

Chapter-1

Nutrition in Plants

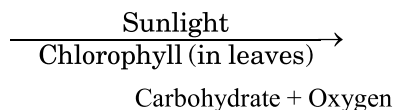
1. All organisms need food for :
 (a) their growth, (b) to build their bodies, (c) to repair and replace the damaged parts of the body, (d) to provide the energy to carry out all necessary life processes in the body.

2.

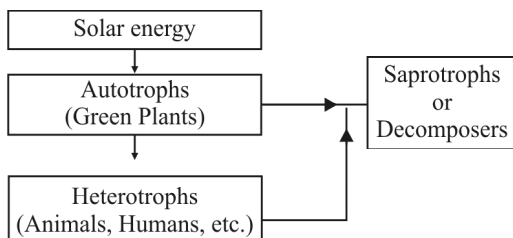
Parasite	Saprotroph
(i) They feed on living organisms.	(i) They feed on dead and decaying matter.
(ii) They take ready made food from the host on which it feeds.	(ii) They convert the matter into solution and then absorb the nutrients from them.

3. The Iodine test can be used to test the presence of starch in leaves. For this, first the leaves are boiled in alcohol to remove chlorophyll from them and then 2 drops of iodine solution are added to it. The colour changes to blue which indicates the presence of starch.
4. Synthesis of food in green plants takes place by the process of photosynthesis. During photosynthesis, chlorophyll containing cells of the leaves, in the presence of sunlight, using carbon dioxide and water to synthesise carbohydrates. During this process oxygen is released.

Carbon dioxide + Water



5.



6. (a) autotrophs, (b) starch, (c) chlorophyll, (d) carbon dioxide, oxygen.
7. (a) *Cuscuta*, (b) Insectivorous plant, (c) Stomata.
8. (a) (ii) parasite (b) (iii) Pitcher plant.
9.

Column I	Column II
Chlorophyll	Leaf
Nitrogen	<i>Rhizobium</i>
<i>Cuscuta</i>	Parasite
Animals	Heterotrophs
Insects	Pitcher plant

10. (i) F, (ii) F, (iii) T, (iv) T.

11. (ii) Stomata

12. (iv) leaves

13. A green house is a framed structure covered with a transparent material sheets. Farmers grow many fruits and vegetable crops inside large green houses to provide best growing conditions to their crops. Advantages of green houses are :
1. Safety from open adverse environmental conditions.
 2. Safety from pests, weeds and wild animals.
 3. Crops can be grown even in off-season.
 4. Prevention of water loss due to evaporation in open dried atmosphere.
 5. Safety from too much cold and fog.

Chapter-2

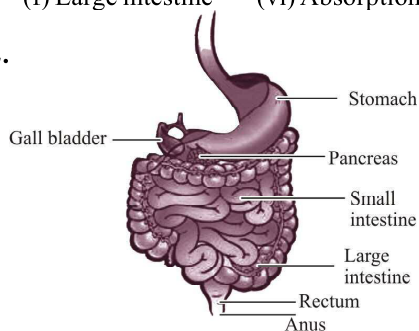
Nutrition in Animals

1. (a) ingestion, digestion, absorption, assimilation, egestion. (b) liver, (c) digestive, (d) villi (e) food vacuole.
2. (a) F (b) T (c) T (d) T.
3. (a) (iii) small intestine (b) (iv) large intestine.
4.

Column I	Column II
Food Components	Product(s) of digestion
Carbohydrates	Sugar
Proteins	Amino acids
Fats	Fatty acids and glycerol
5. The finger-like outgrowths on the inner walls of the small intestine are called villi. Their function is to increase the surface area for the absorption of the digested food.

6. Bile is produced in the gland called liver. Bile juice is stored in a sac like structure called gall bladder and it helps in the digestion of fats.
7. Cellulose is the carbohydrate present in the grass that can be digested by ruminants. Ruminants have a large sac-like structure called Caecum between the small intestine and the large intestine. There are certain bacteria present in ruminants and they help in digesting the cellulose of the food. In humans, these bacteria are absent. Hence, they are incapable of digesting cellulose.
8. Glucose is the simplest form of carbohydrate and absorbed by the cells into the blood and transported to the cells of different organs. Glucose breaks down in the cell with the help of oxygen into carbon dioxide and water and the energy is released. Thus, the glucose gives instant energy.
9. (i) Small intestine, (ii) Mouth, (iii) Stomach, (iv) Small intestine, (v) Large intestine.
10. **Similarity :** In *Amoeba*, the digestive juices are secreted into food vacuole and in human beings, the digestive juices are secreted in stomach and small intestine. These secreted juices act on the food and break it down into simpler substances. **Difference :** *Amoeba* captures food with the help of false feet or **Pseudopodia** and human beings take in food through mouth.
11. **Column I** **Column II**
- | | |
|---------------------|---------------------------------|
| (a) Salivary gland | (iii) Saliva secretion |
| (b) Stomach | (iv) Acid release |
| (c) Liver | (i) Bile juice secretion |
| (d) Rectum | (ii) Storage of undigested food |
| (e) Small Intestine | (v) Digestion is completed |
| (f) Large intestine | (vi) Absorption of water |

12.

**A part of human digestive system**

13. Human beings are Heterotrophs i.e., they cannot synthesise their own food. They depend on green plants for their food directly or indirectly. The green plants produce their own food in the form of glucose and they can provide sufficient energy to survive.

Chapter-3**Heat****1. Similarities :**

- (i) Both of them use celsius scale on the glass tube.
- (ii) Both of them have a long narrow uniform glass tube.
- (iii) Both have a bulb at one end that contains mercury.

Differences :

- (i) Clinical thermometer is used to measure temperature of human body whereas laboratory thermometer is used to measure temperature of other objects.
- (ii) Clinical thermometer has a kink near the bulb that does not let the mercury fall on its own. This kink is absent in laboratory thermometer.
- (iii) Clinical thermometer reads temperature in the range 35°C to 42°C while the range of laboratory thermometer is 10°C to 110°C.

2. Conductor—aluminium, iron**Insulator**—plastic, wood.

3. (a) temperature (b) clinical (c) celsius (d) radiation (e) conduction (f) dark.
4. (i) Land breeze blows during (d) night
- (ii) Sea breeze blows during (c) day
- (iii) Dark coloured clothes are preferred during (a) Winter
- (iv) Light coloured clothes are preferred during (a) Summer
5. Many layers of clothing have spaces between them where the air is trapped. As air is bad conductor of heat, it does not allow the body heat to escape out. Thus, the layers of clothing keeps us warm in winter.

6.



7. As white colour reflects the maximum heat falling on it so it is advised to paint outer walls of the houses white in hot climate to avoid excessive heating.
8. (d) between 30°C and 50°C
9. (b) not flow from iron ball to water or from water to iron ball.
10. (d) does not become cold.
11. (c) copper is a better conductor of heat than the stainless steel.

Chapter-4

Acids, Bases and Salts

1.

Acids	Bases
1. Acids are sour in taste.	1. Bases are bitter in taste.
2. Acid is a substance which contains hydrogen ion (H^+).	2. Bases are substances which contain hydroxyl ion (OH^-).
3. They turn blue litmus paper red.	3. They turn red litmus paper blue.

2. Ammonia has basic nature.
3. Litmus solution is extracted from lichens. It is used to test the nature of substances i.e., whether the substance is an acid and or a base.
4. Distilled water is neutral. It can be verified with litmus test. Litmus paper does not change its colour when dipped in distilled water.
5. The reaction between an acid and a base is known as neutralization. Salt and water are produced in this process with the evolution of heat.

Acid + Base

→ salt + water + (Heat is evolved)

6. (i) F (ii) F (iii) T (iv) T (v) F.
7. Dorji can decide this with the help of litmus paper:
 - (i) The drink which turns the blue litmus paper red, is acidic.
 - (ii) The drink which turns the red litmus paper blue, is basic.
 - (iii) The drink that does not affect the red or blue litmus paper at all is neutral.
8. (a) Acidity means the excess acid produced in stomach causing discomfort. To neutralise the effect of excess acid antacid such as milk of magnesia is taken.
 - (b) When an ant bites, it injects the formic acid into the skin that causes irritation. To neutralise the effect of this acid, calamine solution is applied which contains zinc carbonate which is a weak base and does not harm the skin.
 - (c) The wastes of many factories contain acids. If these wastes are disposed off in the water bodies, the acids in them will kill the aquatic organisms. Thus these are first neutralized by adding basic substances before disposing off.
9. The colour of turmeric indicator is yellow.
 - (i) When hydrochloric acid is added, it turns blue.
 - (ii) When sodium hydroxide is added, it turns red.
 - (iii) When sugar solution is added, it does not change colour.
10. There are two possibilities regarding the nature of the solution :
 1. The solution is basic as the blue colour of litmus paper does not change but if a red colour litmus paper is used, it may remain red.
 2. The solution is neutral as the colour of litmus paper does not change.
11. (ii) a and d.

Chapter-5

Physical and Chemical Changes

1. (a) Chemical change
- (b) Physical change

- (c) Chemical change
(d) Physical change
(e) Physical change
(f) Chemical change.
2. (a) False.
Correct statement : Cutting a log of wood into pieces is an irreversible physical change.
(b) False.
Correct statement : Formation of manure from leaves is a chemical change.
(c) True (d) False.
Correct substance : Iron and rust are two different chemical substances.
(e) True.
3. (a) calcium carbonate, (b) sodium hydrogen carbonate, (c) painting or greasing, galvanization, (d) physical, (e) chemical.
4. The equation for the reaction between baking soda and lemon juice is—
 Lemon juice + Baking soda
 (Citric acid) (Sodium hydrogen Carbonate)
 $\longrightarrow$ CO_2 (bubbles) + other substances.
 Carbon dioxide
 This is a chemical change.
5. When a candle burns, both physical and chemical changes take place :
 1. Physical change is the melting of wax and vaporization of melted wax.
 2. Chemical change is burning of wax to give carbon dioxide, heat and light.
 LPG is an example of physical and chemical change both taking place together. When LPG comes out of a cylinder, it is converted from liquid to gaseous state which is a physical change.
 When this gas burns in air, it is a chemical change.
6. Setting of curd is a chemical change as curd is the new substance formed from the original substance milk with different taste, smell and chemical properties.
7. Burning of wood may be represented as
 Wood + Oxygen $\longrightarrow$
 Charcoal + Carbon dioxide + Heat + Light.
 This is a chemical change as new substances are formed.
 Cutting of wood into small pieces is a physical change as no new substance is formed, only size of the wood is reduced.

8. Take a cup full of water in a beaker and add a few drops of dilute sulphuric acid. Heat the water and when it starts boiling add copper sulphate powder slowly while continuously stirring. Continue adding copper sulphate powder till no more powder can be dissolved. Filter the solution and allow it to cool. After some time crystals of copper sulphate solution can be seen.
9. Rusting is caused due to the reaction of iron with oxygen and moisture in the atmosphere. By painting the gate its contact of iron with oxygen and moisture is cut off and hence rusting is prevented.
10. In coastal areas, the content of moisture is higher in comparison to deserts, hence the rusting of iron objects is also faster.
11. (ii) Process - B is a chemical change.
12. (iii) Both processes A and B are chemical changes.

Chapter-6

Respiration in Organisms

1. An athlete needs to supply extra energy to his muscle cells which have worked hard during running. For this, he breathes faster and deeper so that more oxygen is supplied to the cells. This speeds up the breakdown of food and as a result, more energy is released.
2. **Similarities :** Aerobic and anaerobic respiration both produce energy and give out carbon dioxide.
Differences :
- | Aerobic respiration | Anaerobic respiration |
|---|--|
| (i) It occurs in the presence of oxygen. | (i) It occurs in the absence of oxygen. |
| (ii) Large amount of energy is released. | (ii) Smaller amount of energy is released. |
| (iii) Glucose is broken down into water and carbon dioxide. | (iii) Glucose is broken down into lactic acid or alcohol and carbon dioxide. |
3. Sometimes dust particles, pollen etc. pass nasal hair and irritate the lining of the nasal cavity. Then we sneeze as we want to get rid of the unwanted particles like dust, pollen etc. from our body. It allows only clean and dust free air to enter our body.

4. Test tube A has highest concentration of CO_2 . This is because test tube A contains snail. Snail is an organism that breathes in O_2 and breathes out CO_2 . Hence CO_2 concentration increases in test tube A.

Test tube B contains a water plant, which takes in CO_2 for food synthesis and gives out O_2 . Hence more O_2 concentration is found in test tube B.

Test tube C contains both a snail and a plant. The CO_2 produced by the snail is utilized by the plant for its food synthesis and the O_2 released by the plant is utilized by the snail for respiration. Therefore, test tube A has the highest concentration of CO_2 .

5. (a) (iii) spiracles, (b) (ii) Lactic acid, (c) (ii) 15-18, (d) (ii) move downwards.

6. **Column I**

- (a) Yeast
(b) Diaphragm
(c) Skin
(d) Leaves
(e) Fish
(f) Frog

Column II

- (iii) Alcohol
(iv) Chest cavity
(i) Earthworm
(v) Stomata
(ii) Gills
(vi) Lungs and skin

7. (i) F, (ii) F, (iii) T, (iv) F (v) T.

8.

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

9. (b) The amount of air available to a person is less than that available on the ground.

Chapter-7

Transportation in Animals and Plants

1. **Column I**

- (i) Stomata
(ii) Xylem
(iii) Root hairs
(iv) Phloem

Column II

- (b) Transpiration
(d) Transport of water
(a) Absorption of water
(c) Transport of food

2. (i) arteries, (ii) red blood, (iii) capillaries, (iv) heart beat, (v) urea, (vi) salts (vii) urine (viii) transpiration.

3. (a) (i) xylem, (b) (iii) under the fan

4. Transport of materials is necessary in both plants and animals as every cell needs a regular supply of nutrients and oxygen for releasing energy through respiration. The food that we eat is broken down into smaller components to be absorbed by the cells. The oxygen that we inhale is also transported to all the cells of the body. Our body also requires a constant removal of waste materials such as carbon dioxide, for the transport of all these materials (food, oxygen and wastes), our body has a specialised transport system. Similarly, in plants the transport of water and food is accomplished with the help of a complex transport system.

5. The blood platelets are responsible for the clotting of the blood. When some injury occurs, blood starts flowing. But it clots on its own. If there are no platelets, the blood will not be able to clot and keep on flowing. Huge loss of blood ultimately causes death.

6. There are small openings on the lower surface of the leaves. These pores are called stomata. These openings are surrounded by guard cells.

Functions of stomata :

1. It helps in the transpiration of water *i.e.*, loss of excess water from the plant.

2. Loss of water from the stomata creates an upward pull *i.e.*, suction pull which helps in absorption of water from the roots.

7. Transpiration is the evaporation of water from the plants. The water evaporates through the stomata present on the surface of the leaves. Transpiration is mainly responsible for the loss of water that was absorbed by the plants. However, it is important for plants as it helps in the movement of water to the top of all trees. As a result, it helps in the distribution of water throughout the plant body. It also helps in cooling the plant.

8. There are four components of blood :

(i) **Plasma** : Plasma is a liquid part of blood which is yellowish in colour and contains 90% water. It contains food, enzymes, wastes, proteins, etc.

(ii) **Red Blood Cells (RBCs)** : Red blood cells

are disc shaped cells containing red coloured pigment called haemoglobin in it. Haemoglobin helps in transportation of oxygen.

(iii) White Blood Cells : White blood cells are the fighting cells which protect us against bacteria and foreign materials causing infections.

(iv) Platelets help in clotting of the blood.

9. Blood is needed by all parts of the body as it is an important part of the transport system of our body. It performs the following important functions :

- (i) It transports O_2 from the lungs to all the body cells.
- (ii) It carries CO_2 , a waste product back to the lungs so that it can be exhaled easily.
- (iii) It transmits heat, thus regulating the body temperature.
- (iv) It also fights off diseases and infections.

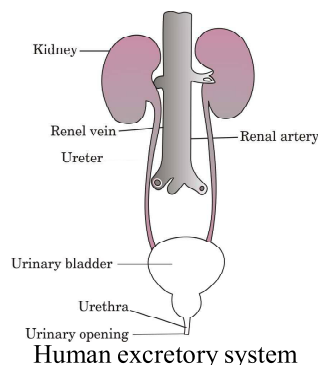
10. A red pigment called haemoglobin gives the blood its red colour. This pigment helps in carrying oxygen to various parts of the body by blood.

11. The human heart is divided into four chambers. The upper two chambers are called right and left atrium and the lower two chambers are called the right and left ventricles. Right atrium receives carbon dioxide rich blood from the body. Blood from right atrium enters the right ventricle, which contracts and pumps the blood to the lungs.

On the other hand, oxygen rich blood from the lungs returns to the left atrium. From the left atrium, blood enters left ventricle. Left ventricle contracts and pumps the blood to all parts of the body.

12. Certain waste and toxic products are formed during function of body cells. The waste products like urea etc. are toxic. When these toxic materials are not removed from the body they get mixed with blood and can damage the cells of body. It is necessary to remove such poisonous waste materials from our body.

13.



Human excretory system

Chapter-8

Reproduction in Plants

1. (a) Vegetative reproduction, (b) unisexual flower, (c) pollination, (d) fertilisation, (e) wind, water, animals.

2. **Different methods of asexual reproduction are:**

(a) Vegetative propagation : When vegetative parts of a plant like stem, leaves, roots and buds give rise to new ones, it is called vegetative propagation. e.g., rose.

(b) Budding : In yeast, new organisms are produced by the bud formation from the parent organism. After growing to full size, the bud gets detached and forms a new independent individual.

(c) Fragmentation : In organisms like algae, body of the organisms breaks up into two parts. Then each part grows into a new filament thus forming two organisms from a single one.

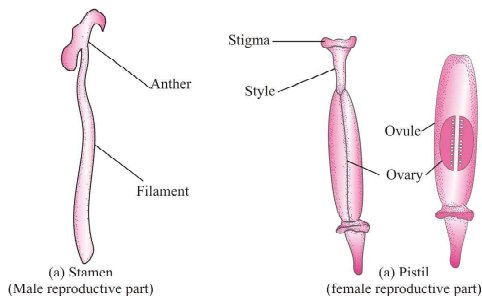
(d) Spore formation : Spores are tiny spherical unicellular structures protected by thick wall. The spore is stored in a hard outer covering called sporangium. Under favourable conditions, the hard cover breaks and spores spread for germination.

3. Sexual reproduction means involvement of both parents in the process of reproduction. It is found mainly in higher plants, where male gamete and female gamete fuse to form a zygote. These zygotes develop into individuals which are not identical. Offsprings inherit the characteristics of both the parents. In sexual reproduction, both parents survive after the process of reproduction.

4.

Asexual reproduction		Sexual reproduction
(i)	Only one parent plant is involved.	Both male and female parents are involved.
(ii)	Occurs in unisexual plants.	Occurs in bisexual plants.
(iii)	Occurs in lower plants.	Occurs in higher plants.
(iv)	Reproductive organs are not present.	Fully developed reproductive parts are present.
(v)	In most of the methods, original parent disappears.	Original parents remain alive after process of reproduction.
(vi)	Characteristic of only one parent is inherited.	Characteristics of both parents are inherited.
(vii)	No need of seeds.	Seeds are used to get new plants from a flower.

5.



6.

Self-Pollination	Cross-Pollination
(i) Pollen grains are transferred to the stigma of same flower.	Pollen grains are carried to stigma of another flower of another plant.
(ii) Occurs in bisexual plants having anther and stigma maturing at the same time.	Occurs in bisexual flowers having anther and stigma maturing at different times.
(iii) It takes place in plants like wheat, peas etc.	It takes place in plants like lady finger, tomato, brinjal etc.

7. When the pollen grain reaches stigma of a flower of same species, it starts growing out into the pollen tube of the stigma. This tube continues to grow inside the style till it reaches the ovule. Male cells are released into the ovule for the fertilisation with the female egg cell and thus the zygote is formed. After this process of fertilisation, the ovary develops into fruit and ovule into seeds.

8. (i) Some light seeds like that of madar, which are hairy, dry and small are carried away by the wind to different places.

(ii) Spiny seeds and fruits like that of xanthium and urena, stick to the clothes of passer-by and animals. These seeds are carried away by these agents to different places.

(iii) Some seeds are dispersed when the fruit bursts with sudden jerks like in castor and balsam.

(iv) In some plants having heavy seeds like that of coconut. Water acts as the dispersing agents.

9. Column I

Column II

(a) Bud

(iii) Yeast

(b) Eyes

(v) Potato

(c) Fragmentation

(ii) Spirogyra

(d) Wings

(i) Maple

(e) Spores

(iv) Bread Mould

10. (a) (iv) flower; (b) (i) fertilisation, (c) (iv) fruit, (d) (ii) bread mould, (e) (ii) leaves.

Chapter-9

Motion and Time

- (i) Oscillatory motion
 - (ii) Linear motion
 - (iii) Circular motion
 - (iv) Oscillatory motion
 - (v) Oscillatory motion
 - (vi) Linear motion.
- (ii), (iv), (v).
 - Time taken to complete 20 oscillations = 32 s
 - Time taken to complete one oscillation

$$= \frac{32}{20} = 1.6 \text{ s}$$

∴ Time period of the pendulum is 1.6 s.

4. Given, distance = 240 km
time taken = 4 hours

$$\therefore \text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}} = \frac{240 \text{ km}}{4h}$$

$$= 60 \text{ km/h}$$

$$\therefore \text{Speed of train is } 60 \text{ km/h.}$$

5. Given,

Odometer reading at 08:30 AM = 57321.0 km

Odometer reading at 08:50 AM = 57336.0 km

$$\therefore \text{Distance covered by the car} \\ = 57336.0 - 57321.0 \text{ km} \\ = 15 \text{ km.}$$

$$\text{Time taken} = 08:50 - 08:30 \\ = 20 \text{ minutes}$$

$$= \frac{20}{60} h = \frac{1}{3} h$$

$$\therefore \text{Speed in km/h} = \frac{15 \text{ km}}{\frac{1}{3} h} = 45 \text{ km/h.}$$

6. Given,

$$\text{time taken} = 15 \text{ minutes}$$

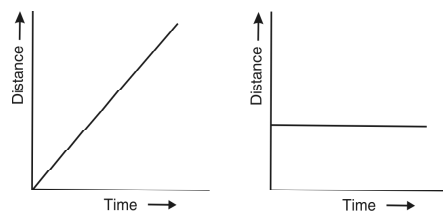
$$\text{Speed} = 2 \text{ m/min.}$$

Using the formula,

$$\text{Distance} = \text{Speed} \times \text{time} \\ = 2 \times 15 = 30 \text{ m}$$

- $\therefore$ Distance between Salma's school and her house is 30 m.

- 7.



8. (ii) Speed = Distance/Time is correct.
9. (iv) m/s.
10. Using formula, Distance
= Speed $\times$ time.
Distance covered during first 15 minutes

$$= 40 \times \frac{15}{60} = 10 \text{ km.}$$

Distance covered during next 15 minutes

$$= 60 \times \frac{15}{60} = 15 \text{ km.}$$

$$\therefore \text{total distance covered}$$

$$= 10 + 15 = 25 \text{ km.}$$

$$\therefore \text{(ii) } 25 \text{ km.}$$

11. 0.1 cm/s or 10 m/s

12. A is moving faster.

13. (iii).

Chapter-10

Electric Current and Its Effects

1. S.No. Electric Component Symbol

1. Connecting wires



2. Switch in 'ON' Position



3. Bulb



4. Cell



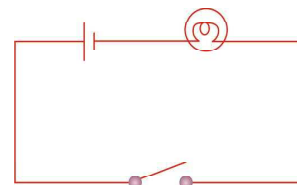
5. Switch in 'OFF' Position



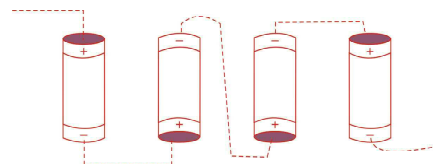
6. Battery



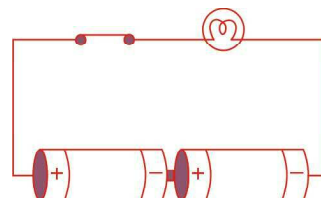
- 2.



- 3.



- 4.



5. Two effects of electric current are :
 - (i) When an electric current is passed through a wire, it gets heated up.
 - (ii) When an electric current is passed through a straight conductor, it behaves as a magnet.
6. Needle of a compass is a tiny magnet, which points in north-south direction. When a magnet is brought close to it, the needle shows deflection. Now, when the electric current is passed through the wire, it starts behaving as a temporary magnet. Hence, when such a wire is near a compass, it shows deflection. This is the magnetic effect of electric current.
7. No, the compass needle does not show deflection, when the switch in the circuit is closed because there is no battery in the circuit.
8. (a) positive, (b) battery, (c) becomes red hot and emits heat, (d) fuse.
9. (a) False, (b) True, (c) False, (d) True.
10. No, the electromagnet cannot be used for separating plastic bags from a garbage heap. Electromagnet attracts magnetic materials like iron. Thus, the plastic bags will not be attracted from garbage by an electromagnet.
11. No, we would not agree to replace a fuse by a piece of wire. Fuse uses a wire with specific melting point, according to the wire. So, the fuses with ISI mark should be used in our houses to prevent short circuits.
12. The possible defects in the circuit that need to be looked into are :
 - (i) Positive terminal of one cell should be connected to the negative terminal of the other cell.
 - (ii) Bulb should not be fused.
 - (iii) Switch should be closed properly.
 - (iv) Wire should not be broken.
13. (i) No bulb will glow.
(ii) All bulbs will glow simultaneously.
- (b) A convex mirror (ii) Can form image of objects spread over a large area.
- (c) A convex lens (i) Used as a magnifying glass.
- (d) A concave mirror (iii) Used by dentist to see enlarged image of teeth.
- (e) A concave lens (vi) The image is erect and smaller in size than the object.
4. (i) Plane mirror forms an erect image.
(ii) It forms a virtual image.
(iii) Size of the image is same as that of the object.
(iv) Image is formed at the same distance behind the mirror as the object stands in front of it.
(v) Image formed is laterally inverted *i.e.*, right hand side of the object seems to be the left side and vice-versa.
5. Letters which appear same when seen in a plane mirror are A, H, I, O, M, T, U, V, W etc.
6. The image which cannot be taken on a screen is called virtual image. When some object is placed very close to the concave mirror, we do not get any image on the white screen placed behind the mirror. Such image is called virtual image.
7. **Convex lens** (i) Convex lens forms both real and virtual image.
(ii) It can form a magnified image.
- Concave lens** (i) Concave lens always forms a virtual image.
(ii) Image is always diminished in size.
8. **Use of concave mirror** : by dentists to examine the teeth.
Use of convex mirror : side view mirror in vehicles.
9. Concave mirror can form a real image.
10. Concave lens always forms a virtual image.
11. (ii) Concave mirror.
12. (iii) 6m.
13. (iii) 4 m/s.

Chapter-11

Light

1. (a) virtual, (b) mirror, (c) plane, (d) real, (e) lens.
2. (a) F (b) T (c) T (d) F (e) F
3. **Column I** (a) A plane mirror
Column II (v) The image is erect and of the same size as the object.

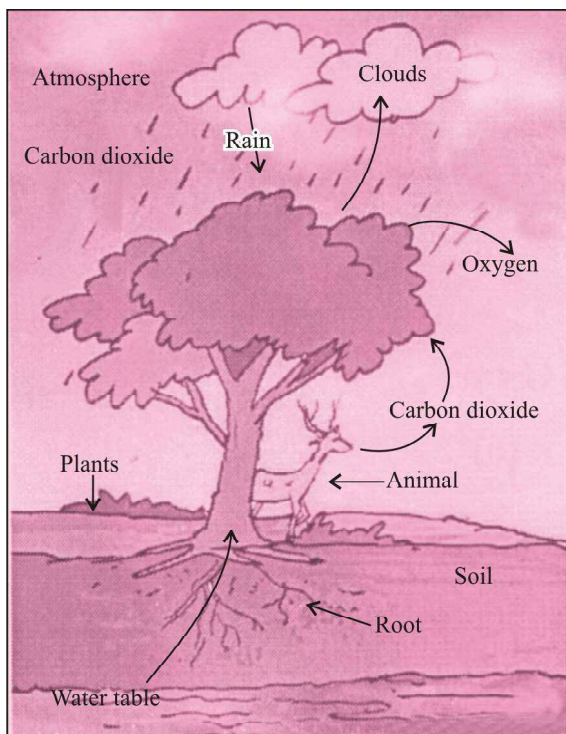
Chapter-12

Forests : Our Lifeline

1. Various types of animals (herbivores, carnivores, omnivores) live in forests and contribute to food chain. Following activities show how animals help a forest grow and regenerate.

- (1) Animals help in dispersal of seeds from one part of the forest to other part.
 - (2) Animal excreta, and their dead bodies when decompose into soil, act as manure for the plants.
 - (3) Micro-organisms convert dead plants and leaves into humus which is rich in nutrients. Humus in soil provides necessary minerals for plant growth.
2. Rain drops in a forest do not hit the ground directly. The upper most layer of the forest canopy intercept the rain drops and most of the water comes down to the soil by dripping down the branches and the stems of the trees. From the leaves, it drops slowly over the branches of the shrubs and herbs. Thus, forests acts as a natural absorber of rain water and allow it to seep and therefore help in controlling floods. It also act as a barrier and breaks the fall of rain. Tree roots hold the soil firmly. In the absence of trees, the rain hits the ground directly and may flood area around it. The soil will not hold water, which will cause floods and soil erosion.
 3. The micro-organisms which convert the dead plants and animals to humus are known as decomposers.
Examples : Fungi and Bacteria.
Decomposers recycle and convert the dead matter into humus which mixes with forest soil and provides necessary nutrients to plants. Thus, decomposers help in maintaining the necessary nutrient balance in the soil.
 4. Forests play an important role in maintaining the balance between oxygen and carbon dioxide in the atmosphere. Forest works like a self-sustaining system. Whatever is produced in the forest is utilised by different components of the forest. Animals during respiration take in oxygen and release carbon dioxide. Plants take in carbon dioxide and release oxygen through the process of photosynthesis. Even the waste is converted into beneficial substances in a forest. Due to this, there is no waste in a forest.
 5. Forests are excellent, perfect and natural recycling factories. All animals, whether herbivores or carnivores, depend ultimately on plants for food. Herbivores eat plants and their products. Carnivores eat herbivores. Dead remains of animals and plants are decomposed by micro-organisms into humus. Whatever is produced in the forest is ultimately utilised by different components of the forests. Forests maintain a network of food chains called food web and hence nothing goes waste in a forest.
6. (1) Fruits and vegetables
(2) Timber and wood
(3) Turpentine, Latex (rubber raw product)
(4) Spices, resin, gum
(5) Medicines and herbs.
 7. (a) pollination, (b) air and water, (c) lowest, (d) soil.
 8. Forests are very important resources. We should be careful and concerned about the issues related to forests due to following reasons :
(1) If there are no forests, there would be more floods and more soil erosion.
(2) Forests are the dwelling of many animals. Deforestation will endanger our life and environment.
(3) Forests affect the global environment in a great way. For example, reduced forests cover in a particular area leads to global warming which affects the whole earth.
(4) In the absence of trees and plants, the animals will not get food and shelter.
(5) Forests provide us large number of useful products including wood, fruits and medicines. These products would not be available in the absence of trees and plants.
 9. Variety of animals and plants living in forests build a rich biodiversity. Different animals and plants play different role in the system of a forest. For example, herbivores are needed to eat green plants and to provide food for the carnivores. Similarly, carnivores are needed to eat the herbivores and check their population. This biodiversity make forests more productive, stable and resilient.
If there is no grass, all herbivores would die. If there are no carnivores, all herbivores would eat up all the plants and there would be shortage of food. If there are no decomposers, the dead remains of plants and animals would pollute the environment. Due to such biodiversity, a balance in nature is maintained.

10.



11. (iv) Kerosene.

12. (ii) Plants and animals in a forest are not dependent on each other.

13. (iii) humus.

Chapter-13

Wastewater Story

1. (a) pollutants, (b) sewage, (c) sludge, (d) oils, fats.

2. Sewage is a liquid waste which has water as its largest component along with various types of impurities like wastewater from houses, offices, factories, hospitals, etc. It is a complex mixture containing suspended solids, organic and inorganic impurities, nutrients, saprotrophic and disease causing bacteria and other microbes.

Discharging untreated sewage into rivers or seas will pollute the water resources.

Contaminated water is dangerous for aquatic plants and animals. It also causes spreading of many diseases like cholera, typhoid, polio, meningitis, malaria, dengue, etc.

3. Oils and fats can clog the drains reducing its effectiveness in filtering water. In open drains, they block the pores in the soil and thus hamper the filtration by soil. Hence, oils and fats should not be released in the drain.

4. Treatment of wastewater involves physical, chemical, and biological processes, which remove physical, chemical and bio-logical matter that contaminates the water.

Following steps are involved :

(1) Wastewater is passed through bar screens, which remove large objects like rags, sticks, cans, plastic packets, napkins, etc.

(2) Water then goes through grit and sand removal tank, where sand, grit and pebbles settle down.

(3) Water is then allowed to settle in a tank where solids like faeces (called sludge) settle at the bottom and are removed with a scraper. A skimmer removes the floatable solids like oil and grease. Water so cleared is called clarified water. Sludge is used to produce biogas.

(4) Clarified water is then passed through an aerator tank where air is pumped into the water. It helps aerobic bacteria to grow which decompose organic matter like human waste. After several hours, the suspended microbes settle at the bottom as activated sludge. The water is then collected from the top.

(5) Water is removed from the top and is stored in a tank. The treated water has low level of organic material and suspended matter. It is discharged into a sea, a river or into the ground. Sometimes, this treated water is sometimes disinfected with chemicals like chlorine and ozone before releasing it into the distribution system.

5. Sludge is human waste (like faeces) in wastewater left during sewage treatment. Since it is organic waste, it is used to produce biogas and manure.

Sludge is collected by a scraper. It is transferred to a separate tank where it is decomposed by the anaerobic bacteria. The biogas produced in the process can be used as fuel. After the aerator tank, microbes and human waste settle down and form activated sludge. The activated sludge is about 97% water. The water is removed by

sand drying beds or machines, organic matter and nutrients to the soil.

6. Untreated human excreta contains many pathogens and disease causing microbes which may cause several diseases like cholera, diarrhoea, typhoid, polio, meningitis, hepatitis, etc. The germs of these diseases can easily reach human population through air, water or insects and through contaminated food and water. Thus, untreated human excreta is a health hazard.
7. Chemicals like chlorine (chlorine dioxide) and ozone (in the pharmaceutical industry) are commonly used to disinfect water.
8. When wastewater passes through the bar screens, large objects like rags, sticks, cans, plastic packets, napkins are removed under the filtration process.
9. A large number of diseases are caused due to poor sanitation and contaminated drinking water. Poor sanitation leads to growth of harmful microbes, flies and mosquitoes which are the source of spreading of many diseases like cholera, typhoid, polio, meningitis, hepatitis and dysentery.
10. Water treatment plant requires costly infrastructure to build and to be maintained. So, we should be an active citizen and limit the type of waste. Try to follow the following :
 - (1) Open drains should be covered and keep our surroundings clean.
 - (2) Should not litter anywhere, adopt good sanitation practices, for example, oil and fats should not be thrown in drains.

(3) Chemicals like paints, insecticides, motor oil, etc. should not be thrown in drain which may kill useful bacteria.

(4) Used tea leaves, solid food remains, soft toys, cotton, sanitary towels, etc. should also be thrown in the dustbin.

(5) Make people aware and encourage community practices to keep our environment clean.

(6) Separate trash as recycled waste and non-recycled waste.

11.

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							I		N			
	⁸ E	X	C	R	E	T	A		E			

12. (ii) (b) and (c).

