STUDY MATERIAL CLASS VII- SCIENCE

CHAPTER -1

NUTRITION IN PLANTS

Nutrition: It is the mode of taking food by an organism and its utilization by the body.

• **Nutrients**: The components of food that provide nourishment to the body.

• All organisms take food and utilize it to get energy for the growth and maintenance of their bodies.

• **Autotrophs-** Green plants synthesize their food themselves by the process of photosynthesis. They are autotrophs.

• Photosynthesis: Green plants prepare their own food with the help of carbon dioxide and water taken from the environment in presence of sunlight called chlorophyll (found in green plants) for the manufacture of food. This process is known as photosynthesis.

• Plants use simple chemical substances like carbon dioxide, water and minerals for the synthesis of food.

• Chlorophyll and sunlight are the essential requirements for photosynthesis.

• Complex chemical substances such as carbohydrates are the products of photosynthesis.

• Solar energy is stored in the form of food in the leaves with the help of chlorophyll.

• Oxygen is produced during photosynthesis.

• Oxygen released in photosynthesis is utilized by living organisms for their survival.

• **Parasites**- Fungi derive nutrition from dead, decaying matter. They are saprotrophs. Plants like Cuscuta are parasites. They take food from the host plant.

• Heterotrophs- A few plants and all animals are dependent on others for their nutrition and are called heterotrophs.

• **Parasitic**: Organisms that live on the body of other organisms.

• All parasitic plants feed on other plants as either:

(i) Partial Parasites: Obtain some of their nutrition from the host, e.g. painted cup.

(ii) Total Parasites: dependent completely on the host for nutrition, e.g. mistletoe.

• **Saprophytic**: Organisms that obtain nutrition from dead and decaying plant and animal matter.

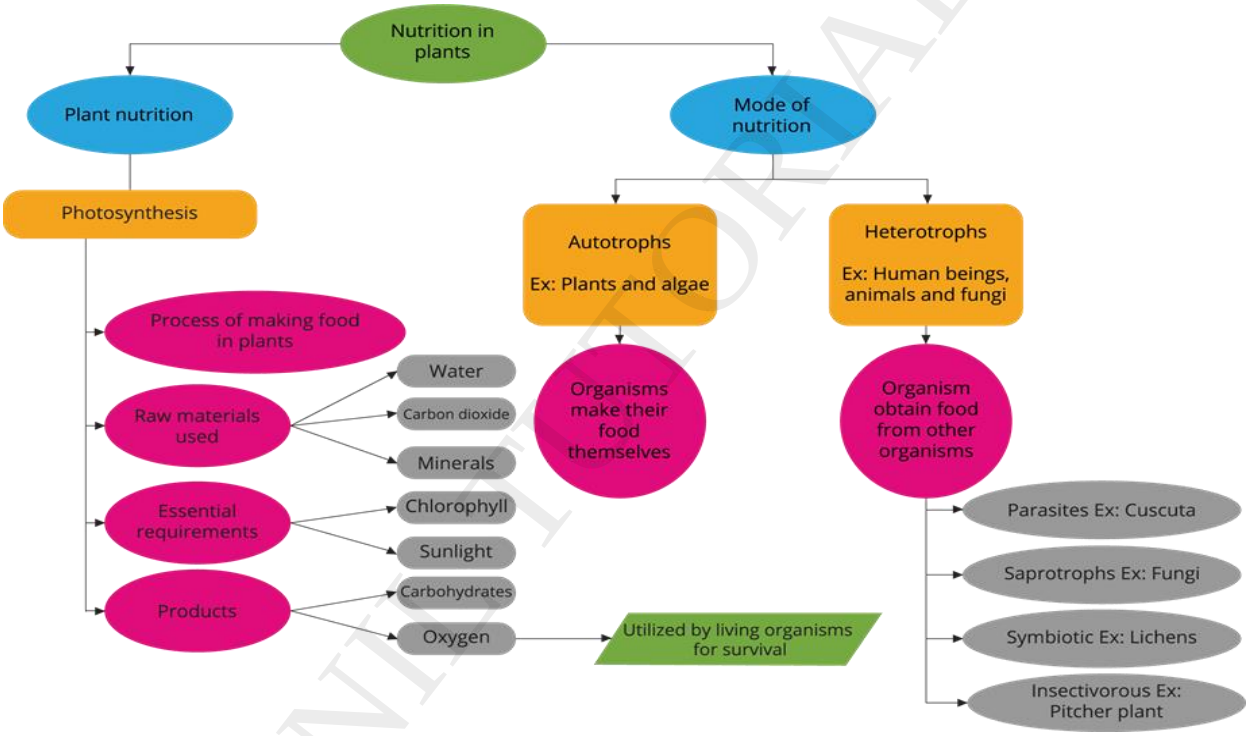
• Mushrooms, moulds and certain types of fungi and bacteria.

• Insectivorous Plants: Green plants which obtain their nourishment partly from soil and atmosphere and partly from small insects. Example: pitcher plant, bladderwort, and venus fly trap.

• **Symbiosis:** Mode of nutrition in which two different individuals associate with each other to fulfill their requirement of food.

• Lichens found on tree trunks is the association between alga and fugus. Alga obtains water from fungus and it in turn obtains food from alga.

Mind Map--



Some Important Questions-

Question 1. Potato and ginger are both underground parts that store food. Where is the food prepared in these plants?

Anwer: In both the plants, shoot system and leaves are above ground. They prepare food through photosynthesis and transport it to the underground part for storage.

Question 2. Photosynthesis requires chlorophyll and a few other raw materials. Add the missing raw materials to the list given below: Water, minerals, (a) …… (b) …….

Answer: (a) Sunlight (b) Carbon dioxide

Question 3.The tiny openings present on the leaf surface. What are they called?

Answer: Stomata are the tiny pores present on the surface of leaves through which gaseous exchange takes place in plants.

Question 4. What is the function of guard cells of stomata?

Answer: Guard cells help in controlling the opening and closing of stomata for gaseous exchange.

Question 5. Which parts of the plant are called food factories of the plant?

Answer: Leaves are referred to as food factories of plants. This is because, leaves synthesise food by the process of photosynthesis.

Question 6. A carbohydrate is produced by plants as food source. It is constituted from which molecules?

Answer: Carbohydrates are composed of carbon, hydrogen and oxygen.

Question 7. Why do some plants feed on insects?

Answer: Insectivorous plants grow in soil which lack nitrogen, therefore they eat insects to fulfill their need of nitrogen.

Question 8. Define parasites.

Answer: Parasites they are those organisms which grow on other plants or animals for their food, e.g. Cuscuta.

Question 9. Name the bacteria that can fix atmospheric nitrogen.

Answer: Rhizobium is the bacterium which can fix atmospheric nitrogen.

Question 10. Except plants, why can't other living organisms prepare their food using CO_2, water and minerals?
Answer: Our body does not contain chlorophyll for absorbing solar energy which is necessary for preparing food using air, water, etc.
Question 11. A leguminous plant can restore the soil's concentration of mineral nutrients. Can you give examples of some such plants?
Answer: Plants such as gram, pulses and beans are leguminous.
Question 12. Algae are green in colour. Why?
Answer: Algae contain chlorophyll which imparts green colour to them.
Question 13. What do you understand by nutrition?
Answer: The process of utilising nutrients like carbohydrates, proteins, fats, etc., to generate energy is called nutrition.
Question 14. Fungus can be harmful and useful. Give an example showing both of these traits of fungus.
Answer: Fungus produces antibiotics like penicillin used to treat diseases and fungus can also harm us by causing fungal infections on skin and hair.
Question 15. A unique feature in leaves allows them to prepare the food while other parts of plants cannot. Write the possible reason for this.
Answer: Leaves contain chlorophyll which is essential for food preparation and is absent in other parts of plant.
Question 16. Algae and fungi form a unique association sharing benefits from each other. What is the name of association between them?
Answer: Lichens.
Question 17. In a plant, photosynthesis occurs in a part other than leaf. Name that plant and the part where photosynthesis occurs.
Answer: Cactus, the part where photosynthesis occurs are stem and branches which are green.
Question 18.Why is Cuscuta, categorised as a parasite?
Answer: Cuscuta derives its nutrition using an association where it deprives its host of all valuable nutrients and absorbs them itself. Hence, it is called a parasitic plant.
Question 19.Plant cannot use the nitrogen present in the soil directly. Why?
Answer: Plants can use nitrogen only in soluble form while in soil nitrogen is present in inorganic form.
Question 20. Why insectivorous plants are called partial heterotrophs?
Answer: Insectivorous plants are autotrophs, i.e. they prepare their own food. They are partial heterotrophs as they eat insects for obtaining nitrogen.
Question 22.What is the stored food form in sunflower seeds?
Answer: In sunflower seeds, glucose is stored in the form of oils (fats).
Question 23.What do you understand by saprotrophic mode of nutrition?
Answer: The mode of nutrition in which organisms take their nutrients from dead and decaying matter is called saprotrophic mode of nutrition.

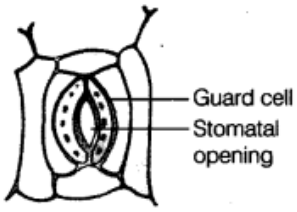
Question 24. A mutually beneficial relationship that occurs between two plants. It is known by what name? Give an example.
Answer: Symbiosis is the mutually benefitting association between two plants, e.g. lichens.
Question 25.For testing the presence of starch in leaves, a boiled leaf is used. Why?
Answer: Boiling the leaf remove chlorophyll/green colour from the leaves.
Question 26.Mosquitoes, bed bugs, lice and leeches suck our blood. Can they be called as parasites?
Answer: Yes, these animals/insects are parasites as they harm the hosts while they suck blood.
Question 27.Insectivorous plants have one or the other specialised organs to catch their prey. What is that organ?
Answer: Leaves of insectivorous plants catches the prey.
Question 28.Farmers spread manure of fertilisers in the field or in gardens, etc. Why are these added to the soil?
Answer: Plants absorb mineral nutrients from soil. Thus, declining their concentration in soil fertilisers and manures enhance or add these essential nutrients back in soil.
Question 29.A cell is formed of many sub-components. Identify different constituents of the cell. Are animal and plant cells similar?
Answer: A cell contains nucleus, cytoplasm, vacuole, cell organelles like chloroplast, mitochondria, etc. No, animal cells are different from plant cells.
Question 29.
Different modes of nutrition has been observed in plants. What are they? Give example of each.
Answer:
Plants show two major modes of nutrition, i.e.
(i) Autotrophs are those which can synthesise their own food.
(ii) Heterotrophs are those which are dependent on other plants and animals for their food. They are of following types:
(a) Parasites, e.g. Cuscuta
(b) Saprotrophs, e.g. fungi.
Question 30. Autotrophs and heterotrophs are two different organisms with distinct modes of nutrition state. How are they different from each other?
Answer: The difference between autotrophs and heterotrophs are as follows:

Autotrophs	Heterotrophs
They can prepare their own food	They cannot prepare their own food
Autotrophs take simple inorganic substances and change it into complex organic food, e.g. green plants.	They take in complex food and breakdown it into simple compounds, e.g. all animals, fungi and non-green plants.

Question31.
Observe the given figure and label the following terms given in the box. Stomatal opening, guard

cell

Answer: Labelled figure is given



Question32.

Nitrogen is an essential nutrient for plants growth. But farmers who cultivate pulses as crops like green gram, bengal gram, black gram, etc., do not apply nitrogenous fertilisers during t cultivation. Why?

Answer:

Roots of pulses (leguminous plants) have a symbiotic association with a bacterium called Rhizobium. This bacteria convert gaseous nitrogen of air into water soluble nitrogen compounds and give them to the leguminous plants for their growth. Hence, farmers need not use nitrogenous fertilisers.

Question 33. Pooja is worried about her new shoes which she wore on special occassions that they were spoiled by fungus during rainy season. Is she right to worry, if yes, then tell why does fungi suddenly appears during the rainy season?

Answer: Yes, the fungi reproduces by spores which are generally present in the air and grow on any article that are left in hot and humid weather for a long time. During rainy season they land on wet and warm things and begin to germinate and grow.

Question 34.Harish went to visit his grandfather in village where he saw that his grandfather's field of wheat are infected with fungus but no one is aware of this. Harish rushed to his grandfather's side and told him that the field have been infected with fungi. He should use an antifungal agent in his fields to stop this infection.

(a) What is fungus?

(b) Can fungus only cause diseases or can it be helpful also?

(c) What values are shown by Harish?

Answer: (a) Fungus are saprophytic organisms usually present as spores in atmosphere which can germinate on any substrate in optimal conditions.

(b) Fungus are also useful in that they produce many antibiotics which can cure different types of infections like penicillin.

(c) Harish is sincere, curious and knowledgeable with a keen sense of applying it where necessary.

Question 35. Wild animals like tiger, wolf, lion and leopard do not eat plants. Does this mean that they can survive without plants? Can you provide a suitable explanation?

Answer: Animals like tiger, wolf, lion and leopard are carnivores and do not eat plants. They hunt and eat herbivorous animals like deer, gaur, bison, zebra, giraffe, etc., which are dependent on plants for food. If there are no plants, herbivorous animals will not survive and ultimately animals like tiger, wolf, lion and leopard will have nothing to eat.

Match the Column I with Column II.

	Column I		Column II
(a)	Saprotroph	(i)	Pitcher plant
(b)	Chlorophyll	(ii)	Food factory of plants
(c)	Bacteria *Rhizobium*	(iii)	Green plant leaf
(d)	*Cuscuta*	(iv)	Fungi
(e)	Insects	(v)	N_2-fixing
(f)	Mango tree	(vi)	Stomata
(g)	Leaf	(vii)	Parasite
(h)	Tiny pores present on leaf	(viii)	Raw material
(i)	CO_2 and water	(ix)	Saprophyte
(j)	Mushroom	(x)	Autotroph

Answers:
1. (a) – (iv), (b) – (iii), (c) – (v), (d) – (vii), (e) – (i), (f) – (x), (g) – (ii), (h) – (vi), (i) – (viii), (j) – (ix)

CHAPTER-2

NUTRITION IN ANIMALS

- All the animals can be divided into three groups on the basis of their food habits. These are:
    1. **Herbivores:** Those animals which eat only plants are called herbivores. Examples are Goat, Cow, and Deer etc.
    2. **Carnivores:** Those animals which eat only other animals as food are called carnivores. Examples are Lion, Tiger, and Lizard etc.
    3. **Omnivores**: Those animals which eat both, plants and animals are called omnivores. Examples are Man, Dog and Crow etc.

Process of nutrition in animals

Holozoic nutrition: It is a process by which animals take in their food. It involves different steps namely, ingestion, digestion, absorption, assimilation and egestion. Human beings exhibit holozoic mode of nutrition involving five basic steps.

- **Ingestion:** The process of taking food into the body is called ingestion.
- **Digestion:** the process in which the food containing large, insoluble molecules is broken down into small, water soluble molecules is called digestion.
- **Absorption:** The process in which the digested food passes through the intestinal wall into blood stream is called absorption.
- **Assimilation:** The process in which the absorbed food is taken in by the body cells and used for energy, growth and repair is called assimilation.
- **Egestion:** The process in which the undigested food is removed from the body is called egestion.

Nutrition in Simple organisms

In this section we will learn about simple organisms like amoeba, paramecium, hydra, spider and frog.

Nutrition in Amoeba

- Amoeba is a microscopic organism which consists of only a single cell.
- Amoeba is mostly found in pond water.
- Figure given below shows the structure of amoeba.
  Amoeba eats tiny plants and animals as food which floats in water in which it lives.
- The mode of nutrition in Amoeba is **holozoic**.
- The process of obtaining food by Amoeba is called **phagocytosis.**
- Steps involved in the nutrition of Amoeba:
    1. **Ingestion:** Amoeba ingests food by forming temporary finger-like projections called pseudopodia around it. The food is engulfed with a little surrounding water to form a food vacuole ('temporary stomach') inside the Amoeba.
    2. **Digestion:** In Amoeba, food is digested in the food vacuole by digestive enzymes which break down the food into small and soluble molecules by chemical reactions.
    3. **Absorption:** The digested simple and soluble substances pass out of food vacuole into the surrounding environment.
    4. **Assimilation:** The absorbed food materials are used to obtain energy through respiration and make the parts of Amoeba cell which leads to the growth of Amoeba.
    5. **Egestion:** The remaining undigested material is moved to the surface of the cell and thrown out of the body of Amoeba.

Nutrition in Paramecium:

- Paramecium is also a tiny unicellular animal which lives in water.
- Ingestion: Paramecium uses its hair like structures called **cilia** to sweep the food particles from water and put them into mouth.
- Ingestion is followed by other steps such as digestion, absorption, assimilation and egestion which are same as those we studied in **Amoeba**

Nutrition in Hydra

- Hydra is a simple multicellular animal.
- It has a number of tentacles around its mouth, which are used for ingestion of food.
- These tentacles entangle small aquatic animals and kill them with their stinging cells.
- After this they push them into their mouth. Now inside their body cavity digestive juices are secreted
- by the surrounding cells.
- These juices digest the food and the digested food is absorbed through the cavity walls and assimilated in the cells.

Nutrition in frog

- The frog uses its long sticky tongue to catch insects. Frogs have well developed digestion system in which the digestion of food takes place.

Nutrition in Spider

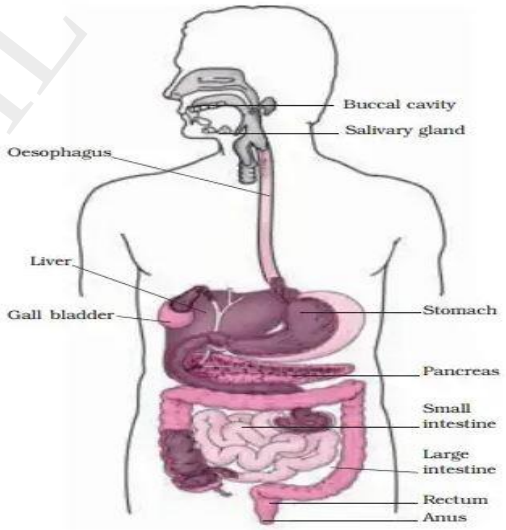
- In spiders digestion of food actually takes place outside their body.
- A spider weaves a sticky web in which small insects get stuck.
- It then injects digestive juices into the body of the insect, which digests the body part of the insects.
- The spider then sucks up the digested food.

Nutrition in Humans

- There are 5 steps involved in nutrition in animals including human beings.
- **Ingestion**: The process of taking in food by an organism is called ingestion.
- **Digestion**: Digestion is the mechanical and chemical breakdown of food into simple soluble substances.
- **Absorption**: The digested food is then taken up by the circulatory stream and carried to the cells of the body. This process is called absorption.
- **Assimilation**: The absorbed food is used by the body to generate energy and for growth.
- **Egestion**: The undigested food is a waste product, and it is removed from the body in the last stage by a process called egestion

Human Digestive system

- We take food through our mouth, digest and utilise it.
- Figure given below shows the human digestive system
- Human digestive system consists of alimentary canal and its associated human digestive system glands.



- Various organs of human digestive system in sequence are
    - Mouth (Buccal Cavity)
    - Oesophagus (food Pipe)

- Stomach
- Small intestine
- Large intestine
- Rectum
- Anus.

- The glands which are associated with human digestive system are
  - **Salivary glands**- Located in mouth or Buccal Cavity
  - **Liver**- It is the largest gland situated in the upper part of abdomen on the right side.
  - **Pancreas**- located just below the stomach

  The ducts of various glands open into the alimentary canal and pour secretion of their juices into the alimentary canal.

Digestion in the mouth

- We take food through our mouth and the process of taking food into the body is called **ingestion**.
- The mouth or **buccal cavity** contains teeth, tongue and salivary glands.
- Digestion begins in the mouth when we chew the food with the help of our teeth.
- The teeth cut the food into smaller pieces, chew and grind it.

Chewing breaks down the food into smaller pieces and mixes them with saliva. This process is called **mastication.**

The salivary glands secrete watery liquid called **saliva**. Saliva is a digestive juice that helps to partially digest the starch present in the food.

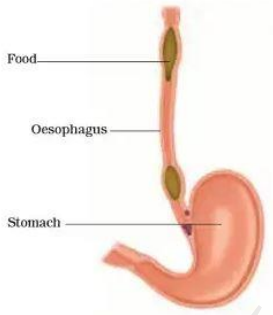
- The tongue helps in mixing saliva with the food.
- **Tongue** is a muscular organ that helps you eat the food. It mixes saliva with the food during chewing and helps in swallowing it.
- We also taste food with our tongue as it has taste buds that detect different tastes of food.

Teeth

- Teeth are used for cutting, grinding and tearing the food before you swallow it.
- You have different types of teeth to do the job.
- **Milk teeth:-** A child has only 20 teeth, 10 in each jaw. These are known as milk teeth. They begin to fall at the age between 6 to 8 and then new set of teeth grows.
- **Permanent teeth:-** This set contains 32 teeth, 16 in each jaw. There are 4 incisors, 2 canines, 4 premolars and 6 molars in each jaw. As shown below in the figure:
- Your front teeth are **incisors**. They are used for biting and cutting.
- Next to incisors are **canines**. These are pointed and are used for piercing and tearing pieces of food.
- Teeth at the back of your mouth are broad with almost flat surface. These teeth crush and grind food and are called the **premolars and molars**. Molars are larger then premolars
- White substance that covers your teeth is called **enamel**.

The food pipe/ Oesophagus

- The swallowed food passes into the food pipe or **oesophagus** as shown below in the figure
- This figure shows the movement of food in food pipe which runs along the neck and chest.



- So, the oesophagus leads from your mouth to the stomach. It is made up of the muscles.
- Food is pushed down by movement of the wall of food pipe.
- This movement called **peristalsis,** takes place throughout the alimentary canal and pushes the food downwards.

Stomach

- **Stomach** is the thick walled bag present on the left side of the abdomen. It is the widest part of the alimentary canal. Oesophagus brings slightly digested food from mouth into the stomach.
- The stomach walls contain s three tubular glands in it walls which secrete gastric juice.
- The gastric juice contains three substances: Hydrochloric acid, the enzyme pepsin and mucus.
- The hydrochloric creates an acidic medium which facilitates the action of the enzyme pepsin that is the digestion of protein into simple substances.
- The acid kills many bacteria that enter along with the food.
- The mucus helps to protect the stomach wall from its own secretions of hydrochloric acid.
- The partially digested food then goes from the stomach into the small intestine.

Small intestine

- Small intestine is highly coiled and is about 7.5 m long.
- After leaving stomach food enters small intestine and last steps of digestion takes place in small intestine.
- It receives secretions from liver and pancreas and wall of small intestine also secrets juices.
- **Liver:-** Liver is the largest gland in the body and is situated in the upper part of the abdomen on the right side. It secrets bile juice that is stored in **gall bladder**

- **Pancreas:-** It is the large cream coloured gland located just below the stomach. The pancreatic juice acts on carbohydrates, fats and proteins and converts them into simple form.
- The partly digested food now reaches the lower part of the small
- The walls of the small intestine contain glands which secretes intestinal juice.
- The enzymes present in it finally convert the proteins into amino acids, complex carbohydrates into glucose and fats into fatty acids and glycerol.

Absorption:

- The small intestine is the main region for the absorption of digested food.
- The inner surface of the small intestine has numerous finger-like projections called villi which increase the surface area for rapid absorption of digested food.
- The digested food which is absorbed through the walls of the small intestine goes into our blood.

Assimilation:

- The blood carries these useful substances to each and every part of the body. The body uses these substances for its growth and maintenance. The absorption of digested food and its utilization by the body is known as assimilation.
- Glucose, which is the final product of carbohydrate digestion, is broken down with the help of oxygen into carbon dioxide and water to release energy. Amino acids are used for growth and repair of worn out cells.
- Fatty acid and glycerol Store below the skin as energy reserves.

Egestion:

- The undigested and unabsorbed food moves into the large intestine, to a part called colon, where some amount of water and salts are absorbed from the undigested food
- The remaining undigested food that moves to the second part called rectum. Here, it is stored and removed from the body through the anus.
- The exit of this waste material is regulated by the anal sphincter.
- This process is known as egestion.

Digestion in grass eating animals (ruminants)

- Plant eating animals such as cows, deer, goats, buffaloes, camels and yaks quickly swallow their food after chewing it once.
- The swallowed food goes to a chamber called rumen. They bring back the food later into the mouth and chew it again. These animals are called ruminants and the process is called rumination.
- The stomach of ruminants consists of four compartments: rumen, reticulum, omasum and abomasum.

- The swallowed food first enters the rumen, where the microorganism begins the digestion of the food (cellulose- a complex carbohydrate).
- In the first two chambers, the rumen and the reticulum, the food is mixed with saliva and separated into layers of solid and liquid material
- Solid clump together to form the cud or bolus.
- The cud is brought back from the rumen to the mouth, where it is chewed slowly by completely mixing it with saliva and is further broken down. When the cud is chewed and swallowed again, it enters the omasum where the food is broken down further into simple compounds that enter in the abomasum.
- Hydrochloric acid and digestive juices (gastric juices) are secreted in these chambers and the food is now fully digested.
- It is then sent to the small intestine for absorption and the leftover undigested food is passed on to the large intestine from where it is excreted.
- Grass is rich in cellulose and we humans cannot digest it.

Some Important Questions-

1. Match the Following:-

Animal	Mode of Food intake
1. Infant	a. Sucking
2. Mosquito	b. Chewing
3. Housefly	c. Suckling
4. Eagle	d. Siphoning
5. Dog	e. Capturing

Ans: The following is the matched table:

Animal	Mode of Food intake
1. Infant	c. Suckling
2. Mosquito	a. Sucking
3. Housefly	d. Siphoning

4. Eagle	e. Capturing
5. Dog	b. Chewing

2. Fill in the blanks:

a) _____ is the elimination of unused parts of the food.

Ans: Egestion is the elimination of unused parts of the food.

b) The digestive system in humans consists of _____ and_____.

Ans: The digestive system in humans consists of alimentary canal and digestive glands.

c) The first set of teeth that grow during infancy and fall off between 6-8 years of age is_____.

Ans: The first set of teeth that grow during infancy and fall off between 6-8 years of age is milk teeth.

d) The working of the stomach was discovered by _____.

Ans: The working of the stomach was discovered by William Beaumont.

3. Fill in the blanks:

(a) The main steps of nutrition in humans are _____, _____, _____, _____ and _____.

(b) The largest gland in the human body is _____.

(c) The stomach releases hydrochloric acid and _____ juices which act on food.

(d) The inner wall of the small intestine has many finger-like outgrowths called _____.

(e) Amoeba digests its food in the _____ .

Solution:

(a) The main steps of nutrition in humans are ingestion, digestion, absorption, assimilation and egestion.

(b) The largest gland in the human body is liver.

(c) The stomach releases hydrochloric acid and digestive juices which act on food.

(d) The inner wall of the small intestine has many finger-like outgrowths called villi.

(e) Amoeba digests its food in the food vacuole.

4.Mark 'T' if the statement is true and 'F' if it is false:

(a) Digestion of starch starts in the stomach. (T/F)

(b) The tongue helps in mixing food with saliva. (T/F)

(c) The gall bladder temporarily stores bile. (T/F)

(d) The ruminants bring back swallowed grass into their mouth and chew it for some time. (T/F)

Solution:

a) F b) T c) T d) T

5. Tick (✓) mark the correct answer in each of the following:

(a) Fat is completely digested in the

(i) stomach (ii) mouth (iii) small intestine (iv) large intestine

(b) Water from the undigested food is absorbed mainly in the

(i) stomach (ii) food pipe (iii) small intestine (iv) large intestine

Solution:

a) (iii) small intestine b) (iv) large intestine

6. Match the items of Column I with those given in Column II:

Column- I	Column- II
Food components	Product(s) of digestion
Carbohydrates	Fatty acids and glycerol
Proteins	Sugar
Fats	Amino acids

Solution:

Column- I	Column- II
Food components	Product(s) of digestion
Carbohydrates	Sugar
Proteins	Amino acids

Fats	Fatty acids and glycerol

7. What are villi? What is their location and function?

Solution: Villi are finger-like projections or outgrowth. They are present in the small intestine of our digestive system. The villi increase the surface area for absorption of the digested food.

8. Where is the bile produced? Which component of the food does it help to digest?

Solution: Bile juice is produced in the liver, and it helps in the digestion of fats by breaking large fat globules into smaller ones.

9. Name the type of carbohydrate that can be digested by ruminants but not by humans. Give the reason also.

Solution: Cellulose is the carbohydrate that can be digested by ruminants but not by humans because humans lack cellulose enzyme required to digest the cellulose.

10. Why do we get instant energy from glucose?

Solution: Glucose is a simple sugar which is easily absorbed into the blood whereas other carbohydrates are first broken down into glucose and then absorbed; hence, glucose gives instant energy.

11. Which part of the digestive canal is involved in:

(i) Absorption of food _____.

(ii) Chewing of food _____.

(iii) Killing of bacteria _____.

(iv) Complete digestion of food _____.

(v) Formation of faeces _____.

Solution:

i) Small intestine ii) Buccal cavity iii) Stomach iv) Small intestine v) Large Intestine

12. Write one similarity and one difference between nutrition in amoeba and human beings.

Solution: Similarity: Both amoeba and human beings follow the holozoic type of nutrition.

Difference: Humans intake food through buccal cavity. In amoeba food is ingested through pseudopodia.

13. Match the items of Column I with suitable items in Column II

Column-I	Column-II

a) Salivary gland	(i) Bile juice secretion
b) Stomach	(ii) Storage of undigested food
c) Liver	(iii) Saliva secretion
d) Rectum	(iv) Acid release
e) Small intestine	(v) Digestion is completed
f) Large intestine	(vi) Absorption of water
	(vii) Release of faeces

Solution:

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

Short Answer Questions-

1. Define Nutrition in animals.

Ans: Nutrition in animals is very important. Some of them are plant-eating while others are carnivores. It includes the process of food ingestion, digestion, absorption and assimilation by the cells of their body. It also includes the removal of unused portions of food.

2. Differentiate between absorption and assimilation.

Ans: The difference between absorption and assimilation is as follows:

Absorption	Assimilation
Absorption is the process of ingestion of the digested food from the alimentary canal into the bloodstream through the intestinal villi.	Assimilation is the process of ingestion of digested food and nutrients and the synthesis of new compounds from the molecules that are absorbed to perform respiration and metabolism.

3. What is the function of the large intestine in digestion?

Ans: The large intestine reabsorbs all the excess water from unabsorbed and undigested food. Thus, it helps in making the unabsorbed portion of the food as faeces and its elimination by excretion. Thus, returning most of the water to the blood can prevent excess water loss as well as eliminate unabsorbed food from the body.

4. List the different types of teeth present in humans and their functions.

Ans: The different types of teeth present in humans and their functions are:

- Incisors: Incisors or the front teeth are the eight visible teeth that are used to bite the food.
- Canines: Next to incisors are the canines that are used to tear flesh or other food items. These are very sharp and come in around nine to twelve years of age.
- Premolars: Next to canines are the premolars which are typically used for grinding and chewing food.
- Molars: Molars are replaced by the eight premolars. They serve the primary function of chewing and grinding food into small particles.

5. What is diarrhoea?

Ans: When excess water from digested food is not reabsorbed, it is passed out through the stool which is loose and watery. Passage of this watery stool frequently is called diarrhoea which is caused by a microbial infection of the alimentary canal. This can lead to severe dehydration that can be controlled by using Oral Rehydration Solutions (ORS).

CHAPTER- 3
HEAT

Heat:

- We know that many things around us can be hot or cold, like tea or boiling water is hot, and ice or ice cream is cold.
- This is not just a sensation but a form of energy called heat energy. Heat can be termed as an energy which makes you feel hot or warm or we can say scientifically that it is a form of energy where the transfer of energy from a hot to a cooler object takes place.
- The differentiation of hot and cold comes from the difference in their temperatures. Hence temperature is a measure of the degree of hotness of an object.

Measuring Temperature:

- The device that measures the temperature is known as a thermometer. There are various kinds of thermometers depending on the purpose or usage of the same.
- The various kinds of thermometers are as follows:

1. Clinical Thermometer:

- This type of thermometer is used to measure the body temperature only and is used in hospitals by doctors and also at home.
- A clinical thermometer generally consists of a long narrow glass tube with a bulb at one end that contains mercury. A thread of shining mercury is seen along the scale indicated on the thermometer, which helps in taking the reading.
- The scale used in India is the Celsius scale and is indicated by the symbol ∘C.
- The normal human body temperature is 37∘C, and so the range of this thermometer is from 35∘C to 42∘C. To take the reading, the bulb of the thermometer is kept below the tongue for a minute.
- Nowadays due to the toxic nature of mercury and issues of the thermometer being broken and spilling it, digital thermometers are in use which are safe and do not contain mercury.

2. Maximum-Minimum Thermometers:

- These are used to measure the maximum and minimum temperatures of a day.
- They are U-shaped parallel glass tubes. It is used to record the temperatures at a place.

3. Laboratory Thermometer:

- This thermometer is used to measure the temperature of all objects other than a human body.
- It consists of a long glass tube without a kink and has a bulb containing mercury at the end of the tube.
- This is generally used in laboratories for checking the boiling points, freezing points etc. Hence the range of this thermometer is from −10∘C to 110∘C.

Transfer of Heat:

- We know that heat is the transfer of energy from a hotter object to a cooler object, like if a spoon is left in a bowl of hot soup, then the heat from the soup is transferred to the spoon and it becomes hot.
- This transfer of heat can occur in different ways. They are:

1. **Conduction:**
    - This is a process of heat transfer where the heat is transferred from the hot part to the cold part of the object. Example - The handle of a pan gets hot when the pan becomes hot and so a wooden or plastic handle is made for them.
    - The substances that allow the heat to pass through them are termed as conductors. Example - iron, copper, etc.
    - The substances that do not allow the heat to transfer through them are called insulators or poor conductors. Example - wood, plastic.

2. **Convection:**
    - This is the form of heat transfer in liquids and gases where the heat is transferred by the movement of the heated molecules within them. Example - boiling of water.
    - The molecules of the fluid or gas near the source of heat become hot and rise up and this is replaced by the colder molecules in the fluid or air. They also get heated up and rise till the entire fluid or air is heated.
    - This is the principle behind the interesting feature in the coastal areas called the sea and land breeze.

a. **Sea Breeze:**
    - In the coastal regions, the land gets heated up faster during the day time. And as the land gets hotter, the hot air rises up.
    - At that time the cool air from the sea blows in to take its place and the warm air from the land moves to the sea to complete the cycle. This cool breeze flowing from the sea to the land is termed as the sea breeze.

b. **Land Breeze:**
    - The opposite of this happens at night. The land cools faster than the water at night, so the cool air moves towards the sea to replace the warm air of the sea.
    - The cool air moving from the land towards the sea is termed as land breeze.

3. **Radiation:**
    - This is the form of heat transfer where a medium like air or liquid is not required to transfer the heat energy. Example - Heat from the sun, a hot utensil becomes cool after some time by transfer of heat to surroundings this way.
    - All the hot bodies are capable of radiating heat.

Absorption of Heat:

- The heat that is radiated by the objects is reflected, absorbed.
- The heat increases the temperature of the object.
- Dark-colours are capable of absorbing heat. So, we feel comfortable wearing them in winters and we use a black umbrella to go out in the sun.
- Light colours reflect heat and so we feel comfortable wearing them in summers.
- We use woollen clothes in winters. Though wool is a poor conductor of heat, it can trap air (again a bad conductor of heat) in between the fibres which does not allow the heat from the body to escape into the surroundings and thus keeping us warm.

CHAPTER-4

ACIDS, BASES AND SALT

Acids:

Acids are compound in which one of the elements that makes up the acid molecule is always the hydrogen element. For example, hydrochloric acid (HCl).

Substances that contain acids are known as acidic substances. The word acid comes from the Latin word *'acere'* meaning sour.

Types of acids:

Based on the sources they are obtained from, acids are of two types:

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Organic acids: Acids that are naturally obtained from plants and animal sources are called organic acids.

Name of Acid	Source
Lactic acid	Curd, milk
Oxalic acid	Spinach tomatoes
Citric acid	Oranges and lemons
Malic acid	Apple
Tartaric acid	Unripe mangoes, grapes
Formic acid	Ant's sting
Acetic acid	Vinegar
Ascorbic acid	Amla

Mineral acids: Acid that are derived from an inorganic material or source are called mineral acids. For example, nitric acid, hydrochloric acid and sulphuric acid.

Depending upon the amount of water present in acids, they are categorized into concentrated and dilute acids.

Concentrated acids: Acids that contain only a small quantity of water are called concentrated acids.

Dilute acids: Acids that contain more water than the concentrated acid are called dilute acids. They can be obtained by adding water to a concentrated acid.

Properties of acids:

Acids are sour to taste.

- Acids turn blue Litmus to red.
- Acids can corrode metals like aluminium and iron due to their corrosive nature. That is why acids are stored in glass containers and not in metal containers.
- Acids are soluble in water.

- Acids react with metal to form a salt and hydrogen gas.
  $Mg+2HCl \rightarrow MgCl_2+H_2$
  Magnesium+ Hydrochloric acid →Magnesium chloride +hydrogen Gas
  Magnesium+ Hydrochloric acid →Magnesium chloride +hydrogen Gas
- Acids react with bases to form a salt and water.
  $NaOH+HCl \rightarrow NaCl+H_2O$
  Sodium hydroxide +Hydrochloric acid →Sodium chloride +water Sodium hydroxide +Hydrochloric acid →Sodium chloride +water
  Advertisements
- Acids react with carbonates to form a salt and carbon dioxide gas.
  $CaCO_3+2HCl \rightarrow CaCl_2+H_2O+CO_2$
  Calcium Carbonate +Hydrochloric acid →Calcium chloride +water +Carbon dioxide
  Calcium Carbonate +Hydrochloric acid →Calcium chloride +water +Carbon dioxide

Strong acids	**Weak acids**
Hydrochloric acid sulphuric acid, nitric acid, phosphoric acid	citric acid, lactic acid, Acetic Acid, carbonic acid

Uses of acids:
Acids are widely used in industries and present in everyday products. Hydrochloric acid which is present in our stomach, help to digest our food. Uses of some acids are given in the following table;

Acids	Uses
Hydrochloric acid	used to remove rust from metals
Sulphuric acid	used in automobile batteries, fertilizers, paints plastic and dyes
Nitric acid	used in fertilizers, plastics, photographic films, explosive and dyes
Acetic acid	used in food supplements as a raw material and used as solvent

Bases:
Bases are compounds which contain oxygen or oxygen along with hydrogen. A base that contain oxygen is called an oxide while a base that contains oxygen along with hydrogen is called the Hydroxide. Substances that contain bases are called basic substances.

Types of Bases:
Based on how they take part in a reaction, bases are of two types: strong bases and weak bases.
Strong bases: Some of the bases are corrosive in nature and may result in skin burns. Such bases are called strong bases. For example, Sodium hydroxide, calcium hydroxide and potassium hydroxide.
Weak bases: Some of the bases are not corrosive in nature. Such bases are called weak bases.

For example, Magnesium hydroxide, Ammonium hydroxide, copper hydroxide.

Properties of bases:

- Bases are bitter to taste.
- Bases turn red litmus to blue.
- Some of the bases are soluble in water they are called alkalis (potassium hydroxide and sodium hydroxide).
- Bases react with acids to form a salt and water.
  $NH_4OH + HCL \rightarrow NH_4Cl + H_2O$
  Ammonium Hydroxide +Hydrochloric acid →Ammonium chloride +water Ammonium Hydroxide +Hydrochloric acid →Ammonium chloride + water
- Bases react with metals to form salt and hydrogen gas
  $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$
  Sodium hydroxide +Zinc →Sodium Zincate+H_2Sodium hydroxide +Zinc →Sodium Zincate+H_2

Uses of bases:

Sodium Hydroxide is a strong base and it is used to drain cleaners. Strong bases dissolve grease and help in removing dirt.

Uses of some bases are given in the following table:

Bases	Uses
Sodium hydroxide	used in the manufacture of paper soaps and detergent
Potassium hydroxide	used in the manufacture of soaps and batteries
Calcium hydroxide	used in the manufacture of mortar and plaster
Magnesium hydroxide (milk of magnesia)	used as an antacid to neutralize acidity in the stomach
Ammonium hydroxide	used in cleansing agent and manufacture of fertilizers

Salts

A salt is formed when an acid and a base react.

The reaction in which acids react with bases resulting in the formation of salt and water are called neutralization reactions.

Types of salts:

A salt can be acidic basic or neutral.

Acidic salts: Acidic salt are formed when strong acids react with weak bases. These salts have a pH value of less than 7. For example, ammonium chloride (NH_4Cl), aluminium chloride ($AlCl_3$).

Basic salts: Basics salts are formed when strong bases react with weak acids. These salts have a pH value of more than 7. For example, sodium carbonate (Na_2CO_3), Sodium acetate (CH_3COONa).

Neutral salts: Neutral salts are formed when strong acids react with strong bases. These salts

have a pH value of 7. For example, sodium chloride (NaCl), Potassium Nitrate (KNO_3).

Properties of Salts:

- Most of the salts are soluble in water.
- Solution of salts in water acts as good conductor of electricity.
- Some salts are white crystal whereas some are coloured. For example, copper sulphate is blue in colour and ferrous sulphate is green.
- Some salts contain water molecules trapped inside them, this is referred to as water of crystallization. The salts that contain water of crystallization are referred to as hydrated salts. For example, Blue vitriol ($CuSO_4.5H2O$).
- Two or more salts that crystallize to form a single substance are referred to as mixed salts. For example, Alum K2SO4. Al2(SO4)3.24H2O.
- **Uses of salts**

Name of the salt	Common name	Uses
Sodium chloride (NaCl)	Common salt	Used for seasoning and preserving food, essential in life processes
Sodium carbonate (Na2CO3)	Washing soda	Used as a detergent
Sodium Bicarbonate (NaHCO3)	Baking soda	Used in baking powder and manufacture of glass and in fire extinguisher
Potassium Nitrate (KNO3)	Nitre	Used in Fireworks and in the manufacture of fertilizers
Sodium nitrate (NaNO3)	Chile saltpetre	Used as a fertilizer and in the manufacture of gunpowder
Calcium carbonate (CaCO3)	Limestone	Used in construction of building, purification of iron
Calcium sulphate (CaSO4)	plaster of Paris (hydrated)	Used in the cement industry and in the synthesis of sulphuric acid
Calcium phosphate (Ca3(PO4)2)	Bone mineral	Used in the manufacture of fertilizer and in medicine
Potassium Aluminium Sulphate (K2SO4.Al2(SO4)3.24H2O)	Alum	Used in purification of water and in textile industry
Ammonium chloride (NH4Cl)	Sal ammoniac	Used in soldering and in dry cell
Copper sulphate hydrated (CaSO4.5H2O)	Blue vitriol	used as fungicide and in textile industry

Neutralization reaction: When the bases react with acid to produce salt and water. This is a neutralization reaction. In a neutralization reaction, the acid loses its acidity and the base its alkalinity. As a result, a neutral solution is obtained.

Uses of neutralization reactions:

Following are some neutralization reaction that we observe in our everyday life.

In the treatment of ant sting: Some people are highly allergic to ant string as it releases formic acid. It is neutralized by rubbing moist baking soda (sodium bicarbonate) or Calamine solution, which contains zinc carbonate on the affected area.
In the treatment of indigestion: Hydrochloric acid secreted in the stomach helps in the digestion of food. However, its excess secretion could lead to acidity and indigestion. Milk of magnesia is used to neutralize the acid.
In the treatment of soil: When the soil is too acidic, it is treated with slaked lime or quicklime, which is a base. If the soil is too basic, it is treated with organic matter such as fertilizers that are obtained from vegetables or fruits as they are acidic in nature.
In the treatment of sewage waste: several Industries produce acids as waste. If they are allowed to flow into water bodies, these wastages would affect aquatic organisms. Slaked lime (Calcium Hydroxide) is often used to neutralize this acidic waste let out from the factories.
Protecting teeth: One of the best common applications of neutralization of acids is the toothpaste. Toothpastes contain an alkali that neutralizes the weak acid produced by bacteria and prevent tooth damage.
Indicators: Substance that assist in determining whether a given substance is acidic or basic, with the help of a colour change are called indicators.

Natural indicators:

Litmus: Litmus is the most commonly used natural indicator extracted from lichen. Two types of Litmus are available: in the form of a solution, referred to as Litmus solution and a strip of paper called Litmus Paper. Acid turns blue Litmus red. Bases turn red litmus blue.
Turmeric: In acidic and neutral substances the turmeric solution remains yellow in colour, while in basic substance it turns brick red in colour.
China rose: China rose (Hibiscus) juice obtained from the petals is used as a natural indicator. if acidic substance are added, it turns dark pink (Magenta) in colour, while adding basic substances make the juice green.
Other commonly used acid base indicators-

Indicators	Colour in acid	Colour in base
Methyl orange	Red orange	Orange
Phenolphthalein	Colourless	Pink

Universal indicator:

Universal indicators are mixture of dyes or compounds that show a gradual change in colour to indicate the acidity or basicity for pH values from 1 to 14.

pH:

pH scale is a numerical representation of the acidity or basicity of substances. It varies from 1 to 14. Solution with a pH value of less than 7 are referred to as 'acids; the ones with the pH value of more than 7 are referred to as 'bases' and those with a pH value of 7 are referred to as 'neutral'.

SOME IMPORTANT QUESTIONS-

1. Name the process in which a solid directly changes into gas on heating.
Answer: Sublimation
2. What is the range of a clinical thermometer?
Answer: 35°C to 42°C
3. What is acid rain?
Answer: The rain containing excess of acids is called an acid rain.
4. Which acid naturally present in our stomach?
Answer: Hydrochloric acid (HCl)
5. What is the role of hydrochloric acid in the stomach?
Answer: Hydrochloric acid (HCl) helps us to digest food.
6. Which acid is present in an ant sting?
Answer: Formic acid is present in an ant sting.
7. What is the nature of soap solution?
Answer: Soap solution is basic in nature.
8. What is the nature of distilled water?
Answer: The Distilled water is neutral.
9. State the nature of baking soda.
Answer: Baking soda is basic in nature.
10. Where does the word acid come from?
Answer: The word acid comes from the Latin word acere which means sour.
11. Why curd, lemon juice, orange juice and vinegar taste sour?
Answer: These substances taste sour because they contain acids.
12. Which is the most commonly used natural indicator?
Answer: The most commonly used natural indicator is litmus.
13. Tom rubs a solution between fingers and feels soapy, what is the nature of that solution?
Answer: Basic
14. Name the acid which is present in each cell of our body.
Answer: Each cell in our body contains an acid, the deoxyribonucleic acid or DNA.
15. When red litmus paper is dipped in a solution; it remains red, what is the nature of the solution?
Answer: Neutral

Short Extra Questions

1. What are the effects of acid rain?
Answer: Acid rain can cause damage to buildings, historical monuments, plants and animals.
2. What does organic matter do in soil?
Answer: If the soil is basic, organic matter is added to it. Organic matter releases acids which neutralises the basic nature of the soil.
3. Why solid baking soda does not change colour of dry litmus paper?

Answer: The solid baking soda does not change colour of dry litmus paper because in solid states ions are not free to move.

4. How acidic soil can be treated?

Answer: When the soil is too acidic, it is treated with bases like quick lime (calcium oxide) or slaked lime (calcium hydroxide).

5. What are salts? Give example.

Answer: In neutralisation reaction a new substance is formed. This is called salt. Salt may be acidic, basic or neutral in nature. Example: Sodium chloride.

6. What is the role of DNA in the cell of the human body?

Answer: It controls every feature of the body such as our looks, colour of our eyes, our height etc.

7. Give examples of some acids and bases.

Answer: Acids – Curd, lemon juice, vinegar, orange juice etc.

Base – baking soda, lime water etc.

8. What are indicators?

Answer: Solutions of substances that show different colour in acidic, basic and neutral solutions are called indicators.

9. What is the effect of the China rose indicator on acidic and basic solutions?

Answer: China rose indicator turns acidic solutions to dark pink (magenta) and basic solutions to green.

10. Ammonia is found in many household products, such as window cleaners. It turns red litmus blue. What is its nature?

Answer: Ammonia is basic in nature as it turns the red litmus blue.

11. Why a turmeric stain on my white shirt is turned to red when it is washed with soap.

Answer: A turmeric stain on my white shirt is turned to red when it is washed with soap because the soap solution is basic in nature.

12. How to prepare lime water?

Answer: To prepare limewater, dissolve some lime (chuna) in water in a bottle. Stir the solution and keep it for some time. Pour a little from the top. This is lime water.

13. Blue litmus paper is dipped in a solution. It remains blue. What is the nature of the solution? Explain.

Answer: The solution could be a base or neutral solution because blue litmus paper doesn't change its colour in the neutral as well as in basic solution.

14. What do you mean by neutral solution? Give examples.

Answer: The solutions which do not change the colour of either red or blue litmus are known as neutral solutions. Examples- sugar solution, distilled water, salt etc.

15. Is the distilled water acidic/basic/neutral? How would you verify it?

Answer: Distilled water is neutral in nature. This can be verified by using red and blue litmus papers. Neither will show change in colour with distilled water. This proves that distilled water is neutral.

16. How does rain become acidic?
Answer: The rain becomes acidic because carbon dioxide, sulphur dioxide and nitrogen dioxide (which are released into the air as pollutants) dissolve in rain drops to form carbonic acid, sulphuric acid and nitric acid respectively.

Long Extra Questions

1**. Why factory waste is neutralised before disposing it into the water bodies?**
Answer: The wastes of many factories contain acids. If they are allowed to flow into the water bodies, the acids will kill fish and other organisms. The factory wastes are, therefore, neutralised by adding basic substances.
2. **Calamine solution is applied on the skin when an ant bites. Give reason.**
Answer: When an ant bites, it injects the acidic liquid (formic acid) into the skin. The effect of the acid can be neutralised by rubbing moist baking soda (sodium hydrogen carbonate) or calamine solution, which contains zinc carbonate.
3. **Name the source from which litmus solution is obtained. What is the use of this solution?**
Answer: Litmus solution is extracted from lichens. It is most commonly used natural indicator. It has a mauve (purple) colour in distilled water. When added to an acidic solution, it turns red and when added to a basic solution, it turns blue.
4. **Why we take an antacid tablet when we suffer from acidity?**
Answer: Our stomach contains hydrochloric acid. It helps us to digest food. But too much of acid in the stomach causes indigestion. Sometimes indigestion is painful. To relieve indigestion, we take an antacid such as milk of magnesia, which contains magnesium hydroxide. It neutralises the effect of excessive acid.
5. **Explain the process of neutralisation with the help of an example.**
Answer: The reaction between an acid and a base is known as neutralisation. Salt and water are produced in this process with the evolution of heat.
Acid + Base → Salt + Water
(Heat is evolved)
The following reaction is an example:
Hydrochloric Acid + Sodium Hydroxide → Sodium Chloride + Water
6. **Dorji has a few bottles of soft drink in his restaurant. But, unfortunately, these are not labelled. He has to serve the drinks on the demand of customers. One customer wants acidic drink , another wants basic and third one wants neutral drink. How will Dorji decide which drink is to be served to whom?**
Answer: Dorji can use red and blue litmus paper in order to test the drink.

- The drink which does not change the colour of either red or blue litmus is the neutral drink.
- The drink which turns red litmus blue is the basic drink.
- The drink which turns blue litmus red is the acidic drink.

7. **Complete the following table.**
Answer:

Found in	Name of acid
Vinegar	Acetic acid
Ant's sting	Formic acid
Citrus fruits such as oranges, lemons, etc.	Citric acid
Curd	Lactic acid
Spinach	Oxalic acid
Amla, Citrus fruits	Ascorbic acid (Vitamin C)
Tamarind, grapes, unripe mangoes, etc.	Tartaric acid

8. **Three liquids are given to you. One is hydrochloric acid; another is sodium hydroxide and third is a sugar solution. How will you identify them? You have only turmeric indicator.**
Answer: Put a drop of each of the three liquids i.e., hydrochloric acid, sodium hydroxide and sugar solution on the turmeric indicator, the liquid which changes the colour of turmeric indicator to red is basic in nature, that is, sodium hydroxide.
Now, put a drop of sodium hydroxide on a drop of each of the other two liquids separately i.e. hydrochloric acid and sugar solution. After that, put the drops of these mixtures on turmeric indicator. The drop which will change colour of the turmeric indicator to red contains sugar solution. This is because the mixture of basic and neutral solution is basic in nature. On the other hand, the drop will not change the colour of turmeric indicator contains hydrochloric acid. This is because hydrochloric acid reacts with sodium hydroxide to form a neutral solution.

CHAPTER-5

PHYSICAL AND CHEMICAL CHNAGES

Introduction

There are several changes we come across daily e.g dissolving sugar in water, or flattening a metal rod by beating it. These involve changes in the form of the substance. Changes can be classified as:
(i) Physical
(ii) Chemical

Physical properties

Physical properties include size, shape, colour and state (solid/liquid/gas) of a substance.

Physical change

- Any change to the physical properties of a substance is called a physical change.
- Physical changes are usually **reversible** as no new substance is formed. It is the same substance but with changed physical properties.

Chemical change

- A change in which one or more new substances are formed is called as a chemical change.
- Usually a chemical change involves a chemical reaction, which forms new products.
- Example : Rusting of Iron, or burning wood.

Metallic Oxides

Formation of metal oxides are examples of chemical changes. They are formed by the reaction of oxygen in air.
– Burning of Magnesium ribbon:
– $2Mg + O_2 \rightarrow 2MgO$
– The product formed is the oxide of magnesium, which is in the form of ash. It does not look anything like the magnesium ribbon used for burning.

Reaction of metallic oxides with water

- Reaction of metal oxides with water form metal hydroxides.
- Example dissolving Magnesium oxide in water, by stirring the ash very well with water.
- **$MgO + H_2O \rightarrow Mg(OH)_2$**
- The product formed is basic in nature and turns red litmus paper → blue

Reaction between baking soda and vinegar

When a pinch of baking soda is added to vinegar we hear a hissing sound and observe the formation of bubbles.

– Vinegar (Acetic Acid) + Baking Soda (Sodium bicarbonate) → CO_2 (Carbon dioxide) + Other products
The carbon dioxide produced during the reaction of Vinegar and baking soda, when passed through lime water gives calcium carbonate, as follows:
– CO_2 + $Ca(OH)_2$ (lime water) → Calcium Carbonate ($CaCO_3$) + H_2O
– The calcium carbonate turns lime water milky.

Observations that indicate a chemical change

- Heat or light is absorbed or given out during a chemical reaction.
- Production of sound
- Production of gases or precipitates
- Production of smell
- A colour change may occur

Rusting

- When substances made of Iron are exposed to oxygen and moisture in the atmosphere, it forms a red layer, which is called **rust**.
- The formation of rust can be represented by the following reaction:
- **$4Fe + 3O_2 \rightarrow 2Fe_2O_3$.** The chemical formula for rust is $Fe_2O_3.nH_2O$. More the moisture in the air, quicker the formation of rust.
- **Galvanization**
  – The process of depositing zinc on the surface of Iron to prevent rusting is called as **galvanisation**.
  – Example: Iron water pipes are galvanised. Ships are made out of iron which is galvanised. Due to the presence of salts in seawater, the process of rusting is hastened. Hence ships need to replace their iron body every year.
- **Crystallisation**
  – The process of separation of salts from their solution is called as crystallisation. It is a purification technique that purifies seawater or separates crystals from impure samples. It is a physical change.

SOME IMPORTANT QUESTIONS

Very Short Answer -

1. Identify the following changes as physical or chemical.
a. Dissolving sugar in water. Ans: Physical.
b. Formation of rain from clouds. Ans: Physical.
c. Formation of acid rain Ans: Chemical.
d. Combustion Ans: Chemical.
e. Hammering a nail flat. Ans: Physical.

Short Answer Questions -

2. What are physical properties? Give examples.
Ans: Physical characteristics are features of a substance that may be determined based on its appearance.
Examples: shape, size, colour, state of compound etc.
3. **What are chemical changes? Give examples.**
Ans: When one or more compounds react to generate completely new products, this is referred to as a chemical change. The original reactant or substance changes totally as a result of a chemical transformation. The final product is unique. The transformation is irreversible.
Examples: Combustion, corrosion, photosynthesis etc.

4. **What are physical changes? Give examples.**
Ans: Physical changes occur in a matter that does not result in the creation of a new product. During these transitions, the matter often shifts from one state to another. For example, changes in the state of matter, the solubility of salt and sugar in water, and so on.
5. **Explain how burning a strip of magnesium ribbon is a chemical change.**
Ans: When magnesium ribbon is burned in the presence of air, it produces white ash with a dazzling white light which is known as magnesium oxide. The ashes formed look physically different in appearance from the initial reactant. It is a chemically unique matter at the same time. Burning magnesium ribbon is an example of a chemical shift because the product is an entirely different compound.
6. **What happens when vinegar is added to baking soda? How do you test the gas produced?**
Ans: Vinegar is acidic in nature on the other hand baking soda is basic in nature. When we combine these two salts, water along with carbon dioxide gas is formed.
The gas produced is passed through lime water. The lime turns milky or white due to the formation of calcium carbonate. This test confirms the presence of carbon dioxide.

Long Answer Questions –

7. What are the indications of a chemical change?
Ans: The following signs of chemical change are present:
- Heat may be absorbed or released in the reaction.
- There might be the production of sound during or at the end of the reaction.
- A pleasant or pungent odour is created.
- A change in the colour of the solution may occur.
- Formation of gas.

8. Explain the formation of rust.
Ans: The degrading of metals such as iron in response to the environment is known as rusting. When it comes to oxygen and water, iron is extremely reactive. The production of iron oxide from iron is referred to as rust. It causes the iron article to deteriorate. Rust (Iron III oxide) is formed when iron combines with oxygen and water. Rust starts on the surface and works its way deeper into the metal.
Iron (Fe) + Oxygen (O_2) (from the air) + water (H_2O) rust (iron oxide Fe_2O_3)
9. How can rusting of iron be prevented? Suggest and explain any three methods.
Ans: Rusting is a phenomenon that occurs on the surface of a metal. It can be avoided in the following ways:
- Applying oil or grease on the surface inhibits the iron surface from coming into touch with the atmosphere, which prevents rusting.
- Galvanization: A layer of a more reactive metal, such as zinc, is deposited on the surface of iron to protect it from rust.
- Painting: Applying a layer of paint to the metal's surface stops it from coming into contact with the atmosphere once more.
- Alloying: To make alloys, iron can be combined with other metals and non-metals. Rust resistance is a feature of alloys. Stainless steel is an important iron alloy.

CHAPTER-6

RESPIRATION IN ORGANISM

Why do we respire?

- All the living organisms are made up of small microscopic units called the cells.
- These cells have different functions to perform in these organisms such as digestion, respiration, transportation and excretion.
- The cells can perform this function only if they get the energy to do so.
- Hence, all living organisms need food which gives them the required energy.
- The energy present in the food gets released when the organisms respire or breathe.

How food helps us in gaining energy?

- As we breathe, we take in the air that contains oxygen in it and breathe out air which contains carbon dioxide. This oxygen when transported to our cells helps in breaking down the food and we get energy.

What is cellular respiration?

- Cellular respiration can be defined as the process in which the food that we eat is broken down inside the cells which results in the release of energy. All the cells in living organisms undergo cellular respiration.
- The cellular respiration takes place in a cell organelle called mitochondria.
- The oxygen that an organism breathes in reacts with the carbohydrates (glucose) present in the food and results in the release of carbon dioxide, water and energy.

Types of respiration-

Aerobic Respiration	**Anaerobic Respiration**
1. This kind of respiration takes place in the presence of oxygen.	1. This type of respiration happens in the cells in the absence of oxygen.
2. It leads to release of a high amount of energy in living organisms.	2. It results in a low amount of energy.
3. Human beings and many other animals undergo aerobic respiration.	3. Yeast and sometimes human beings undergo anaerobic respiration.
4. Carbon dioxide and water are also released in aerobic respiration.	4. Animal muscle cells release lactic acid and Yeasts release ethanol and carbon dioxide in anaerobic respiration.

Anaerobes:

- Organisms that can exist in the absence of air are called anaerobes.
- They undergo anaerobic respiration hence can get energy even without oxygen.
- For example, Yeasts. These are unicellular organisms that exist in the absence of oxygen as well.

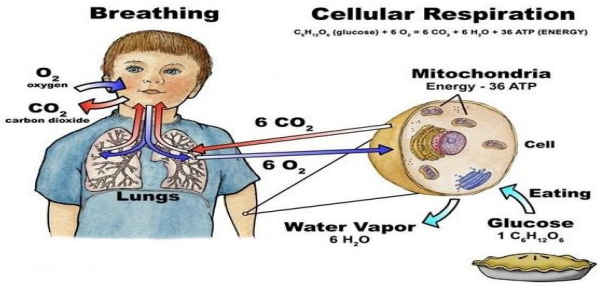
- As a by-product, they release ethanol and carbon dioxide. That is why they are used to make wine and beer. This is called as alcohol fermentation.

Anaerobic respiration in human beings

- Sometimes muscles of human beings can respire without oxygen.
- This generally happens when we undergo a heavy exercise such as running, weightlifting, cycling or walking for a longer duration.
- In such situations, the muscles require more energy and the supply of oxygen is not enough.
- Hence anaerobic respiration takes place in the muscles.
- As a result of muscles also produce lactic acid along with energy.
- This lactic acid accumulates in the muscles and causes cramps.
- That is why we often feel cramps while we do heavy exercises.
- In order to get relief from cramps, we can take a hot water bath or massage our muscles.
- This is so because hot water bath or massage improves the blood circulation in the muscles.
- As a result, the oxygen reaches the cells easily which breaks on the lactic acid into carbon dioxide and water.

Breathing:

- **Breathing** can be defined as a process in which organisms, with the help of their respiratory organs, take in the oxygen-rich air present in the surroundings and release out air that contains high amount of carbon dioxide in it. Breathing occurs continuously in the organisms.
- **Inhalation** is the process of taking the air that contains oxygen inside the body.
- **Exhalation** is a process of releasing out air that contains carbon dioxide out of the body. Inhalation and exhalation take place alternatively in the breathing process.
- **Breathing rate** can be defined as the number of times a person breathes in a minute.
- A breath can be defined as an inhalation followed by an exhalation.
- The breathing rate is not always constant in human beings. We generally breathe faster when our body needs more energy for example while exercising.
- This is so because the body needs more oxygen that can break down the food and produce more energy.
- An average adult human being breeds 15 to 18 times in a minute. While exercising, this rate can change up to 25 times a minute.

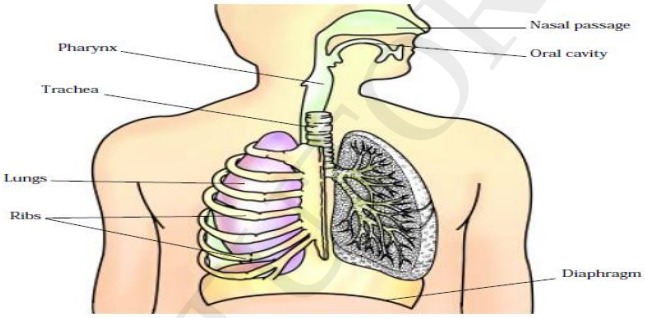


Relation between Breathing and Cellular Respiration

Why do we feel hungry after doing a physical activity like walking or running?

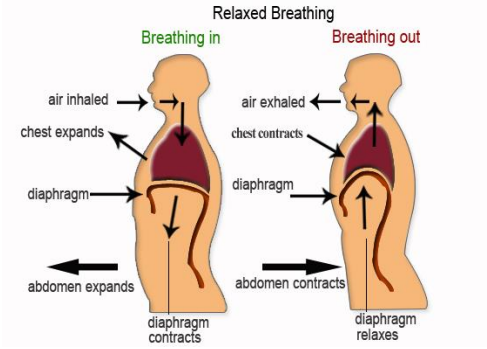
When we do a physical activity the food that is present in our body is converted into energy. Since all the food gets consumed in generating the energy we start feeling hungry. Hence in order to gain more energy we need to eat more food.

The mechanism of breathing in human beings



The Respiratory System in Humans

- We take in the air present in the environment through our nostrils which travels through the nasal cavity.
- Then it moves through the windpipe and reaches the lungs.
- The lungs are located in the chest cavity which is surrounded by the ribs.
- On the floor of the chest cavity lays a muscle sheet called diaphragm.
- During the breathing process, the movement of the ribs and diaphragm takes place. This is so because the lungs expand and contract during breathing.
- As we take in the air it fills up the lungs. This moves the diaphragm downwards and the ribs outwards.
- The lungs when releasing out air from the body which brings back the diaphragm and the ribs to their original positions.



Breathing

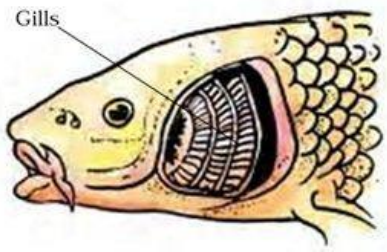
Why do we sneeze?

- As we inhale the air present in the surroundings sometimes various unwanted elements such as smoke and dust are also included in it.
- However, they get stuck in the hair in our nostrils but some of them can get through the nasal cavity.
- They thus cause irritation in the nasal cavity which makes us sneeze.
- This helps in getting rid of the unwanted particles out of the nasal cavity.

Breathing in other organisms

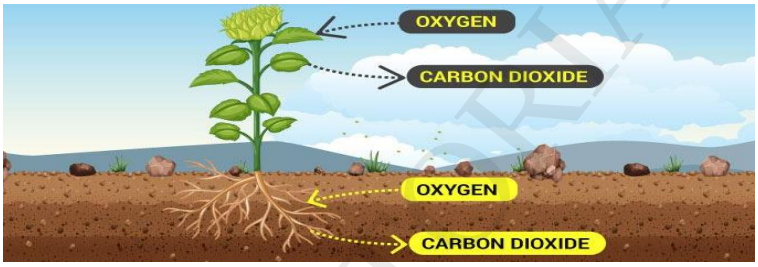
- Many animals have just cavities in their bodies just like human beings for example lions, elephants, goats, cows, snakes and birds.
- **Breathing in cockroach:**
  - Many insects like Cockroaches have small openings called spiracles present on the sides of the bodies.
  - Also, they have an air tube-like structure called the trachea that allows the exchange of gases in these insects.
  - The air enters the body through the spiracles and diffuses in the cells via the trachea.
  - Similarly, the air from the cells enters the trachea and moves out of the body through spiracles.
- **Breathing in earthworms:**
  - Earthworms have a soft, slimming and moist skin.
  - Hence the gases can easily pass in and out of the earthworm through its skin.
  - Similarly, frogs also have a slippery and moist skin that can help in breathing. However, frogs contain lungs too.
- **Breathing underwater**
  - Animals that live underwater have special respiratory organs called gills.
  - They are a comb-like structure present on the skin of these animals.

- Gills allow the exchange of gases between animals and the water easily.
- Some animals called the amphibians can breathe on land by lungs and through moist skin under water. For example frogs and toads.



Respiration through Gills in Fishes

Respiration in plants-



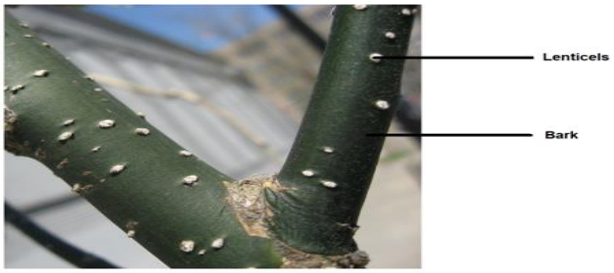
Respiration in plants

1. We know that plants also respire. They take in the carbon dioxide present in the atmosphere and use it in the process of photosynthesis to produce food. As a result of photosynthesis in plants, they release out oxygen in the environment.

2. All the parts of the plants can independently respire that is they can take in the carbon dioxide and release oxygen on their own.

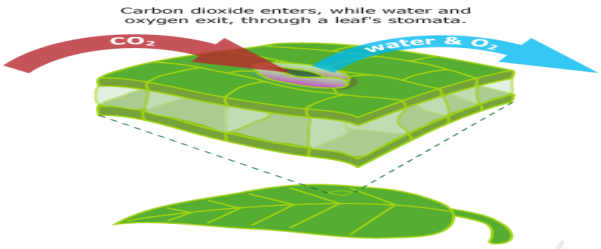
3. The leaves of the plants have stomata present upon them which are small pore-like structures. The allow gases exchange in leaves.

4. The woody stems of the plants also respire. This is because of the presence of special tissue called Lenticels. The cells of this tissue have large intercellular spaces. They exist as dead cells on woody plants and roots and allow the exchange of gases. The bark of trees although is impermeable to gases hence these tissues serve an important purpose of respiration in the stems. As the name suggests, lenticels have a lens-like shape.



Lenticels in plants

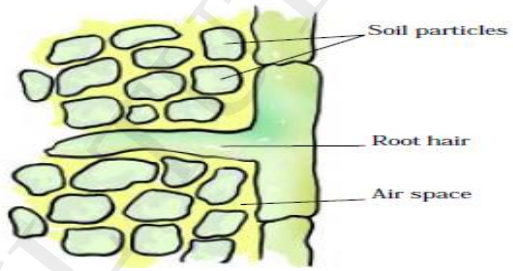
5. The roots of the plants have hair-like structures on them. Hence they can absorb the air present in the soil.



Respiration in Leaves through Stomata

Why plants can die if overwatered?

- We know that the roots get oxygen from the soil.
- We also understand that the air in the soil is present between the soil particles.
- Along with the air, soil also contains some water or moisture.
- If we over-water the plants the spaces between the soil particles get clogged.
- As a result, the roots will not be able to get enough air and the plant can die.



Roots can absorb air from the soil

SOME IMPORTANT QUESTIONS

1. Where does cellular respiration take place?
Answer: Cellular respiration takes place in the cells of all organisms.
2. What is aerobic respiration?
Answer: The process of breakdown of glucose with the use of oxygen is called aerobic respiration.
3. What are some common uses of Yeast?
Answer: Some common uses of Yeast are bread, wine and beer.
4. Name an organism that can survive in the absence of air.
Answer: Yeast can survive in the absence of air.
5. How do earthworms breathe?
Answer: Earthworms breathe through their skins.
6. What does a breath mean?

Answer: A breath means one inhalation plus one exhalation.

7. What is cell?

Answer: A cell is the smallest structural and functional unit of an organism.

8. What are all organisms made up of?

Answer: All organisms are made of small microscopic units called cells.

9. Name the respiratory organ of birds.

Answer: They have lungs in their chest cavities like the human beings.

10. What forms the floor of the chest cavity?

Answer: A large, muscular sheet called diaphragm forms the floor of the chest cavity.

11. What are the end products of anaerobic respiration?

Answer: The end products of anaerobic respiration are alcohol, carbon dioxide and energy.

12. What is produced during anaerobic respiration in muscles that causes cramps?

Answer: Lactic acid is produced during anaerobic respiration in muscles that causes cramps.

13. What is cellular respiration?

Answer: The process of breakdown of food in the cell with the release of energy is called cellular respiration.

14. What is breathing rate?

Answer: The number of times a person breathes in a minute is termed as the breathing rate.

15. Why smoking should be avoided?

Answer: Smoking damages lungs. Smoking is also linked to cancer. So, it must be avoided.

16. What are spiracles?

Answer: Insects have small openings on their body that allow them to breathe. These openings are called spiracles.

17. Why we should eat regularly?

Answer: We should eat regularly because food has stored energy, which is released during respiration.

18. What is a stomata and what is its function?

Answer: Leaves of the plants have tiny pores called stomata for exchange of oxygen and carbon dioxide.

19. What is breathing?

Answer: Breathing means taking in air rich in oxygen and giving out air rich in carbon dioxide with the help of respiratory organs.

20. What is inhalation and exhalation?

Answer: The taking in of air rich in oxygen into the body is called inhalation and giving out of air rich in carbon dioxide is known as exhalation.

Short Extra Questions and Answers-

1. How do frogs breathe?

Answer: Frogs have a pair of lungs like human beings to breathe air. They can also breathe through their skin, which is moist and slippery.

2. Name some animals that breathe through lungs.

Answer: Animals such as elephants, lions, cows, goats, frogs, lizards, snakes, birds, have lungs in their chest cavities like the human beings.

3. Why do mountaineers carry oxygen with them?

Answer: Mountaineers carry oxygen with them because the amount of air available to a person is less than that available on the ground.

4. Why should we cover our nose while sneezing?
Answer: When we sneeze, we should cover our nose so that the foreign particles we expel are not inhaled by other persons.
5. How does respiration occur in earthworms?
Answer: Earthworms breathe through their skins. The skin of an earthworm feels moist and slimy on touching. Gases can easily pass through them.
6. What role does hair present in the nasal cavity play in the process of respiration?
Answer: When we inhale, the particles get trapped in the hair present in our nasal cavity. Thus, the hairs present in the nasal cavity filters the air.
7. What is normal range of breathing rate per minute in an average adult person at rest?
Answer: On an average, an adult human being at rest breathes in and out 15ñ18 times in a minute.
8. Why do we get muscle cramps after heavy exercise?
Answer: The cramps occur when muscle cells respire anaerobically. The partial breakdown of glucose produces lactic acid. The accumulation of lactic acid causes muscle cramps.
9. What happens during exhalation?
Answer: During exhalation, ribs move down and inwards, while diaphragm moves up to its former position. This reduces the size of the chest cavity and air is pushed out of the lungs.
10. What happens during inhalation?
Answer: During inhalation, ribs move up and outwards and diaphragm moves down. This movement increases space in our chest cavity and air rushes into the lungs. The lungs get filled with air.
11. What happens to the air we breathe in?
Answer: The air we breathe in is transported to all parts of the body and ultimately to each cell. In the cells, oxygen in the air helps in the breakdown of food and energy is released.
12. How does respiration work in yeast?
Answer: Yeasts are single-celled organisms. They get energy through anaerobic respiration. In the absence of oxygen, glucose breaks down into alcohol and carbon dioxide.
13. Why are yeasts used to make wine and beer?
Answer: Yeasts are single-celled organisms. They respire anaerobically and during this process yield alcohol. They are, therefore, used to make wine and beer.
14. What is the function of gills in fish?
Answer: Gills in fish help them to use oxygen dissolved in water. Gills are projections of the skin and are well supplied with blood vessels for exchange of gases.
15. How do plant roots respire?
Answer: Like all other living cells of the plants, the root cells also need oxygen to generate energy. Roots take up air from the air spaces present between the soils particles.

CHAPTER-7

TRANSPORTATION IN ANIMALS AND PLANTS

Circulatory System

The organ system of the body that is responsible for the **transport of material** throughout the body is called the **circulatory system**.

- The materials transported are nutrients, oxygen, carbon dioxide, cells, etc
- The medium of transportation is blood.
- The primary parts of the circulatory system are heart, arteries and veins.

Blood

- Blood is a fluid tissue that transports nutrients and oxygen to the cells and carries away carbon dioxide and other waste products in our body.
- The fluid part of blood is called plasma and has various salts and nutrients dissolved in it.
- Blood cells are suspended in plasma and they are Red Blood Cells (RBCs), White Blood Cells (WBCs) and Platelets.

Plasma

- Plasma is the liquid component of the blood in which most of the blood cells are suspended.
- It is mostly made up of water (up to 95%) and contains dissolved nutrients, carbon dioxide and oxygen.

RBC

- Red Blood Cells (RBC) present in the blood are responsible for the transport of oxygen throughout the body.
- They contain a red pigment called haemoglobin, which binds with the oxygen.
- The reddish colour of the blood is due to haemoglobin.

WBC

- The blood contains white blood cells (WBC), which are part of the immune system.
- They are like soldiers, which fight and kill germs that may enter the body.

Blood Platelets

- Platelets are the smallest cells in the blood.
- By clumping together, they form a blood clot, preventing loss of blood due to bleeding.
- They prevent excessive damage to the blood vessels by binding together at the site of damage.

Blood Vessels

- Blood vessels are tubes that carry blood all over the body.
- Arteries, veins and capillaries are collectively called as blood vessels.

Arteries

- Arteries are blood vessels that carry oxygenated blood to the cells and tissues of our body.
- They carry blood from the heart to the tissues.

Veins

- Veins are blood vessels that carry away deoxygenated blood from the cells and tissues of our body.
- They carry blood from tissues to the heart.

Capillaries

- Capillaries are the smallest of the body's blood vessels.
- It serves the most important task of the circulatory system: exchange of material between circulation and cells.
- The fine network makes it easy for the process of diffusion of materials due to the increase in surface area.

Heart

- The heart is a muscular organ in animals that pumps blood through blood vessels to all the parts of the body.
- The heart consists of four chambers that prevent the oxygenated and deoxygenated blood from mixing.
- The upper chambers are called as atria and the lower chambers are called as ventricles.

Valves

- Valves are present in the heart as well as in veins.
- In the heart, they are present between atria and ventricles and at the base of big vessels leaving the heart.
- Valves are responsible for the unidirectional flow of blood in the body.
- Opening and closing of the valves present in the heart is responsible for the lub-dub sound of the heart.

Pulmonary Circuit

- It is the network of arteries and veins connecting the heart and lungs.
- Deoxygenated blood is pumped from the blood to the lungs for oxygenation.
- The oxygenated blood returns to the heart to be pumped to the rest of the body.

Oxygenation of Blood

- Oxygenation of blood occurs at the alveoli in the lungs.
- The alveoli have blood vessels wrapped around it and the blood is oxygenated by diffusion.

Pulse

- The heart periodically expands and contracts to pump blood into the arteries, which also expands and contracts as the blood flows through them. This is called pulsation.
- This pulsation of the arteries can be felt at certain places of the body such as the wrist.
- Pulsation is measured as the number of heartbeats per minute, which is nothing but pulse rate

Excretory System

Excretion

The process of removal of waste products from the cells of living organisms is called excretion.

- For human beings, the waste products are in the form of carbon dioxide, urine and faeces.

Kidneys

- Our body's main excretory organs are the kidneys.
- There is a pair of kidneys present on either side of the spine.
- Each kidney is a bean-shaped organ, reddish in colour.
- It contains millions of tiny tubules that act as microscopic filters and filter out the useful and harmful substances from the blood.
- The useful substances are again reabsorbed back into the blood and only harmful substances are concentrated.

- These harmful substances are present in a dissolved state in water and now it is called as urine.
- Urine is excreted out of the body.
- Thus, kidneys act as filters of our body.

Ureters

- Urine is sent from the kidneys to the urinary bladder through tubes called ureters.

Urinary Bladder

- The urinary bladder is a muscular bag where urine is accumulated and excreted from the body through the urethra.
- It can hold about 300-500 mL urine for a while before the urge to empty occurs.

Dialysis

- Dialysis is the filtering of blood outside the human body using a machine, when both the kidneys fail.

Excretion in Other Animals

- Excretion in different animals differs based on the excretory material.
- Ammonia, urea and uric acid are the commonly excreted material.

Transportation in Plants

Osmosis

Osmosis is the movement of solvent molecules from a region of **lower solute concentration** to a region of **higher solute concentration** through a semi-permeable membrane.

Root Hair

- Root hairs are elongated extensions of the roots that are comparable to hairs on animals.
- They increase the surface area for increased exchange of water and minerals.

Phloem

- Phloem is the plant tissue that transports the soluble organic material created during photosynthesis from the leaves to the other parts of the plant.

Xylem

- Xylem is the plant tissue that transports the water and other nutrients from the roots to other parts of the plant.

Transpiration

- Transpiration is the loss of water in the form of water vapour from stomata present on leaves.
- This process also helps the plants absorb and distribute water through their roots.
- Transpiration exerts a straw-like effect and the water moves up against gravity in tubes made of xylem cells.

SOME IMPORTANT QUESTIONS

Question 1: Why is the transport of materials necessary in a plant or in an animal? Explain.

Answer 1: Transporting minerals to every cell in plants and animals is important as all the cells require specific nutrients and a regular supply of oxygen for releasing energy through respiration. The food we intake is broken down into smaller components for easy absorption by cells.

The oxygen we breathe also is transported to all the cells of the body. Organisms also require the execution of constant removal of waste materials such as carbon dioxide, urea and uric acid.
For the transportation of materials, humans have a very complex and specialized system, and in plants, transportation of water and minerals is performed through a vascular tissue system.

Question 2: What will happen if no platelets are in the blood?

Answer 2: Absence of platelets or lack of platelets in blood results in the blood being unable to clot. Blood clots are because platelets are present in the blood, which are responsible for releasing a few chemicals which clot the blood. Hence, if there are no platelets present in the blood, the blood will not clot and will not be able to prevent further bleeding.

Question 3:

Fill in the blanks.

(i) Haemoglobin is present in _____ cells.

(ii) Arteries and veins are joined by a network of _____ .

(iii) The rhythmic expansion and contraction of the heart is called _____.

(iv) The main excretory product in human beings is _____.

(v) Sweat contains water and _____ .

(vi) Kidneys eliminate the waste materials in the liquid form called _____ .

(vii) Water reaches great heights in the trees because of suction pull caused by _____ .

Answer 3:

(ii) **red blood** (ii) **capillaries.**(iii) **heartbeat.**(iv) **urea.**(v) **salts.** (vi) **urine.**(vii) **transpiration.**

Question 4: What are stomata? Give two functions of stomata.

Answer 4: Tiny pores on the lower side of the leaf's surface are known as stomata.
The functions of stomata are

1. Stomata help in the exchange of gases necessary for the respiration of the plant.
2. Evaporation of water from the surface of the leaf to the atmosphere also occurs through stomata. This process is also known as transpiration.

Question 5: What are the components of blood?

Answer 5: There are three components of blood those are:

1. Red Blood Cells (RBCs) 2. White Blood Cells (WBCs) 3. Platelets
1. Red Blood Cells (RBCs): Red blood cells in the blood are the most abundant cells present. It contains a red pigment known as haemoglobin that binds with oxygen. It's the haemoglobin which carries oxygen and transports it to all parts of the body.
2. White Blood Cells (WBCs): White blood cells are colourless cells without haemoglobin. Their main function is to fight against infections and protect the body from foreign particles like bacteria and viruses.
3. Platelets: Platelets are the smallest cells present in the blood. Their main function is to prevent bleeding.

Question 6: Why is blood needed by all the parts of a body?

Answer 6: Blood is the main medium of transportation for the body. It is needed by all body parts as it performs the following important functions:

1. Blood transports oxygen from the lungs to all the cells in our body.
2. It carries carbon-di-oxide from the body back to the lungs so it can be exhaled easily.
3. Blood also regulates heat, thus helping in thermoregulation.
4. Blood contains WBCs responsible for fighting diseases and infections.

Question 7: Describe the function of the heart.

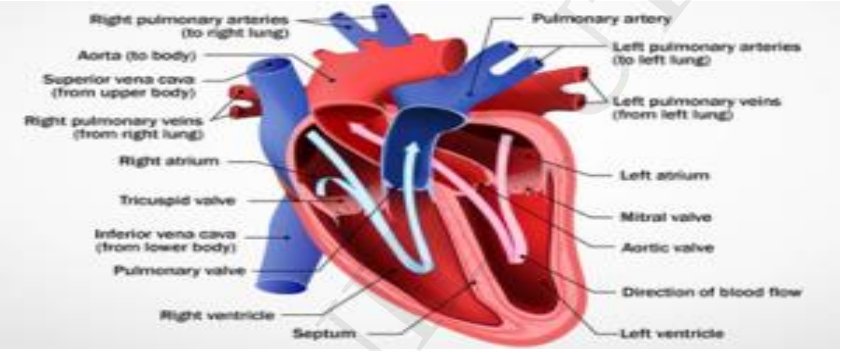
Answer 7: The heart is a muscular organ responsible for pumping blood and keeping a person alive. The human heart has four chambers; the two upper chambers are called the right and left atrium, respectively, and the two lower chambers are called the right and left ventricles.

The flow of blood in the human heart:

The right atrium receives deoxygenated carbon dioxide-rich blood from the body through the pulmonary artery. Blood from the right atrium is pumped to the right ventricle, which pumps blood to the lungs.

exchanging gases takes place in the lungs, and oxygen-rich blood exits the lungs and reaches the left atrium through the pulmonary vein. Blood is then pumped to the left ventricle, from where blood is pumped to all parts of the body.

Hence, the rhythmic contraction and expansion of the heart transports blood to all parts of the body and also causes the sound of a heartbeat.



Question 8: Why is it necessary to excrete waste products?

Answer 8: All cells in our body excrete waste while performing their function. This, although present in low quantity, is toxic for our body hence the need to excrete them. . The process of removing waste products produced in the cells of living organisms is called excretion.

Question 9:

The muscular tube through which stored urine is passed out of the body is called –

(a) kidney (b) ureter (c) urethra (d) urinary bladder

Answer 9: (c) Urethra

Question 10: They are pipe-like, consisting of a group of specialised cells. They transport substances and form two-way traffic in plants. Which of the following terms qualify for the features mentioned above?

(a) Xylem tissue (b) Vascular tissue (c) Root hairs (d) Phloem tissue

Answer 10: (d) Phloem tissue

Question 11: In which of the following parts of the human body are sweat glands absent?
(a) Scalp (b) Armpits (c) Lips (d) Palms
Answer 11: (c) Lips
Question 12: Veins have valves which allow blood to flow only in one direction. Arteries do not have valves. Yet the blood flows in one direction only. Can you explain why?
Answer 12: Arteries do not have valves. Yet the blood flows in only one direction as opposed to the unidirectional, rapid blood flow found in arteries.
Question 13: Arrange the following statements in the correct order in which they occur during the formation and removal of urine in human beings.
(a) Ureters carry urine to the urinary bladder.
(b) Wastes dissolved in water are filtered out as urine in the kidneys.
(c) Urine stored in the urinary bladder is passed out through the urinary opening at the end of the urethra.
(d) Blood containing useful and harmful substances reaches the kidneys for filtration.
(e) Useful substances are absorbed back into the blood.
Answer 34:
(d) Blood containing useful and harmful substances reaches the kidneys for filtration.
(e) Useful substances are absorbed back into the blood.
(b) Wastes dissolved in water are filtered out as urine in the kidneys.
(a) Ureters carry urine to the urinary bladder.
(c) Urine stored in the urinary bladder is passed out through the urinary opening at the end of the urethra.
Question 14:
Name the process and the organ which helps in removing the following wastes from the body.
(a) Carbon dioxide (b) Undigested food (c) Urine (d) Sweat
Answer 14:

PROCESS	**ORGAN**
a) Exhalation	Lungs
b) Egestion	Large Intestine
c) Excretion	Kidneys
d) Perspiration	Sweat Glands

Question 15: Fill in the blanks of the following paragraph using just two words – arteries and veins.

___(a)___ carry oxygen-rich blood from the heart to all parts of the body, and ___ (b)___ carry carbon dioxide-rich blood from all parts of the body back to the heart. ___ (c)___ have thin walls and __ (d)___ have thick elastic walls. Blood flows at high pressure in ___ (e)____. Valves are present in __ (f) ___, which allow blood to flow only towards the heart. __ (g)___ divide into smaller vessels. These vessels further divide into extremely thin tubes called capillaries. The capillaries join up to form ____ (h)_____.

Answer 15:

a)Arteries carry oxygen-rich blood from the heart to all parts of the body, and **b) veins** carry carbon dioxide-rich blood from all parts of the body back to the heart. **c) Veins** have thin walls, and **d) arteries** have thick elastic walls. Blood flows at high pressure in **e) arteries**. Valves are present in **f) veins** which allow blood to flow only towards the heart. **g) Arteries** divide into smaller vessels. These vessels further divide into extremely thin tubes called capillaries. The capillaries join up to form **h) veins.**

Question 16: Define pulse.

Answer 16: Throbbing or the rhythmic contraction and dilation that occurs in the arteries resulting from the heartbeat is called a pulse.

Question 17: Define osmoregulation.

Answer 17: Maintaining the osmotic pressure of the body fluids by controlling the amount of water and electrolyte in the body is called osmoregulation.

Question 18: Explain Dialysis.

Answer 18: Dialysis is a medical treatment performed in patients with weak or faulty kidneys. It is an artificial machine containing a tank with a solution of water glucose and salt with a concentration similar to blood. The patient's blood is taken through the artery and is allowed to pass through the solution for the removal of waste. The purified blood devoid of any impurities is then pumped back to the vein. Dialysis is continued until all the blood has been purified.

Question 19: Why do sponges and hydra lack blood?

Answer 19: Animals such as sponges and hydra do not possess any circulatory system as their habitat, water in which they live brings food and oxygen, and it enters through pores present on their body surface, and the waste is carried out. .

Question 20: Differentiate between Artery and Vein.

Answer 20: The following are the differences between artery and vein:

ARTERY	VEIN
Arteries carry blood from the heart to various body parts.	Veins carry blood from the various parts of the body to the heart.
Arteries carry oxygenated blood from the heart, except the pulmonary artery.	Veins carry deoxygenated blood from the body parts, except the pulmonary vein.
Arteries carry blood under high pressure.	In veins, blood flows comparatively slowly.
As blood flows rapidly, no valves are present.	Valves are present to prevent the blood from flowing backwards.

Question 21: Ammonia is excreted in gaseous form by:

- **Humans**
- **Pisces**
- **Reptiles**
- **Aves**

Answer 21: Pisces

CHAPTER-8
REPRODUCTION IN PLANTS

Reproduction:

- The process of producing offspring by the parent is called reproduction.
- It is a biological process.
- The offspring produced can and cannot be the exact copy of the parent.

Mode of Reproduction:

- There are two modes of reproduction, asexual reproduction and sexual reproduction.

Asexual Reproduction

- Reproduction that occurs without the involvement of male and female gamete is called asexual reproduction.
- Seed is not produced in this mode of reproduction.

Different Types of the Asexual Reproductions are:

Vegetative Propagation

- Reproduction that occurs through vegetative part of the plant i.e., leaves, stems and roots is called vegetation propagation.
- Examples of organism produced by vegetative propagation are:

A. Onion, garlic and tulip are produced by the stems.
B. Sweet Potato and Dahlia are produced by the roots.
C. Bryophyllum is produced by leaves.

Budding

- Bud is the small bulb-like structure bulging from the yeast cell.
- Bud when it gets detached it develops into a new organism and this process of producing new organism from the bud when it gets detached is called budding.
- Examples of organisms produced by budding are yeast and hydra.

Fragmentation

- The process by which organisms get divided into a number of fragments and each fragment develops into a new individual is called fragmentation.
- Fragmentation in spirogyra is an example of this type.

Spore Formation

- The process by which organisms get divided into a number of spores and each spore develops into a new individual under favorable conditions is called spore formation.
- Spore formation in fungi, fern and bacteria are some examples of this type.

Sexual Reproduction

- Reproduction that occurs with the involvement of male and female gametes is called sexual reproduction.
- Male gamete produced by pollen grains and female gamete produced by ovary of the pistil fuses to form a zygote.
- Stigma, style and ovary together forms pistil.
- Seed is produced in this mode of reproduction.
- This reproduction occurs through the reproductive part of the plant i.e., flower.
- The flower has both male reproductive parts called stamens and female reproductive part called pistil.
- Flowers that has either pistil or stamens is called unisexual flowers and flowers that has both pistil and stamens is called bisexual flowers.

Pollination

- When pollen is transferred from the anther to the stigma of a flower is called pollination.
- When the pollen of a flower lands on the stigma of the same flower it is called self-pollination.
- When the pollen of a flower lands on the stigma of another flower it is called cross-pollination

Fertilization

- After pollination occurs fertilization, where male and female gamete fuses to form zygote and later zygote develops into embryo.
- After fertilization, fruits are developed by ovary and seeds are developed by ovules.

Seed Dispersal

- The movement of seeds by water, wind and animals is called seed dispersal.

- Examples of the seeds dispersed by animals are xanthium and urena.
- Examples of seed dispersed when the fruit burst with sudden jerk are castor and balsam.
- Seed dispersal is important because it reduces overcrowding of seeds of plants and hence each plant gets an adequate amount of water and sunlight.

Fission

Fission is a kind of asexual reproduction that happens in unicellular organisms like the amoeba. Here the single cell that is the parent will divide into two or more daughter cells. In binary fission, the single-cell will be divided into two daughter cells. In multiple fissions, the single parent cell will divide into many daughter cells.

Fragmentation

This is a kind of asexual reproduction called cloning, where the organism gets split into various fragments. Then each of the fragments will develop into a fully grown and mature individual, which are the clones of the original organism.

Budding

Budding is a kind of asexual reproduction where a new organism will develop from an outgrowth or a bud because of cell division at one particular parent organism site. This then eventually breaks away from the parent cell.

Spore Formation

Spore formation is the term that is used for reproduction through spores. The spores are microscopic and are a reproductive body. When the spores are released into the area surrounding it, this develops into plants under the conditions if they are favourable. Examples include fungi.

Vegetative Propagation is also a kind of asexual reproduction where the new plant gets produced from stems, roots, buds, and leaves.

Sexual Reproduction in Plants

Plants also have sexual reproduction. This occurs where there is a fusion of the gametes. This eventually gives seeds, which then develop into a new plant. The flowers are a part of the plant which goes through sexual reproduction. The male gametes are the pollen grains that get produced by the anthers. The female gametes are the ovule that gets produced by the pistils. When there is pollination, the male and the female gamete meet. These get fused by the process of fertilization, and then this gives birth to a new plant by the formation of fruit and seeds.

Pollination

Pollination is the process of transferring the pollen grain from the male flower parts from the anthers to the stigma that is the female part of the plant.

Types of Pollination

Pollination is of two kinds. When the pollen lands on the same flower stigma, then this is known as self-pollination. When the pollen lands on another flower's stigma, then this is cross-pollination.

SOME IMPORTANT QUESTIONS

1. **Fill in the blanks:**

(a) Production of new individuals from the vegetative part of parent is called_____.

(b) A flower may have either male or female reproductive parts. Such a flower is called_____.

(c) The transfer of pollen grains from the anther to the stigma of the same or of another flower of the same kind is known as _____.

(d) The fusion of male and female gametes is termed as _____.
(e) Seed dispersal takes place by means of _____, _____ and _____.

Solution:

(a) vegetative propagation (b) unisexual flower (c) Pollination (d) fertilisation

(e) wind, water and animals.

2. **Describe the different methods of asexual reproduction. Give examples.**

Solution: Different methods of asexual reproduction are as follows:

Vegetative Propagation

In this asexual reproduction, new plants are produced from roots, stems, leaves and buds of the individual plant.

Examples – Tuber of potato, the rhizome of ginger.

Budding

The bud is a small projection which gradually grows and gets detached from the parent cell and forms a new yeast cell. The new yeast cell grows, matures and produces more yeast cells.

Example – Yeast.

Fragmentation

In this mode of reproduction, the growth and multiplication are done by rapidly breaking down into two or more fragments. Each fragment grows into new individuals when water and nutrients are available.

Example – Algae

Spore Formation

This reproduction is done by spores which, under favourable conditions, germinate and develop into a new individual.

Examples – Fungi like Rhizopus, Mucor, etc.

Fission

It is a type of asexual reproduction where the unicellular organism splits to form new organisms. There are two types of fission which are,

- Binary fission and Multiple fission

Examples

Unicellular organisms that undergo binary fission are amoeba, paramecium, leishmania, etc.

Plasmodium undergoes the process of multiple fission.

3. **Explain what you understand by sexual reproduction.**

Solution: Sexual reproduction is a method where male and female gametes fuse to form a new individual. In plants, stamens and pistils are male and female reproductive organs which bear the anthers and ovary, respectively.

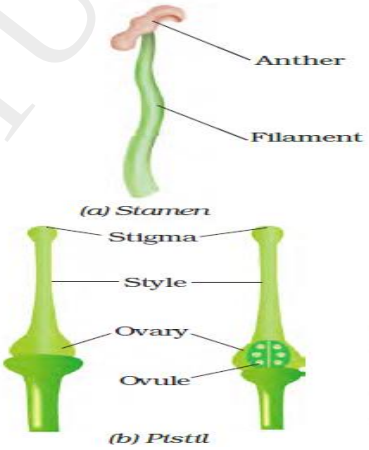
4. **State the main difference between asexual and sexual reproduction.**

Solution:

Asexual reproduction	**Sexual reproduction**
It requires only one parent	Requires a male and female parent
Daughter cells formed are identical to parents and to each other.	Newly formed offsprings show variations in comparison to the parents.
Special reproductive organs are not required	Special reproductive organs are required
Ex: Yeast, rose, jasmine	Ex: Insects, animals

5. **Sketch the reproductive parts of a flower.**

Solution:



6. **Explain the difference between self-pollination and cross-pollination**.
Solution:

Self-pollination	Cross-pollination
In self-pollination, pollen grains are transferred from the anther to the stigma of the same flower.	In cross-pollination, pollen grains are transferred from the anther of one flower to the stigma of another flower of the same kind.
Self-pollination occurs only in bisexual flowers	It occurs in both unisexual and bisexual flowers

7**. How does the process of fertilisation take place in flowers?**
Solution: The process of fusion of male and female gametes (to form a zygote) is called fertilisation. The zygote develops into an embryo, and the embryo undergoes mitotic cell division to form seeds.

8. **Match items in Column I with those in Column II: Column I Column II**

Column-I	Column-II
(a) Bud	(i) Maple
(b) Eyes	(ii) Spirogyra
(c) Fragmentation	(iii) Yeast
(d) Wings	(iv) Bread mould
(e) Spores	(v) Potato
	(vi) Rose

Solution:

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. **Tick the correct answer:**
(a) The reproductive part of a plant is the
(i) leaf (ii) stem (iii) root (iv) flower
(b) The process of fusion of the male and the female gametes is called
(i) fertilisation (ii) pollination (iii) reproduction (iv) seed formation
(c) Mature ovary forms the
(i) seed (ii) stamen (iii) pistil (iv) fruit
(d) A spore-producing organism is
(i) rose (ii) bread mould (iii) potato (iv) ginger
(e) Bryophyllum can reproduce by its
(i) stem (ii) leaves (iii) roots (iv) flower
Solution:
a) (iv) flower b) (i) fertilization c) (iv) fruit d) (ii) bread mould e) (ii) leaves

CHAPTER-9
MOTION AND TIME

Distance

- Distance is the total path covered by the object in the given interval of time.
- Displacement is the shortest path covered by the moving object in the given interval of time.
- Distance=Speed × Time.
- Unit of distance is generally measured in units of length like meters, kilometers etc.

Introduction to motion

- An object is said to be in **motion** if it changes its position with respect to time. Eg: A car moving on a road.
- An object is said to be at **rest** if the object does not change its position with time. Eg: A person standing on the ground.

Units and their standardization

- The standard unit of distance is in meters.
- The standard unit of time is in seconds (s).
- The standard unit of speed is in meter per second (m/s).

Basics of Motion and Its Types

Types of motion

Types of motion are generally divided into 3. They are:

1. **Rectilinear / translator motion**: When a body is moving in a straight line, without changing its direction, then the body is said to possess translator /rectilinear motion.

Eg: A car moving on a straight road.

2. **Circular motion**: When a body moves in the shape of a circle about a fixed point and a fixed radius, then the body is said to be in circular motion.

Eg: Motion of planets around the sun.

3. **Period / Oscillatory motion:** When the motion of a body repeats after fixed intervals of time, then the body is said to in the periodic/oscillatory motion.

Eg: To and fro motion of a simple pendulum.

Periodic or oscillatory motion

- Periodic or oscillatory motion is the motion in which a body repeats its motion after fixed intervals of time.
- Eg: To and fro motion of a simple pendulum, Motion of a car in a circular path, Motion of planets around the sun.

Oscillations of a simple pendulum

- When the bob of a simple pendulum moves from its mean position B to A and back to B again, then from B to C and back to B again, the pendulum is said to complete 1 oscillation.
- In the case of the simple pendulum, the time period is the total time taken by the pendulum to complete one oscillation.

Time and Speed

Speed (Average Speed)

- Speed is the total distance travelled by the object in a given interval of time.

- Speed = Distance travelled / time taken
- Unit of speed is generally measured in meter per second (m/s), kilometer per hour (km/h).

Uniform and Non-Uniform Motion

1. **Uniform motion**: When an object moving along a straight line moves with a constant speed, then the object is said to be in uniform motion.
Eg: A car moving in a straight line with a constant speed.
2. **Non-uniform motion**: When an object moving along a straight line changes its speed with respect to time, then the object is said to be in uniform motion.
Eg: The motion of a train.

Measurement of Time

- Unit of time is generally measured in seconds, minutes, hours.
- The time period is the total time taken by an object to complete one oscillation.

Units of Time

Unit of time is generally measured in seconds, minutes, hours.

Units of Speed

- Speed = Distance travelled in the total time interval.
- Unit of speed is generally measured in meter per second (m/s) and km/h(kilometer per hour).

Speedometer and Odometer

- Speedometer records the speed of the vehicle directly in kilometer per hour (km/h).
- An odometer measures the distance moved by the vehicle directly in kilometers (km).

Distance-time graph

- Distance-time graph is the graph plotted between the distance (in y-axis) and time (in x-axis).
- The slope of a distance-time graph gives the speed of an object.

SOME IMPORTANT QUESTIONS

1. Classify the following as motion along a straight line, circular or oscillatory motion:

(i) Motion of your hands while running.

(ii) Motion of a horse pulling a cart on a straight road.

(iii) Motion of a child in a merry-go-round.

(iv) Motion of a child on a see-saw.

(v) Motion of the hammer of an electric bell.

(vi) Motion of a train on a straight bridge.

Solution:

i) Oscillatory ii) Motion along a straight line iii) Circular motion iv) Oscillatory motion
v) Oscillatory motion vi) Motion along a straight line.

2. Which of the following are not correct?

(i) The basic unit of time is second.

(ii) Every object moves with a constant speed.

(iii) Distances between two cities are measured in kilometres.

(iv) The time period of a given pendulum is constant.
(v) The speed of a train is expressed in m/h.
Solution:
Incorrect statements are:
(ii) Every object moves with a constant speed.
(iv) The time period of a given pendulum is constant.
(v) The speed of a train is expressed in m/h.

3. A simple pendulum takes 32 s to complete 20 oscillations. What is the time period of the pendulum?
Solution:
Number of oscillations = 20
Total time taken to complete 20 oscillations = 32 s

$$\text{Time period} = \frac{\text{Total time taken}}{\text{Number of oscillations}}$$

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

4. The distance between two stations is 240 km. A train takes 4 hours to cover this distance. Calculate the speed of the train.
Solution:
Distance between two stations = 240 kms
Total time take = 4 hrs/240 minutes

$$\textbf{Speed} = \frac{\textbf{Distance}}{\textbf{Time}}$$

$$= \frac{240}{4}$$

= 60 km/h

5. The odometer of a car reads 57321.0 km when the clock shows the time 08:30 AM. What is the distance moved by the car, if at 08:50 AM, the odometer reading has changed to 57336.0 km? Calculate the speed of the car in km/min during this time. Express the speed in km/h also.
Solution:
Initial reading of the odometer = 57321.0
Final reading of the odometer = 57336.0
Distance covered by the car = Final reading of the odometer – Initial reading of the odometer
= 57336.0 – 57321.0 = 15 kms
Starting time of car is 8:30 and it stops at 8:50
Hence, time taken by car = 20 mins

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{15}{20}$$

$$= 0.75 \text{ km/min}$$

$$20 \text{ min} = \frac{1}{60} \times 20$$

$$= \frac{1}{3} \text{ h}$$

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time take}} = \frac{15}{1/3}$$

= 45 km/h

6. Salma takes 15 minutes from her house to reach her school on a bicycle. If the bicycle has a speed of 2 m/s, calculate the distance between her house and the school.

Solution:

Time taken by Salma to reach her school by bicycle = 15 mins= 15 x 60 = 90 s

Speed of Salma's bicycle= 2m/s

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

Distance covered = speed x time taken

= 2 x 900 = 1800 m

1000m = 1 km

$$1800 \text{ m} = \frac{1}{1000} \times 1800$$

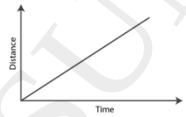
= 1.8 kms

7. Show the shape of the distance-time graph for the motion in the following cases:

(i) A car moving with a constant speed.

(ii) A car parked on a side road.

Solution:



8. Which of the following relations is correct?

(i) Speed = Distance × Time (ii) Speed = Distance/Time (iii) Speed = Time/Distance

(iv) Speed = 1/Distance x Time

Solution: Answer is (ii) Speed = Distance/Time

9. The basic unit of speed is:
(i) km/min (ii) m/min (iii) km/h (iv) m/s
Solution:
Answer is (iv) m/s
10. A car moves with a speed of 40 km/h for 15 minutes and then with a speed of 60 km/h for the next 15 minutes. The total distance covered by the car is:
(i) 100 km (ii) 25 km (iii) 15 km (iv) 10 km
Solution:
The answer is (ii) 25 km
Calculation:
When the speed of the car is 40 km/h
Time taken = 15 min = 15/60 = 0.25 h

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

Distance covered d_1 = speed x time taken
= 40 x 0.25 = 10 kms
When the speed of the car is 60 km/ h

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

Distance covered d_2 = speed x time taken
= 60 x 0.25= 15 kms
Total distance covered by the car = $d_1 + d_2$
= 10 + 15
= 25 kms

CHAPTER-10

ELECTRIC CURRENT AND ITS EFFECTS

- The flow of electrons across a conductor is known as electric current.
- The use of symbols to represent electric components is convenient. A circuit diagram can be used to represent an electric circuit using these.
- When an electric current is passed via a wire, it heats up. It's the current's heating impact. This effect can be used in a variety of ways.
- When enormous electric currents are pushed through wires constructed of specific materials, they melt quickly and shatter. Electric fuses, which prevent fires and damage to electrical appliances, are made from these materials.

- One cell's positive terminal is connected to the following cell's negative terminal. A battery is a collection of two or more cells in this configuration.
- A wire acts like a magnet when an electric current travels through it.
- A full path for the flow of electric current is referred to as an electric circuit.
- Components of an Electric Circuit: The following are components of an electric circuit:

I. Cell: A cell is a device that provides energy to allow current to flow.

II. Bulb: When an electric current passes through it, it illuminates.

III. Switch**:** Turns on or off the circuit.

IV. Connecting Wires: These wires assist in the conduct of electric current and the completion of the circuit.

Electric Current's Effects:

I. Heating Effect: When an electric current runs through a wire, it heats up. This is the electric current's heating impact. When current travels through an electric heater, a coil of wire called the element gets red hot. The quantity of heat generated by a wire is determined by the material, length, and thickness of the wire.

II. Fuse: A fuse is a safety device that protects an electric circuit from harm. A small wire is inserted into porcelain or insulating material to create it.

III. MCB: The abbreviation MCB stands for Miniature Circuit Breakers. When the current in a circuit reaches the safe limit, these switches automatically turn off.

- Magnetic effect occurs when an electric current travels across a wire. This is the electric current's magnetic effect. Hans Christian Oersted was the first to notice this.
- An electromagnet is a current-carrying coil of insulated wire wound around a piece of iron. It is a wire coil wound on a soft iron core that is used to separate magnetic material from garbage. Small electromagnets are used by doctors to remove small bits of magnetic material that have accidentally fallen into the eye. Electromagnets are also found in many toys.

SOME IMPORTANT QUESTIONS

1. What is a circuit diagram?

Answer: It is a symbolic representation of an electric circuit.

2. Which property of a conducting wire is utilised in making electric fuse?

Answer: Low melting point of the wire.

3. What is electric current?

Answer: Electric current is flow of electrons.

4. Why does light bulb get hot?

Answer: Light bulb gets hot due to heating effect of the electric current.

5. Who discovered magnetic effect of current?

Answer: Hans Christian Oersted discovered magnetic effect of current.

6. How does a bulb glow?

Answer: In the bulb there is a thin wire, called the filament, which glows and gives off light when an electric current passes through it.

7. Write some uses of battery.

Answer: Many devices such as torches, transistors, toys, TV remote controls, use batteries.

8. Which wire used in electric heater and why?

Answer: Nichrome wire is used in electric heater because it has a high melting temperature.

9. What is filament?

Answer: In the bulb there is a thin wire, called the filament, which glows when an electric current passes through it.

10. Is it possible for a wire to melt and break? Why?

Answer: Yes, if a large current passes through a wire, the wire may become so hot that it may even melt and break.

SOME EXTRA QUESTIONS

1. What is the heating effect of the electric current?

Answer: The wire gets hot when an electric current passes through it. This is the heating effect of the electric current.

2. Who invented electric bulb?

Answer: The credit for the invention of the electric bulb is usually given to Thomas Alva Edison, though others before him had worked on it.

3. What are the uses of heating effect of electric current?

Answer: Electrical appliances, such as immersion heaters, hotplates, irons, geysers, electric kettles, hair dryers uses of heating effect of electric current.

4. Explain the symbol of electric cell.

Answer: In the symbol of the electric cell, the longer line represents the positive terminal and the thicker, shorter line represents the negative terminal.

5. Name any two effects of electric current.

Answer: The two effects of electric current are:

- Heating effect of electric current
- Magnetic effect of the electric current

6. Why are fuse wires not used in circuit containing electric cell?

Answer: Fuse wires are not used in circuit containing electric cell because the amount of current follow is low and if the circuit breaks there is no risk of fire.

7. What is an electric circuit?

Answer: The electric circuit provides a closed path for electricity to pass between the two terminals of the electric cell. The bulb glows only when current flows through the circuit.

8. We could not see element in electrical appliances. Give reason.

Answer: We could not see element in electrical appliances because electrical appliances, such as immersion heaters, hotplates, irons, geysers, electric kettles, hair dryers, have elements inside them.

9. Why a fused bulb does not glow?

Answer: A break in the filament of an electric bulb means a break in the path of the current between the terminals of the electric cell. Therefore, a fused bulb will not glow as current does not passes through its filament.

10. Sometimes the cells are placed side by side. Then how are the terminals of the cells connected?

Answer: There is usually a thick wire or a metal strip connecting the positive terminal of one cell to the negative terminal of the next cell.

11. Why should we look for ISI mark on electrical appliances?

Answer: Before buying any electrical appliance we should look for ISI mark because this mark ensures that the appliance is safe and wastage of energy is the minimum.

12. On what factors does the heat produced in a wire depend?

Answer: The amount of heat produced in a wire depends on its material, length and thickness. Thus, for different requirements, the wires of different materials and different lengths and thicknesses are used.

13. What is battery? How can it be made using cells?

Answer: A combination of two or more cells is called a battery. Battery can be made by connecting two or more cells together. The positive terminal of one cell is connected to the negative terminal of the next cell.

14. Do you think an electromagnet can be used for separating plastic bags from a garbage heap? Explain.

Answer: No, an electromagnet cannot be used for separating plastic bags from a garbage heap because plastic bag is a non-magnetic material and will not be attracted by an electromagnet.

LONG QUESTIONS

1. What are electromagnets?

Answer: A core of magnetic material (such as iron) surrounded by a coil of wire behaves like a magnet when electric current flows through it. When the electric current is switched off, the coil generally loses its magnetism. Such coils are called electromagnets.

2. How does a heating element work in an electric heater?

Answer: An electric room heater or an electric heater used for cooking. All these contain a coil of wire. This coil of wire is called an element. When these appliances are switched on after connecting to the electric supply, their elements become red hot and give out heat.

3. What is MCB and what is it used for?

Answer: These days Miniature circuit breakers (MCBs) are increasingly being used in place of fuses. These are switches which automatically turn off when current in a circuit exceeds the safe limit. We can turn them on and the circuit is once again complete.

4. An electrician is carrying out some repairs in your house. He wants to replace a fuse by a piece of wire. Would you agree? Give reasons for your response.

Answer: No, electrician should not replace a fuse by a piece of wire because for fuse, wires made from some special materials are used so that it melt quickly and break when large electric currents passes through them.

5. What are the reasons for excessive currents in the electrical circuits?

Answer: One reason for excessive currents in electrical circuits is the direct touching of wires. This may happen if the insulation on the wires has come off due to wear and tear. This may cause a short circuit. Another reason for excessive current can be the connection of many devices to a single socket. This may cause overload in the circuit.

6. An electric bulb results in wastage of electricity. Comment

Answer: An electric bulb is used for light but it also gives heat. This is not desirable. This results in the wastage of electricity. This wastage can be reduced by using fluorescent tube lights in place of the bulbs. **Compact fluorescent lamps (CFLs)/ Light Emitting Diode (LED)** also reduce wastage and can be fixed in the ordinary bulb holders.

7. What is the use of electrical fuse?

Answer: In all buildings fuses are inserted in all electrical circuits. There is a maximum limit on the current which can safely flow through a circuit. If by accident the current exceeds this safe limit, the wires may become overheated and may cause fire. If a proper fuse is there in the circuit, it will blow off and break the circuit. A fuse is thus a safety device which prevents damages to electrical circuits and possible fires.

CHAPTER-11
LIGHT

- Light is a naturally occurring substance that enhances vision and makes objects visible. Light follows a straight path.
- A mirror can be made out of any polished or gleaming surface.
- A true image is one that can be obtained on a computer screen. It's made up of light rays that pass through the screen.
- A virtual image is an image that cannot be obtained on a screen. It's made up of light rays that appear to travel right through the screen.
- A planar mirror produces an erect picture. It's a virtual object that's the same size as the real thing. The picture behind the mirror is the same size as the object in front of it.

The left side of an object appears on the right side of an image generated by a mirror, and the right side of the object appears on the left side of the picture.

- A true and inverted image can be created via a concave mirror. The picture generated when the object is put very close to the mirror is virtual, erect, and enlarged.
- A convex mirror is one that curves outwards and has a convex reflecting surface. The image that is created is virtual, upright, and shrunk. A convex mirror creates an image that is upright, virtual, and smaller in size than the object.

(a) Concave mirror (b) Convex mirror

- A concave lens is one that has a thinner centre than it has at the edges. It's a convergent lens. The resulting image is imaginary, erect, and shrunken.
- A convex lens can create both a true and a distorted image. The image generated when the object is put very close to the lens is virtual, erect, and enlarged. The convex lens is known as a magnifying glass when it is used to magnify objects.

Convex Lens Concave Lens

- White light is made up of seven different colours.

Properties of Light:

1. Rectilinear Propagation of Light: The quality of light that allows it to move in a straight line in any direction. The direction in which light travels to form a ray.
2. Light Reflection: This is the phenomenon of light rebounding back after striking an object's surface. Smooth, gleaming surfaces reflect nearly all of the light.
3. Dispersion: The breaking of white light into its seven colours is referred to as dispersion. Violet, Indigo, Blue, Green, Yellow, Orange, and Red (VIBGYOR) hues make up white light.

CHAPTER 12

FOREST OUR LIFE LINE

Deforestation

Clearing of forests and trees eventually using that land for other purposes like agriculture and other human activities. The main causes for deforestation are:

(i) agricultural expansion

(ii) livestock grazing

(iii) Illegal logging, which is cutting, processing of trees in prohibited land.

(iv) human infrastructure expansion

(v) overpopulation

Consequences of Deforestation

(i) The source of conversion of carbon dioxide to oxygen is reduced. Plants use photosynthesis to convert carbon dioxide to oxygen. This process leads to Global Warming.

(ii) Pollution increases as there is a decrease of plants, which give out fresh air to breathe.

(ii) Ground water level also gets lowered. Desertification and droughts are the results of deforestation.

Wildlife Conservation

Conservation of forest and wildlife

- Many NGO's are working towards creating public awareness for conserving depleting forest cover and vanishing wildlife.
- Central and state governments in India have set up national parks and wildlife sanctuaries to protect forests and endangered species in wildlife.

Species

Species is a group of populations, which are capable of interbreeding (reproducing fertile offspring).

Flora and fauna

The plants and animals observed in a specific region are referred to as flora and fauna of that region.

Biosphere Reserves

Biosphere and Biodiversity

- Biosphere is that part of the earth in which living organisms exist and is a sum of all the ecosystems.
- Biodiversity, refers to the variety of organisms existing on the earth, their interrelationships and their relationship with the environment.

Endemic species

Endemic species are species of plants and animals that are exclusively found only in a particular region or area.

Wildlife Conservation Projects

(i) Biosphere Reserve- Large areas which conserve biodiversity and civilization of that region. They preserve and protect tribal groups in addition to wildlife. Eg: Pachmarhi Biosphere Reserve.

(ii) **Zoo**- Wild animals are kept for research, preservation and also for public exhibition and tourism. Eg: Mysore zoo, Indira Gandhi zoological park.

(iii) **National Park**- Reserved habitats for both flora and fauna especially endangered species. National parks cover large areas where animals can freely move around. E.g. Gir forest national park, Periyar national park.

(iv) **Sanctuary-** Sanctuaries are largely protected habitats for animals. E.g. Krishna wildlife sanctuary.

Recycling of Paper

Paper is recycled so that more trees do not have to be cut down to create more paper. It is important that we conserve trees and reduce the use of paper as much as possible.

Reforestation

Reforestation is restoring of the cleared or destroyed forests by planting new trees.

Extinction

- Extinction is the dying out or death of all members of a species.
- Human intervention (either directly or indirectly) has become the leading cause of species extinction.
- Eg: Animals like the Dodo bird, Tasmanian wolf are extinct.

Endangered animals

Animals whose count is reducing to an extent that they might face extinction are known as the endangered animals. Eg: Giant panda, tiger. Red Data Book is a source (reference) book, keeping a record of all the plant and animals that are endangered.

Ecosystem

Ecosystem is the region consisting of all the living plants, animals and microorganisms in an area along with non-living components such as climate, soil, river deltas, etc.

Migration

Migration is defined as the movement of organisms in large numbers from one place to another.

CHAPTER -13

WASTEWATER STORY

1. Waste Water

- Water that has been drained out from the sink, showers, toilet, laundries etc. is called wastewater
- It is of black brownish colour which is rich in a lather, oil, suspended impurities etc.

2. Water Our Lifeline:

- Clean water is a basic need of a person for survival.
- Earth has 71%71% water still there is water scarcity and clean water is not available to everyone.
- Inability to access clean water leads to many water-related diseases.
- Cleaning of water is a process of removing pollutants before it enters a water body or is reused, pollutants are substances that cause contamination.
- This process of treating wastewater to remove pollutants is usually referred to as sewage treatment.

3. What is Sewage?

- Sewage is a liquid waste produced by the community of people.
- Sewage is essentially the wastewater that is released by houses, industries, hospitals, offices and rainwater that has run down the street during a storm or heavy rainfall.
- Sewage contains disease-causing bacteria and other microbes which can spread a lot of diseases.
- Discharging of sewage into the river body contaminates our source of freshwater and leads to water scarcity and other problems.
- It is also threatening the life of aquatic animals and plants.
- Therefore, sewage should be treated before discharging into water bodies.

4. Water Freshens Up-An Eventful Journey:

- The liquid waste i.e., sewage goes to the point of disposal from the point of being produced through the network of big and small pipes called sewers.
- These sewers form sewerage.
- Manholes are a small covered opening in a paved area allowing access beneath, especially one leading to a sewer and are located at every 50 m to 60 m within the sewerage.
- Manholes are found at the junction of two or more sewers and at points where there is a change in direction.
- Wastewater through the sewerage reaches the wastewater treatment plant where it has to go through a different method of treatment.
- After treatment and purification, it is discharged into water bodies and available for use.

5. Wastewater Treatment Plant:

- It is a facility where physical, chemical and biological processes are used to treat the wastewater.
- In the wastewater treatment plant, firstly wastewater is passed through bar screens which removes large objects like rags, sticks, cans, plastics etc.
- Water then goes to a grit and sand removal tank. The process of removing grit and sand is known as screening.
- The water is then allowed to settle in the large tank which is sloped towards the centre to separate sludge.
- After this, the sludge is transferred to an aeration tank where it is decomposed by the anaerobic bacteria and air is pumped to assist aerobic bacteria to grow.
- Bacteria consume unwanted matter still remaining in the water.
- The activated sludge contains 97% water this water is removed by sand drying beds or machines.
- It is necessary to disinfect water chemically with chlorine and ozone to kill unwanted bacteria and microbes.

6. Better Housekeeping Practices:

- Sewage formation should be decreased as it leads to the pollution of water.
- We must adopt some measures such as:
- Not throwing vegetable oil and fats down the drain
- Chemicals should not be discharged into the drain as they may kill the microbes that help purify water.
- Throwing used tea leaves, kitchen wastes, soft toys, sanitary towels, etc. in the dustbin.

7. Sanitation and disease:

- Poor sanitation and contaminated drinking water are the major cause of the spreading of various diseases like cholera, typhoid, polio, meningitis, hepatitis and dysentery.
- Excreting in open areas leads to water and soil pollution and these untreated human excreta are harmful to our health which indirectly goes into our body.

8. Alternative Arrangement for Sewage Disposal:

a. On-site sewage disposal system

- These toilets do not require scavenging.

- Excreta from these toilets are directed into a biogas plant.
- The biogas produced is employed as a source of energy.

b. Sanitation at Public Places:

- The government has laid down certain standards of sanitation in public places.
- We all should contribute to maintaining sanitation in public places.
- We should not scatter litter anywhere as it will lead to pollution

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