The two lower chambers are called ventricles (left ventricle and right ventricle.) All the four chambers are connected to the arteries and veins.

The heart is composed of cardiac muscles and the thickness of the walls in the different chambers reflects their functions. The atria have thin muscles because they pump blood to short distance to the ventricles below them. The right ventricle is more heavily muscled than either of the atria because it has to force blood much farther distance of the lungs. The left ventricle has the thickest wall because it has to force the blood all the way round the body.

3. Heartbeat and the Pulse

The heart beats as the cardiac muscles in its wall contract and relax. When they contract, the heart becomes smaller squeezing blood out. When they relax, the heart becomes larger. A heartbeat is made up of a contraction followed by relaxation of the cardiac muscles. The human heart beats at a rate of 60-80 times per minute. In a child the heart beats from 90-100 times per minute. Heartbeat increases when a person does some extra work such as running, jumping, cycling, dancing etc., or when he is excited or under stress. This can be felt as an increase in the thumping of the hearts. Heartbeat is reflected through the body in the form of pulse. The alternate expansion and contraction of the arteries is called the pulse. The pulse may be felt at the wrist. In adults, the pulse rate ranges from 60-80 beats per minute. In children, it is between 80-100 per minute.

- The removal of the waste and harmful products from the body is known as excretion. The organs of excretion in human body are liver, lungs, skin and kidneys.



5. The organs of excretion in human body are liver, lungs, skin and kidney. Excretory substances are urea, sweat and undigested food.

Kidney are a pair of bean-shaped reddish-brown excretory organs. They are located just above the waist on either side of the backbone. They are about 10 cm long. Each kidney consists of a large number of coiled tubes called nephrons. The kidney is connected with rest of the organs of the excretory system as shown in the figure.

A narrow tube called ureter runs from the kidney to the urinary bladder. From the bladder leads a tube called urethra. Kidney produce urine which consists of urea, water and other wastes removed from the blood.

II. Fill in the blanks with the appropriate word/words given with in brackets:

Ans. 1. water, 2. leucocytes, 3. Arteries, 4. plasma, 5. lungs

III. Write whether the following statements are 'true' or 'false':

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

IV. Differentiate between each of the following :

Ans. 1. In single circulation, the blood passes from the heart to the gills and then slowly round the body and back to the heart in a single circuit. It takes place in a two-chambered heart only. Example Fish.

In double circulation, a pulmonary circulation from the heart to lungs and then to the heart and a systemic circulation from the heart to rest of the body and back to the heart takes place. For it, a four chambered heart is must. Example Mammals.

2. Arteries are located deep in the body away from the skin, while veins are located close the skin.

V. Tick (✓) the correct option in the following :

Ans. 1. (d), 2. (c), 3. (d), 4. (c), 5. (a)

11

Transportation of Food and Water in Plants

I. Answer the following questions:

Ans. 1. (i) **Herbs** : A herb is a plant which does not contain woody stem. Herbaceous plants have a soft and green stems. Their stems are usually juicy or fleshy and are relatively weak.

(ii) **Shrubs** : Shrubs are woody plants with several stems. All of which are almost of the same size.

- (iii) **Trees** : Trees are tall and woody plants that continue to grow for many years. Usually, trees have one main stem called trunk and several branches that grow upward or outward at a distance above the ground.

2. Transport of Food and Water in Plants

Plants have two systems for the transporation of food and water. They are:

(i) Xylem vessels and (ii) Phloem vessels

- (i) **Xylem vessels or Xylem Tubes** : These vessels carry water and minerals. Upward movement of water and minerals occurs through xylem vessels present in the roots, stem and leaves of the plants.

Xylem vessels of the roots join with the xylem vessels of the stem and leaves. A xylem vessel is a compound of dead, hollow cells with no end walls. The cells join end to end and form a continuous tube. Main function of xylem vessel is to transport water and minerals from roots to leaves and to keep the plant upright.

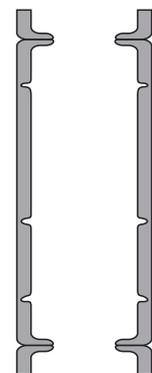
- (ii) **Phloem Vessels or Phloem Tubes** : Phloem tubes are also made of many cells joined end to end. These vessels carry food materials. The end wall of a phloem is perforated, so it looks like a sieve. Thus, phloem tubes are also called seive tubes. Main function of phloem vessels is to transport food from the leaves to the other parts of the plants.

3. Transport of Water in Plants

The absorption of water from the roots and its distribution to all cells takes place through the following process.

Molecules of water are very small, whereas, molecules of sugar are many times larger than water molecules. The membrane holes are big enough to let the water molecules pass through, but not the sugar molecules. It is called a semi-permeable membrane, because it allows only some molecules to pass through it, but not all.

There is high concentration of sugar molecules in the right side of the membrane than in the left side. In the absence of the membrane, the sugar molecules would diffuse from the concentrated solution into the dilute solution till they were evenly spread out. But they cannot do it because

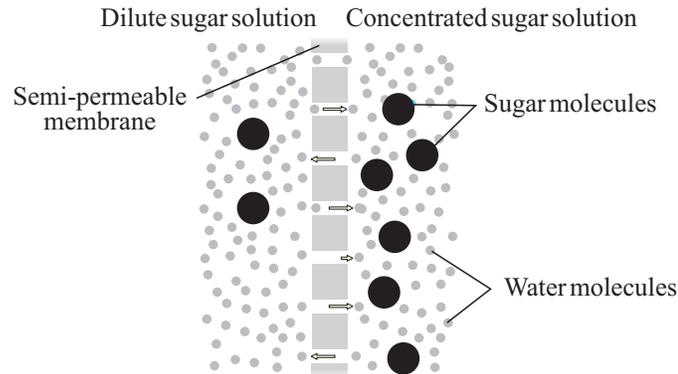


Xylem Vessel



Phloem Tube

the pores of the membrane are too small for them to get through. On the left side of the membrane, there is a high concentration of water molecules than the right side. The water molecules, so diffuse from the left side into the right side. As a result, water has diffused from the dilute solution through the semi-permeable membrane into the concentrated solution.



Osmosis : The molecules pass from a region of their higher concentration to a region of their lower concentration through a semi-permeable membrane

4. The root hair are in constant contact with soil water found in the spaces of soil particles. They absorb water from the soil. The semi-permeable membrane present in the root hair cells allow only certain substances to pass through it. The concentration of cell sap of the root hair is higher than the soil water. Therefore, the soil water passes into the root hair by the process of osmosis thereby diluting the cell sap.
5. The absorption of water from the roots and its distribution to all cells takes place by a process called osmosis. Osmosis is the diffusion of water from a region of higher concentration to a region of lower concentration through a semi-permeable membrane. From the root hair, water passes by osmosis across the cell layer of the root into the xylem vessels. Water, thus absorbed by the root hair passes cell to cell by osmosis to all parts of plant.
6. **Transport of food in plants** : Leaves of the green plants make food by photosynthesis. This food is dissolved in water and enters the phloem vessels of the veins. From here, food is carried in any direction within the plant. The process is called translocation of food.
Usually, food moves downward through the phloem of stem, into roots. There, it enters the centre. In the cortex, sugar (simple) is converted into starch and stored.
7. Transpiration is the process of loss of water in vapour form from leaves in the plants.

individuals of their own kind. It is the means of perpetuation of species. There are two types of reproduction found in animal and plants. These are: (i) Asexual (ii) Sexual. They differ from each other. Asexual reproduction involves one parent only while in sexual reproduction involves gametes (male and female).

2. Parts of a Flower : A typical flower consists of four sets of floral parts :

(i) **Calyx (Sepals) :** Calyx is the outermost whorl of the flower. The main function of sepals is to protect the bud of the flower. Being green in colour it also takes part in photosynthesis.

(ii) **Corolla (Petals) :** It is the second whorl of the flower and is made of brightly coloured structures, called petals. The main function of the petals is to attract insects and buds to the flower for pollination.

(iii) **Androecium (Stamens) :** Third whorl of the flower called androecium is made up of stamens which represent the male reproductive organ of the flower.

(iv) **Gynoecium (Pistil or Carpels) :** The fourth and last whorl of the flower called gynoecium represents the female reproductive organ of the flower.

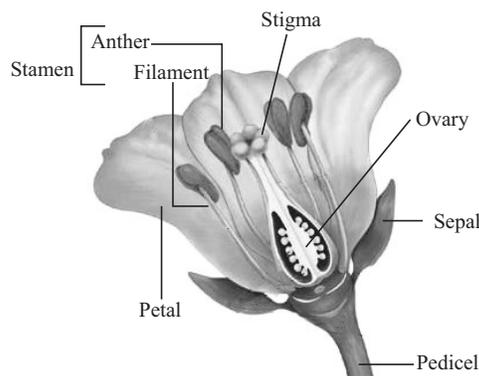
3. The seed is ripened ovule which contains a baby plant or an embryo.

Dispersal of Seeds : The scattering of seeds away from the parent plant is called dispersal. Fruits and seeds are scattered by various agents like, wind, water, animals or even the plant itself by explosion.

(i) **Dispersal by wind :** Some seeds which are light in weight, have hair or wings, are taken away by wind from one place to another easily. Cotton, dandelion, madar and poppy seeds are dispersed by winds.

(ii) **Dispersal by water :** Fruits like coconut are dispersed by water when they fall into a river, stream or an ocean.

(iii) **Dispersal by Birds and Animals :** Some birds and animals eat fleshy plant parts of the fruits like mango, orange, apple etc., and throw away the seeds.



Parts of a flower

Some seeds have hooks and stiff hair. These stick to the bodies of grazing animals. These animals carry them far and disperse. Pea, grass, goose grass and xanthium are dispersed by animals.

(iv) **Dispersal by Explosion** : Fruits like peas, lady's finger, mustard and wall flower disperse their seeds by splitting open. When the fruit ripen, its walls are pressurized. Finally, the fruit splits into two halves with a small explosion, dispersing the seeds away from the plant.

4. The different methods of asexual reproduction in plants are : (i) Binary fission (ii) Spore Formation (iii) Budding (iv) Vegetative Reproduction.
5. The advantage of cross-pollination over self-pollination is :
 - (i) The offsprings produced through cross-pollination are always healthier.
 - (ii) More abundant seeds are produced by this method.
 - (iii) New varieties of flowers are also produced.
 - (iv) The plants show a number of varieties which increase their adaptability to change in the environment.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. Asexual, 2. bisexual, 3. seed, 4. artificial, 5. Androecium, 6. ovary

III. Write whether the statements are 'true' or 'false' :

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

IV. Differentiate between the following :

- Ans.**
1. Asexual reproduction involve one parent only. While in sexual reproduction two parents are involved.
 2. In binary fission an organism splits into two smaller organisms of equal size and shape, but in budding a bud grow out from the parent's body.
 3. These is almost no wastage of pollen grain in self pollination while cross pollination is a wasteful method.
 4. In unisexual flowers, has only single reproductive organ either stamen or pistil is parent while in bisexual flowers both male and female reproductive organs are present.
 5. Plants that have seeds with one cotyledon are monocotyledons but in dicotyledonous plants seeds have two cotyledons.
 6. The wind acts as the pollinating agent in wind pollinated flowers whereas insect acts as the pollinated pollinating agent in insect pollinated flowers.

V. Tick (✓) the correct options in the following :

Ans. 1. (c), 2. (d), 3. (c), 4. (d), 5. (a)

Time, Motion and Speed

I. Answer the following questions:

Ans. 1. Time is an interval between two instances or events. In the beginnings man used movement of shadow cast by sun or sundial or the quantity of sand or water dropped from the upper vessel into a lower one through a narrow opening. People even measured time by observing the melting of a candle.

2. Now-a-days people are using modern clocks for measuring time which are more accurate. Multiples and sub-multiples of time the solar day is divided into 24 equal parts and each part is called an hour. An hour is further divided into 60 equal parts and each part is called a minute. Again, a minute is divided into 60 equal parts and each part is called a second. Second is taken as the SI unit of time and is equal to $1/86400$ th part of the solar day.

So, we conclude that;

1 solar day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

Number of seconds in one solar day

= $24 \times 60 \times 60$ seconds

= 86400 seconds

= $1/86400$ th part of a solar day

3. The 24-hour clock does not require the use of a.m. or p.m. The hours are numbered serially 1 to 24, starting from midnight. Midnight is 0000 hours. Thus, 3.00 p.m. will be 1500 hours (3 hours after midday). Times on a twenty-four hour clock are always expressed in four digits.

4. Motion in Living and Non-living Things

We know that all living things move. They use different organs for moving from one place to another. For example, insects crawl with the help of their legs, animals like lion, cow, cat, etc., use legs to go from one place to another. Fish swims with the help of fins, birds fly with the help of wings and human beings use legs for motion. All these motions are visible.

Plants also move, but their movements are not visible, their parts show movement towards external stimuli like light and water. Their roots grow and move deep in the soil. The stem moves up towards the light. A sunflower always moves its face from east to west with the sun.

We also know that non-living things also move, but their movements are

not spontaneous. They do not move on their own will. They need some external force or source of energy to move. For example, a scooter moves due to energy of the fuel and the blades of a fans move due to electrical energy etc.

5. Speed is the distance of an object that is moves in unit internal of time.

Kinds of Speed

- (i) **Uniform speed** : The speed of a moving 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, covers one kilometer in each minute, then its motion is said to be uniform over one minute interval.
- (ii) **Non-uniform or Variable Speed** : The speed of a moving 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, trucks, scooters, etc., is 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 moving body with non-uniform speed. We use the term 'average speed'. The total distance travelled divided by the total time taken gives the average speed. For example, if a car covers a distance of 50 km in 2 hours and 100 km in next 3 hours, than its average speed can be collected as follows :

$$\begin{aligned}\text{Average speed} &= \text{Total distance covered} / \text{Total time taken} \\ &= (50 + 100) \text{ km} / (2 + 3) \text{ h} \\ &= 150 / 5\text{h} = 30 \text{ km/h}\end{aligned}$$

6. There are two types of motions : (i) Uniform motion (ii) Non-uniform motion.

The characteristics of a moving body are :

- (i) change its position with respect to its surroundings.
(ii) It moves from one place to another place.

7. Velocity is defined as the speed in a particular time. Velocity is differ by the speed of a moving body because the velocity has both magnitude and direction and so it is a vector quantity. Whereas the speed is a scalar quantity.

II. Fill in the blanks with the appropriate word/words in the brackets :

- Ans.** 1. speed, 2. pendulum, 3. velocity, 4. scalar, 5. second, 6. 60, 7. 100, 8. m/s, 9. motion, 10. Time

III. Write whether the following statements are 'true' or 'false' :

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

IV. Match the statements in column 'A' with those in column 'B' :

- Ans.** 1. (d), 2. (e), 3. (b), 4. (a), 5. (c)

V. Differentiate between each of the following:

- Ans.**
1. In uniform motion an object covers equal distance in equal intervals of time along a straight line. But in non-uniform motion an object does not cover equal distance in equal intervals of time along a straight line.
 2. Digital watch measures time up to $1/10$ th of a second while atomic clocks which are accurate up to 10 millionths of a second.
 3. The velocity has a vector quantity, whereas the speed is a scalar quantity as it possesses magnitude only.
 4. Uniform speed covers equal distance in equal intervals of time. Variable speed covers unequal distance in equal intervals of time.
 5. A scalar quantity possesses magnitude only while a vector quantity has both magnitude and direction.

VI. Write these time using a.m. or p.m. correctly :

- Ans.**
1. 10 minutes past midnight : **a.m.**
 2. 4 O'clock in the morning : **a.m.**
 3. Two hours before noon : **a.m.**
 4. 6 O'clock in the evening : **p.m.**
 5. 10 O'clock at night : **p.m.**
 6. 1 minute before midnight : **p.m.**

VII. Tick (✓) the correct options in the following :

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

VIII. Express these :

- Ans.**
1. Express these times according to 24-hour clock.
0225, 0305, 2250, 2005, 0705
 2. Express these times according to the 12-hour clock.
12.50 a.m., 4.50 p.m., 6.30 p.m., 1.07 a.m., 11.45 p.m.
 3. Express the following speed in m/s
12.50 m/s, 37.50 m/s, 25 m/s, 63.89 m/s
 4. Express the following speed in km/h.

IX. Solve the following problems :

- Ans.**
1. **Solution :** Total speed of a swimmer = 100 m
Time taken = 60s
By applying formula
Average speed = Total distance / total time
 $= 100 \text{ m} / 60 \text{ s} = 1.67 \text{ m/s}$
 2. **Solution :** Speed = Distance / Time
 $9 \times 1000 / 40 \times 80 = 3.75 \text{ m/s}$
 3. Speed = Distance / Time
 $288 / 96 = 3 \text{ km/h}$
 4. Speed = Distance / time
 $1500 / 4 \times 60 = 25 / 4 \text{ m/s} = 25 / 4 \times 18 / 5 = 90 / 4 \text{ km}$
 5. Average speed = total time / time taken
 $50 + 45 + 35 / 10 + 8 + 5 = 130 / 23 = 5.65 \text{ m/s}$

I. Answer the following questions:

- Ans.**
- An electric current is a stream of moving electrons in a conduction.
Direction of Flow of Electric Current : The direction of flow of an electric current is that in which positive charges move or could move in a conductor, *i.e.*, the direction of flow of current is from the positive terminal of the source to the negative terminal.
 - Cells are the source of electric current. In a cell, the chemical energy is changed into electrical energy.
 - Simple Electric Circuits**
 The path of an electric current is called a circuit. The different parts of a circuit are called components of circuits. The circuit consists of four main parts :
 - Source of electric current *i.e.*, a cell.
 - One appliance *e.g.*, bulb, heater etc.
 - Conducting wires.
 - Switch to complete or break the circuit.
 - When current flows through a conductor it offers some obstruction to the flow of current. This obstruction in the flow of current is called electrical resistance.
Resistors in Series
 - In series, the resistance increases with the increase in number of resistors.
 - The current in series decreases with the increase in number of resistors.
 - In series combination, if one bulb gets fused, the other bulb stops glowing as the circuit is broken.**Resistors in Parallel**
 - In parallel, resistance decreases with the increase in number of resistors.
 - The current flowing in any resistors in parallel will be inversely proportional to resistance. So, more the resistance less is the current.
 - In parallel combination, if one bulb gets fused, the other bulb still continues to glow as there the circuit is unbroken through the other bulb.
 - Heating Effect of Electric Current**
 When an electric current flows through a conducting wire, a part of whole

of the electrical energy is converted into heat energy. This heating effect of current is mainly used in electric irons, electric stoves, electric geysers, electric fuses, electric kettles, electric heaters, electric toasters and electric immersion rods etc. In these appliances, the elements are made from nichrome wire that becomes red hot when electric current passes through it. The nichrome wire of suitable thickness and length is coiled around an insulating fire-proof material like silica or fire clay.

The heating effect of all these appliances depends upon the resistance of the heating element. The resistance of a wire depends upon the nature of material, length of the wire and area of cross-section. Higher the resistance of the coil, greater is the heating effect. Nichrome metal has high resistance.

6. A fuse is a part of an electric circuit which prevents too much current from the flowing through the circuit.

Position and working of a fuse in an Electric Circuit

A safety fuse having fuse wire 'F' of the suitable thickness is stretched between metallic terminals C_1 and C_2 fixed to an insulating porcelain holder P. This holder can fit into a similar female socket connected in series with live wire of the circuit. A fuse is always connected to the live wire of the circuit.

When the current in the circuit exceeds, the fuse wire gets heated and melted, thereby breaking the circuit. The appliance is, thus, saved from damaging by heavy current. The circuit is then made reusable by inserting a new fuse into the socket.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. lower, 2. light, 3. switch, 4. heating, 5. opened

III. Write whether the following statements are 'true' or 'false':

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

IV. Tick (✓) the correct options in the following :

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

15

Light

I. Answer the following questions:

Ans. 1. Light is a form of energy which produces sensation of sight.
The property of light travel in a straight line is called the rectilinear propagation of light.

To show that light travels in a straight line.

label three cardboards as A, B and C. Make a small hole in the centre of each cardboard. Keep the cardboards vertically so as the three holes remain in a straight line. Place a lighted candle near the hole of the cardboard A. Bring the eye near the hole of cardboard C.

You can see the flame of the burning candle clearly. It is because the light from the candle is passing through the holes in a straight line. The flame is not visible if you disturb the cardboard B. It means that light does not travel in a zig-zag path. So, it is concluded that light always travels in a straight line.

2. When the light falls on the surface, all or part of it is sent back from the surface. This is called the reflection of light.

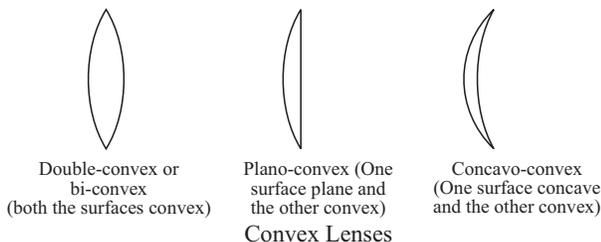
Laws of Reflection

- (i) When a ray of light falls on a mirror, it is reflected in such a way that the angle of incidence is equal to the angle of reflection.
 - (ii) The ray is reflected back in the same media.
 - (iii) The incident ray, the normal at the point of incidence and the reflected ray, all lie in the same plane.
3. A piece of transparent material which has one or two spherical surfaces is called a lens.

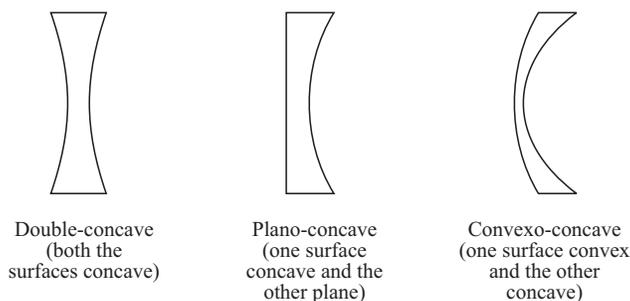
Types of Lenses : There are two types of lenses.

(i) **Convex Lens or Converging Lens :** A convex or converging lens is thicker at the centre and gradually becomes thinner towards the edges. There are three types of convex lenses : double-convex or bi-convex (both the surfaces convex; plano-convex (one surface plane and the other convex) and concavo-convex (one surface concave and the other convex).

(ii) **Concave Lens or Diverging Lens :** A concave lens is thinner at the centre and gradually becomes thicker towards the edges. There are three types of concave lenses : double-concave (both the surfaces concave); Plano-concave (one surface concave and the other plane) and convexo-concave (one surface convex and other concave).

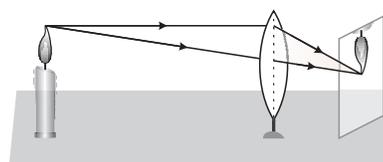


- Take a convex lens mounted on a lens stand. Place a lighted candle on the right hand side of the lens, at a distance of about 60 cm. Place a white paper sheet mounted on a piece cardboard, on the left hand side of the lens. Move the screen forward and backward until a sharp image of the candle is obtained.



Concave Lenses

Now change the position of the candle by placing it at a distance of about 50 cm. Again move the screen forward and backward until you obtain the image of the flame. Note the changes in the size of the image. Repeat the experiment many times by moving the candle forward by 10 cm in each case.

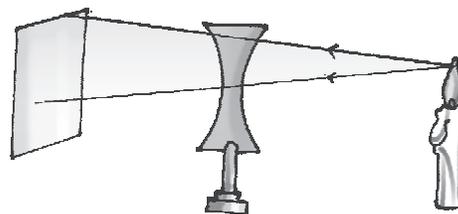


Nature and size of the image formed by a convex lens

You will notice, that as the candle is moved towards the lens, the size of the image becomes larger and larger.

- Take a concave lens mounted on a lens stand. Place a lighted candle on right hand side of the lens at a distance of about 60 cm. Place a screen on the left hand side of the lens, in an upright position. Move the screen forward or backward. No image is formed on the screen at any position. However if you look through the lens from the side of the screen you will find an erect, diminished and virtual image of the candle.

Now move the candle 10 cm towards the lens. Adjust the position of the screen to get an image. You will notice that no image is formed on the screen. But when you look through the lens by the side of the screen, you will notice a virtual, erect and diminished image of the candle.



Nature and size of the image formed by a concave lens

Plane mirrors :

A plane mirror is used :

- (a) as a looking glass;
- (b) in showrooms, barbers saloon etc. in order to enable a person to see at once not only the front view of himself but also the back and the side views;
- (c) to produce optical illusions on a stage;
- (d) in the construction of reflecting instrument like periscope.

Spherical Mirrors :

Concave mirrors are used in torches and flash lights.

Dentists use concave mirrors to look at the back of your teeth.

Make up artists also use concave mirrors for the same reason. A concave mirror is also used while shaving.

Convex mirrors are often used as rear-view mirrors in vehicles. The driver can see images of vehicles coming from the entire road behind him in the small reflection. They are also used as a reflector in a street lamp.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. virtual, 2. black, 3. concave, 4. converge

III. State whether the following statements are 'true' or 'false':

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

IV. List the differences between :

- Ans.**
- 1. Objects have rough surface in diffuse reflection while object have smooth surface in regular reflection.
 - 2. A real image is always inverted and can be obtained on the screen. But a virtual image is always erect and cannot be obtained on a screen.

VI. Tick (✓) the correct option in the following :

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

Water

(A Precious Resource)

I. Answer the following questions:

- Ans.** 1. All living organisms including human beings need water to remain alive. We need water not just to remain alive but to sustain our way of life. The importance of water for sustaining life can be given as under :
- (i) **Water in Living Things :** Every organism consists mostly of water. Human body consists about 65% of water, so as other animals also.

All living beings need plenty of water to carry out their life processes. They must take in nutrients to remain alive and healthy. Watery solution help to dissolve these nutrient and carry them to all parts of the organism's body.

Every organism must keep its water supply almost normal or it will die. If the body losses more than 20% of its normal water content, a person will die painfully.

Water plays a vital role in the metabolic reactions taking place inside the body. It acts as a universal solvent, thus, providing a medium for chemical reactions to take place.

Properties of solubility and fluidity of water are useful in the processes of digestion, blood circulation and excretion. Water also helps in regulating our body temperature by the process of sweating.

- (ii) **Water in the Homes :** In our homes, we need water for cleaning, bathing, washing, carrying away wastes, gardening and for cooking and drinking.
 - (iii) **Water in Irrigation :** People grow crops and other vegetation mostly in the areas where there is plenty of water from rains.
 - (iv) **Water in electric Power :** Water is used to produce electric power.
 - (v) **Water in the Industries :** An industry uses water in many ways. It uses water as a raw material in soft drink, canned fruits and many other products. It uses water for cleaning fruits and vegetables before canning and freezing then.
 - (vi) **Water in transport :** Since people learnt how to make boats they began using rivers and lakes to carry themselves and their goods from one place to another. Later, they built larger boats and sailed across the ocean in search of new places and new trade routes. Today people still depend on water transportation to carry heavy and bulky products like machinery, coal, grain and oil.
 - (vii) **Water for Recreation :** People build most of their recreation areas near lakes, rivers and seas. They enjoy water sports such as swimming, fishing and sailing. People also enjoy the beauty of a quiet lake, a thundering waterfall or a roaring surf.
2. **Sources of Water :** There are three sources of water.
- (i) **Rivers and Lakes :** Rivers and lakes, streams and ponds etc., fulfil only 2.6% of the total water resources of the world. It is the fresh water which is fit for drinking, irrigation and other uses.

Most cities that depend on rivers for water are located at the river banks. The amount of water in a river depends on the amount of rainfall

over the land which drains into the river and the amount of snow that melts on mountains.

(ii) **Oceans** : Oceans are the largest reservoirs of natural water because streams and rivers flow into them. Almost 97% of all water is in the oceans. But this water is too salty (saline) to be used for drinking, cooking, farming and manufacturing.

(iii) **Underground Water** : Cities which are far away from rivers and lakes use underground water. Some of the rainwater seeps into the ground through the soil and reaches the hardrock collecting there as Water-table. It becomes available to us as ground water. This ground water is used by plants for growth and development and is often used by human beings for meeting daily needs of water.

3. Hazards caused by waste dumped in water

(i) **Effect on Health** : Polluted water can cause many diseases like diarrhoea, dysentery, typhoid, jaundice, hepatitis, etc. The household sewage if not properly disposed, can mix with drinking water supply.

(ii) **Effect on Quality of Water** : The domestic sewage, industrial effluents and agricultural wastes decrease the quality of water to a considerable amount. A lake or river can become dead in due course of excessive dumping of wastes in it.

(iii) **Effect on Aquatic Plants and Animals** : Due to dumping of wastes, the quality of water goes down. This also disturbs the oxygen because in water, on which aquatic life depends, factories and industries release some very harmful chemicals. They are poisonous and damage aquatic life to a large extent.

4. Water in which soap does not lather well is called hard water, for example seawater. Water in which soap lathers is called soft water. For example : river, water. Usually using hard water is harmful and is a disadvantage.

5. We get water for domestic use as follows :

(i) The raw water is passed through screen filters which remove large insoluble particles like twigs and leaves etc.

(ii) Alum is added at this point. It helps in settling fine particles of clay which may be suspended in water. This process is called Coagulation.

(iii) The water is then allowed into a settling tank. Heavy sediments settle down here.

(iv) The clear water from the top is now passed through beds of sand filters to remove any left over insoluble solids.

(v) Finally, a small amount of chlorine gas is passed through water in the chlorination tank.

II. Fill in the blanks with the appropriate word/words given in the brackets:

Ans. 1. Rain, 2. 75%, 3. salty, 4. drought, 5. boiling

III. Write whether the following statements are 'true' or 'false':

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

IV. Water heaters, kettles and cooking utensils in which hard water is boiled get coated on the inside the with a layer of insoluble material called 'fur'. Fur is considered a nuisance because Fur has to be remove during acids another chemicals.

V. Define the following terms :

Ans. (i) Rainwater is accumulating and storing, of rainwater. It has been used to provide during water, water for livestock, water for irrigation or to refill aquifers in a process called groundwater recharge.

(ii) The system of pipes that carries sewage or waste water from houses and other buildings is called a sanitary sewage system.

VI. Tick (✓) the correct options in the following :

Ans. 1. (c), 2. (c), 3. (a)

17

Forest (Our Life Line)

I. Answer the following questions:

Ans. 1. A biotic community having trees and other vegetation with a closed canopy is called forest. These are three major groups of forests :

(i) **Coniferous forests :** These forests are made up of coniferous (cone-bearing) and evergreen trees. They mainly consist of coniferous trees such as pines, firs, spruces and other evergreen trees which bear cones and have needle-like leaves. These forests extend as a continuous belt around the North Pole region and high mountains in Europe, Asia and North America.

Coniferous trees provide us softwood which is considered to be the finest quality of wood for construction purposes.

(ii) **Temperate Deciduous Forests :** Trees found in temperate deciduous forests mostly have broad and flat leaves which help them to do maximum transpiration. These forests are named so because they lose their leaves every autumn and grow new ones in the spring. Trees which grow in these forests include ashes, beeches, hazels, chestnut, maple, oak, sal and shisham.

The dense and strong wood of deciduous trees is called hardwood and used in making high quality furniture.

Deciduous forests are further divided into two groups.

- (a) Tropical Deciduous Forests : These forests occur in sub-tropical regions.
 - (b) Mid-latitude Deciduous Forests : These forests are found in coastal temperate regions.
 - (iii) Tropical Rainforests : These forests grow in those regions that have warm and wet weather all throughout the year. These regions include central America, South-East Asia, Central and Western Africa, New Guinea, the Pacific islands and the north of Australia. In India they are found in Assam (Assom), Meghalaya, Andaman and Nicobar islands and slopes of Western Ghats.
2. The forests are useful of mankind because forests give us a large variety of products which are much valuable of mankind. These products are as follows :
- (i) **Food** : Forests provide us a number of food items like vegetables, fruits, cereals, pulses, spices, etc. Wild fruits have been gathered by humans beings since ancient trees. They are eaten raw or preserved. Tamarind (imili) is widely used in food. Asafoetida (heeng), a gum obtained from plant sources, is used to flavour food and in medicines. Spices like cinnamon (delchini), the bark of a tree, bay leaves (tej patta), cardamom (elaichi) and pepper are all forest products. Forests are also a source of wild honey.
 - (ii) **Fuel** : People living near forests get their requirement of fuel from forests. They are allowed to pick the fallen branches or cut only the dried lower branches of the trees. Present day fuels like coal, petrol and kerosine, diesel and natural gas were formed from the forests over millions of years, after they got in the earth.
 - (iii) **Timber** : Wood from teak and shisham trees is widely used for making furniture. In the hills, wood from pine and deodar is used for making houses and furniture.
 - (iv) **Essential Oil** : Many essential oils are obtained from rosha grass, khas and sandalwood etc. These oils are used in the manufacture of soaps, cosmetics, perfumes, confectionary and medicines etc.
 - (v) **Medicines** : Plants have been the most important source of medicines. The forests are filled with medicinal plants.
 - (vi) **Perfume** : Aromatic plants like lemon grass, lavender, sandalwood and jasmine are used for making perfumes.

- (vii) **Cosmetics** : There are many wild plants that find their way to use in cosmetics industry. Natural products are preferred to chemicals as they do not cause any harm to the skin.
 - (viii) **Gum and Resins** : Gum obtained from plant is used in paper industry and confectionary as some gums are also edible. Resin obtained from pine is collected and is used to make turpentine oil. It is used in paints and varnishes.
 - (ix) **Paper** : Eucalyptus and bamboo are two plants used for making paper.
 - (x) **Rubber** : Rubber which is used in the manufacturing of tyres, tubes, raincoats, belts, sports goods etc., is a forest plant product. It is obtained from the white, milky substance called latex of the rubber plant.
 - (xi) **Tannins** : They are obtained from bark, wood, leaves, fruits and roots.
 - (xii) **Other Useful Forest Products** : Kattha is obtained from the wood of a khar tree. It is mainly used along with betel leaves (paan) as an Indian delicacy. Kattha is also used in making dyes.
 Soap and Shampo substitutes like ritha and shikakai are obtained from forest plants. Camphor, peppermint oil and balladonna are obtained from forests and used in medicines. Quinine, cacaine and penicillin are other product obtained from forests.
3. The starting point of a food chain always plant because plants are the only living beings which can make their own food. All other living beings depend on plants, directly or indirectly for their food. Thus every food chain starts from the plants. That's why they are also known as producers.
 4. The cutting down of trees is called deforestation. All these activities prove destructive for us.
 Due to increasing demand of land and forest products, large forest areas are cut every year for cultivation, irrigation and for construction of houses, buildings, roads, dams etc. People often cut trees for fuel, wood, fodder, timber etc.
 When we cut down forests many animals are made homeless. Many others die for lack of food. The barren and tree less land cause many types of imbalance of nature. The water cycle and food chain etc., are disturbed.
 5. The growing population and man's dependences on forests made man cut down trees blindly and indiscriminately. This cutting down of trees is called deforestation. This disturbs the balance in nature. The man has disturbed the ecosystems by cutting trees. For example,

When it rains, most of the rain water is absorbed by trees and taken up by the stem to the leaves. It then evaporates during the process of transpiration. If no trees were there, the rain water simply runs off the soil into rivers. Much less goes back into the air as water vapour. The air then becomes drier and finally less rain is produced. Trees hold soil firmly around the roots and help in preventing soil erosion. If rain falls and a strong wind blows in an area having less number of trees, the soil can be easily eroded. Due to soil erosion, the top fertile layer of soil is lost and so the land becomes a waste land because nothing can be grown in it.

The soil can be easily washed into rivers by the rain water filling up the river bed and causing floods. Loss of forests also means loss of a habitat for different types of animals and plants.

6. The importance of forest to human being and animals are as follows :

(i) **A habitat for plants and animals :** Forests provide a habitat for large number of organisms. A peculiar forest has peculiar flora and fauna. The tropical rain forests do not get enough sunlight so they have shade loving plants in plenty. Plants such as ferns, lichens and mosses usually grow in these forests. Due to humid atmosphere a large variety of epiphytes (orchids), creepers and climbers grow here.

(ii) **Maintaining the Groundwater Level :** Trees transpire water continuously. This water comes down to land in the form of rains. Some of this water percolates down to increase water level of the water-table.

The earth's surface has alternate layers of pervious and impervious soil. Water passes down through the pervious soil and comes to a halt at the impervious layer. This water forms the ground-water table.

(iii) **As Agents of Percolation of Water :** Forests act as speed breakers for heavy rains which may damage the upper fertile soil. When forests fell down, the soil is exposed to direct showers of heavy rains. This leads to floods. The soil under the forests has a lot of humus which absorbs most of the rain water like a huge sponge. The water gradually seeps down into the ground. This movement of water is called percolation.

(iv) **As Retainer and Source of Water :** Forests play a very vital role in maintaining the water cycle in nature. Plants release large amounts of water in the form of water vapour through the process of transpiration. Water vapour in the air is an important source of rainfall.

- (v) **Help to Prevent Soil Erosion :** The removal of top soil by natural agents like sun, water, wind, etc. is called soil erosion. The top soil is very fertile. Removal of this soil leads to loss of agricultural land.
- (vi) **Maintaining Humidity :** Dampness (wetness) in the air means humidity. It denotes the water vapour quantity in the air at a given time and temperature. It varies from place to place and day to day with the changing of temperature.

7. Dependence of Plants on Animals

- (i) **For Carbon-dioxide :** Carbon-dioxide released by animals during the process of respiration is used by the plants to prepare their food.
 - (ii) **For Pollination and Dispersal of Seeds :** Plants cannot move from one place to another and so need support in the pollination and dispersal of seeds. Animals helps these phenomena to occur. Some plants have mechanisms for the dispersal of seeds. However in most cases animals play an important role in the pollination and dispersal of seeds.
 - (iii) **For Nutrients :** Plants need a nutrient-rich soil for their proper growth and development. Animal excreta along with dead animal matter (decomposed by micro-organisms) supply nutrients to the soil, which in turn, is absorbed by the plants.
8. Trees transpire water continuously. This water comes down to land in the form rains. Some of thin water percolates down to increase water level of the water table. Thus forest help in maintaining the level of ground water-table.
9. If all forests disappear on the earth than many animals are made homeless. The water cycle and food chain it will disturbed. Many other animals that depended on the plant also disappeared. The barren and tree less land will cause many types of imbalance in nature. The soil can be easily washed into rivers by the rain water filling up the river bed and causing flood. This would happen because due to increasing demand of land and forest products, large forest areas are cut every year for cultivation, irrigation and for constructions of house, building, roads, dams, etc. People often cut trees for fuel, wood, fodder, timber, etc.

II. Fill in the blanks with the suitable word/words :

Ans. 1. high, 2. Tropical, 3. Tannin, 4. Resin, 5. khair, 6. paper,
7. transpiration, 8. producer, 9. 1/5th, 10. extinct

III. Write whether the following statements are 'true' or 'false' :

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

IV. Match the statements in column 'A' with those in column 'B':

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

V. Name each of the following :

Ans. 1. Pines, Firs, Spruces, 2. Coniferous, Temperate Deciduous, Tropical Rain Forest, 3. Meghalaya, Assam, Andaman and Nicobar, 4. Water, Wind, 5. Snakes, Lizards, 6. Timber, Resin, Rubber, 7. sandalwood, Khas, 8. Pine, Deodar, 9. Aloe vera, Amla, 10. Turpentine oil

VI. Tick (✓) the correct option in the following :

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