

Teacher's Handbook

BIOLOGY Class-IX

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EXERCISE-1

I. Choose the Correct Answer:

1. The process of obtaining food and utilizing it for growth and energy is called:
Ans: B) Nutrition
2. The fundamental unit of life is:
Ans: B) Cell
3. Organisms that produce their own food are called:
Ans: A) Autotrophs
4. Green plants synthesize their food by:
Ans: B) Photosynthesis
5. Which pigment is essential for photosynthesis?
Ans: B) Chlorophyll
6. The main site of photosynthesis in plants is:
Ans: B) Leaves
7. Photosynthesis occurs in:
Ans: A) Chloroplast
8. The energy for photosynthesis is obtained from:
Ans: B) Sunlight
9. The digestive juice that neutralizes stomach acid is:
Ans: C) Pancreatic juice
10. The process of breaking down food into simpler substances is called:
Ans: A) Digestion
11. The enzyme in saliva that helps digest starch is:
Ans: B) Amylase
12. The largest internal organ of the human body is:
Ans: B) Liver
13. The enzyme that digests proteins in the stomach is:
Ans: B) Pepsin
14. The small intestine absorbs nutrients through:
Ans: A) Villi
15. Which organ stores bile?
Ans: B) Gall bladder
16. The tube connecting the mouth and stomach is called:
Ans: B) Oesophagus
17. The part of the digestive system where maximum digestion occurs is:
Ans: B) Small intestine
18. Amoeba captures food using:
Ans: C) Pseudopodia
19. The first step of holozoic nutrition is:
Ans: B) Ingestion
20. The total number of permanent teeth in an adult human is:
Ans: C) 32
21. The process of removing undigested food from the body is called: **Ans:** B) Egestion
22. The finger-like projections in the small intestine are called: **Ans:** B) Villi
23. The main function of bile is to: **Ans:** C) Emulsify fats
24. Parasitic plants obtain food from: **Ans:** B) Other plants
25. The process in which food is broken down inside a vacuole in amoeba is called:
Ans: B) Phagocytosis
26. The ultimate source of energy for all living organisms is:
Ans: B) Sun
27. Which of the following is a carnivore?
Ans: C) Tiger
28. The organ responsible for producing insulin is:
Ans: B) Pancreas
29. Which gas is used in photosynthesis?
Ans: B) Carbon dioxide
30. The end product of protein digestion is:
Ans: B) Amino acids
31. The process of conversion of complex food into simple absorbable form is called:
Ans: B) Digestion
32. Which organ absorbs water from undigested food?
Ans: B) Large intestine
33. Which mode of nutrition is found in fungi?
Ans: B) Saprophytic

34. The muscular movement that pushes food down the oesophagus is called:

Ans: B) Peristalsis

35. In plants, the gaseous exchange takes place through:

Ans: B) Stomata

II. True or False:

1. Plants make food by photosynthesis. **Ans:** True
2. Chlorophyll is found in mitochondria. **Ans:** False (Chloroplasts)
3. Oxygen is a product of photosynthesis. **Ans:** True
4. Amoeba uses cilia for movement. **Ans:** False (Pseudopodia)
5. Bile helps in the digestion of fats. **Ans:** True
6. Pancreas secretes insulin. **Ans:** True
7. Stomach secretes hydrochloric acid. **Ans:** True
8. Omnivores eat only plants. **Ans:** False (Plants and animals)
9. Large intestine absorbs water. **Ans:** True
10. The liver produces bile. **Ans:** True
11. Photosynthesis occurs in roots. **Ans:** False (Leaves)
12. Saprophytes feed on dead matter. **Ans:** True
13. The gall bladder stores bile. **Ans:** True
14. Holozoic nutrition includes ingestion. **Ans:** True
15. Teeth help in digestion of proteins. **Ans:** False
16. Fungi follow parasitic nutrition. **Ans:** False (Mainly saprophytic)
17. Oxygen is needed for photosynthesis. **Ans:** False (CO₂ is used; O₂ is released)
18. Proteins break down into amino acids. **Ans:** True
19. Lipase digests carbohydrates. **Ans:** False (Digests fats)
20. Chloroplasts are present in animal cells. **Ans:** False (Only in plant cells)

III. Match the Following:

Set 1:

1. **Autotrophs** → D) Green plants
2. **Heterotrophs** → C) Humans
3. **Saprophytes** → A) Fungi
4. **Parasites** → E) Cuscuta
5. **Omnivores** → B) Bears

Set 2:

1. **Incisors** → B) Cutting food
2. **Canines** → D) Tearing food
3. **Premolars** → C) Chewing food
4. **Molars** → E) Grinding food
5. **Wisdom Teeth** → A) Last set of molars

Set 3:

1. **Amylase** → C) Breaks down starch
2. **Pepsin** → B) Breaks down proteins
3. **Lipase** → D) Digests fats
4. **Trypsin** → E) Digests proteins
5. **Maltase** → A) Converts maltose to glucose

IV. Multi-Correct Answer Type:

1. Which are autotrophs?

Ans: A) Plants, B) Algae

2. Which are types of heterotrophic nutrition?

Ans: A) Parasitic, B) Saprophytic, C) Holozoic

3. Which organs secrete digestive enzymes?

Ans: A) Stomach, B) Pancreas, C) Salivary glands

4. Which are components of gastric juice?

Ans: A) Pepsin, B) HCl, C) Mucus

5. Which are parts of the small intestine?

Ans: A) Duodenum, B) Jejunum, C) Ileum

6. Which enzymes digest proteins?

Ans: A) Pepsin, B) Trypsin, C) Rennin

7. Which gases are involved in photosynthesis?

Ans: B) Carbon dioxide (Oxygen is a byproduct)

8. Which are types of carbohydrates?

Ans: A) Glucose, B) Starch, C) Cellulose

9. Which are phases of photosynthesis?

Ans: A) Light reaction, B) Dark reaction (Calvin cycle)

10. Which are macronutrients for plants?

Ans: A) Nitrogen, B) Phosphorus, C) Potassium

V. Reasoning Type Questions:

1. **Assertion:** HCl in the stomach helps in protein digestion.

Reason: HCl activates pepsinogen to pepsin, which breaks down proteins.

Ans: (a) Both correct; Reason explains Assertion.

2. **Assertion:** Green plants are autotrophic.

Reason: They prepare their own food through photosynthesis.

Ans: (a) Both correct; Reason explains Assertion.

3. **Assertion:** Amoeba uses pseudopodia for ingestion.

Reason: Pseudopodia help in engulfing food by phagocytosis.

Ans: (a) Both correct; Reason explains Assertion.

4. **Assertion:** The pancreas produces digestive enzymes.
Reason: It secretes insulin, which helps in digestion.
Ans: (b) Both correct but Reason is unrelated (insulin regulates blood sugar).
5. **Assertion:** Villi increase absorption in the small intestine.
Reason: Villi contain blood vessels for nutrient absorption.
Ans: (a) Both correct; Reason explains Assertion.
6. **Assertion:** Photosynthesis occurs only during the day.
Reason: Light activates chlorophyll for photosynthesis.
Ans: (a) Both correct; Reason explains Assertion.
7. **Assertion:** Carnivores depend directly on plants for food.
Reason: Carnivores eat herbivores, which depend on plants.
Ans: (d) Assertion incorrect; Reason correct.
8. **Assertion:** Bile helps in fat digestion.
Reason: Bile contains lipase.
Ans: (c) Assertion correct (emulsifies fats); Reason incorrect (bile lacks lipase).
9. **Assertion:** Saliva digests starch.
Reason: Salivary amylase converts starch to maltose.
Ans: (a) Both correct; Reason explains Assertion.
10. **Assertion:** The liver stores bile.
Reason: The gall bladder stores bile.
Ans: (d) Assertion incorrect (liver produces bile); Reason correct.

VI. Find Odd Man Out:

1. **Ans: D) Pepsin** (Others: Carbohydrates)
2. **Ans: D) Kidney** (Others: Digestive organs)
3. **Ans: D) Haemoglobin** (Others: Digestive enzymes)
4. **Ans: A) Photosynthesis** (Others: Catabolic processes)
5. **Ans: D) Parasites** (Others: Consumer types)
6. **Ans: D) Villi** (Others: Teeth types)
7. **Ans: D) Stomata** (Others: Cell organelles)
8. **Ans: D) Trachea** (Others: Small intestine parts)
9. **Ans: A) Urea** (Others: Gases in photosynthesis/respiration)
10. **Ans: D) Cuscuta** (Others: Heterotrophic organisms)

VII. Answer the Following:

1. What is nutrition? Explain its types.

Ans: **Nutrition** is the biological process by which organisms obtain and utilize food for energy, growth, repair, and maintenance.

There are two main types:

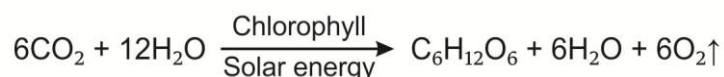
- **Autotrophic Nutrition:** Organisms (like green plants) make their own food from simple inorganic substances using sunlight (e.g., photosynthesis).

- **Heterotrophic Nutrition:** Organisms (like animals, fungi) depend on other organisms for food. It includes:
 - **Holozoic** (e.g., humans, Amoeba),
 - **Parasitic** (e.g., tapeworm, Cuscuta), and
 - **Saprophytic** (e.g., fungi like mushrooms).

2. Describe the process of photosynthesis with its equation.

Ans: **Photosynthesis** is the process by which green plants make food (glucose) using sunlight, carbon dioxide, and water in the presence of chlorophyll.

Equation:



Steps involved:

- Absorption of light by chlorophyll
- Splitting of water (photolysis) into hydrogen and oxygen
- Conversion of CO_2 into carbohydrates using ATP and NADPH

3. What is the role of the pancreas in digestion?

Ans: The **pancreas** acts as both an exocrine and endocrine gland.

- Its **exocrine part** secretes pancreatic juice into the duodenum. This juice contains:
 - **Amylase** (digests starch),
 - **Lipase** (digests fats), and
 - **Trypsin** (digests proteins).
- The **endocrine part** releases insulin and glucagon to regulate blood sugar.

4. Explain the role of enzymes in digestion.

Ans: **Enzymes** are biological catalysts that speed up chemical reactions. In digestion, they break down complex food molecules into simpler absorbable forms:

- **Amylase** breaks starch into maltose
- **Pepsin and Trypsin** break proteins into amino acids
- **Lipase** breaks down fats into fatty acids and glycerol
- Other enzymes like **maltase, lactase, sucrase** break disaccharides into monosaccharides

5. Describe the different types of teeth in humans and their functions.

Ans: Humans have **32 permanent teeth** classified into:

- **Incisors (8)** – Cutting food
- **Canines (4)** – Tearing food
- **Premolars (8)** – Grinding food
- **Molars (12)** – Grinding and chewing food

They help in mechanical digestion by increasing surface area for enzyme action.

6. What are the components of gastric juice? What are their functions?

Ans: **Gastric juice**, secreted in the stomach, contains:

- **Hydrochloric acid (HCl)**: Kills bacteria and activates pepsin
- **Pepsin**: Begins protein digestion
- **Mucus**: Protects the stomach lining from acid
- **Rennin** (in infants): Coagulates milk proteins

7. Explain the structure and function of villi in the small intestine.

Ans: **Villi** are tiny, finger-like projections on the inner wall of the small intestine.

- **Structure**: Each villus contains a network of blood capillaries and a lymph vessel (lacteal).
- **Function**: They increase the surface area for **absorption** of digested nutrients. Blood absorbs glucose and amino acids; lacteals absorb fatty acids and glycerol.

8. How does digestion occur in Amoeba?

Ans: Amoeba digests food by **phagocytosis**.

- It uses pseudopodia to **engulf** food particles
- The food is enclosed in a **food vacuole**
- Enzymes digest the food inside the vacuole
- **Absorbed** nutrients diffuse into the cytoplasm
- **Undigested waste** is expelled outside through the cell membrane

9. What is the function of bile in fat digestion?

Ans: **Bile**, produced by the liver and stored in the gallbladder, helps in:

- **Emulsification of fats**: Breaking large fat droplets into smaller ones to increase the surface area for enzymes like lipase
- It also **neutralizes acidic chyme** from the stomach before entering the intestine

10. Describe the functions of the liver in digestion and human health.

Ans: The **liver** performs several vital functions:

- **Produces bile** for fat digestion
- **Regulates blood sugar** by storing glucose as glycogen
- **Detoxifies** harmful substances
- **Stores nutrients** like iron and vitamins
- **Produces proteins** important for blood clotting and plasma
- Maintains **metabolic balance** and supports overall health

EXERCISE-2

I. Choose the Correct Answer:

1. Which gas is essential for aerobic respiration? **Ans: B) Oxygen**
2. Which process releases energy from food? **Ans: B) Respiration**
3. Which component transports oxygen in blood? **Ans: B) Haemoglobin**
4. Where does glycolysis occur in a cell? **Ans: B) Cytoplasm**
5. Which molecule is the primary source of energy in respiration? **Ans: B) ATP**
6. Which organelle is known as the powerhouse of the cell? **Ans: B) Mitochondria**
7. Which process occurs in mitochondria? **Ans: B) Krebs cycle**
8. Where does aerobic respiration occur in a cell? **Ans: B) Mitochondria**
9. The respiratory pigment in humans is? **Ans: B) Haemoglobin**
10. Which part of the respiratory system contains alveoli? **Ans: B) Lungs**
11. Anaerobic respiration produces which by-product in yeast? **Ans: B) Ethanol**
12. During exercise, muscles use which type of respiration?
Ans: C) Both A and B (Aerobic and Anaerobic)
13. Which compound is produced during anaerobic respiration in muscles?
Ans: C) Lactic acid
14. Which process involves the intake of oxygen and release of carbon dioxide?
Ans: B) Breathing
15. Lactic acid fermentation occurs in? **Ans: B) Muscles**
16. The opening in leaves for gas exchange is called? **Ans: B) Stomata**
17. Which structure prevents food from entering the windpipe? **Ans: A) Epiglottis**
18. Which organism respire through its skin? **Ans: B) Earthworm**
19. Which gas is exhaled during respiration? **Ans: C) Carbon dioxide**
20. The function of alveoli is to? **Ans: B) Exchange gases**
21. The human respiratory system starts with? **Ans: B) Nasal cavity**
22. Which type of respiration produces more energy? **Ans: A) Aerobic**
23. In plants, respiration occurs through? **Ans: A) Stomata**
24. Oxygen is carried in blood by binding with? **Ans: B) Haemoglobin**
25. Which organ in humans is responsible for voice production? **Ans: B) Larynx**
26. In insects, respiration occurs through? **Ans: B) Trachea**
27. Which respiratory organ is found in fish? **Ans: B) Gills**
28. Breathing rate is controlled by which part of the brain? **Ans: B) Medulla oblongata**
29. The diaphragm is a part of which system? **Ans: B) Respiratory**
30. Which waste product is removed through respiration? **Ans: B) Carbon dioxide**
31. Which organ allows respiration in amphibians? **Ans: A) Skin**
32. Which part of the respiratory system filters dust particles? **Ans: B) Nasal cavity**
33. Which blood vessel carries oxygenated blood from the lungs? **Ans: B) Pulmonary vein**
34. Which gas is released during respiration in plants at night? **Ans: B) Carbon dioxide**
35. Fermentation occurs in which type of respiration? **Ans: B) Anaerobic**

II. True or False:

- | | |
|---|-------------------|
| 1. Respiration releases energy from food. | Ans: True |
| 2. Anaerobic respiration needs oxygen. | Ans: False |
| 3. Mitochondria is the site of respiration. | Ans: True |
| 4. Glycolysis occurs in mitochondria. | Ans: False |
| 5. ATP is the energy currency of cells. | Ans: True |
| 6. Humans respire only aerobically. | Ans: False |
| 7. Lactic acid is produced in muscles. | Ans: True |
| 8. Fish use lungs to respire. | Ans: False |
| 9. Plants respire through stomata. | Ans: True |
| 10. Breathing and respiration are the same. | Ans: False |
| 11. Plants do not respire at night. | Ans: False |
| 12. Haemoglobin carries oxygen in blood. | Ans: True |
| 13. Trachea is also called the windpipe. | Ans: True |
| 14. Breathing rate is controlled by the brain. | Ans: True |
| 15. Insects respire through gills. | Ans: False |
| 16. Yeast respire aerobically only. | Ans: False |
| 17. Frogs respire through skin and lungs. | Ans: True |
| 18. Oxygen is transported by plasma in blood. | Ans: False |
| 19. Respiration in humans occurs only at night. | Ans: False |
| 20. The diaphragm helps in breathing. | Ans: True |

III. Match the Following:

Set 1:

- | | |
|---------------------|---------------------------|
| 1. Alveoli | → a) Gas exchange |
| 2. Diaphragm | → d) Helps in breathing |
| 3. Trachea | → e) Windpipe |
| 4. Larynx | → b) Voice box |
| 5. Bronchi | → c) Air passage to lungs |

Set 2:

- | | |
|---------------------|----------------------|
| 1. Fish | → e) Gills |
| 2. Frog | → b) Lungs and skin |
| 3. Earthworm | → d) Skin |
| 4. Insects | → c) Tracheal system |
| 5. Humans | → a) Lungs |

Set 3:

- | | |
|--------------------------|---------------------------|
| 1. Stomata | → c) Found in leaves |
| 2. Lenticels | → d) Found in woody stems |
| 3. Root hairs | → e) Help in gas exchange |
| 4. Photosynthesis | → a) Produces oxygen |
| 5. Respiration | → b) Produces energy |

IV. Multi-Correct Answer Type:

1. Which are types of respiration? **Ans:** A) Aerobic, B) Anaerobic
2. Products of aerobic respiration? **Ans:** A) CO₂, B) Water, C) ATP
3. Organs involved in human respiration? **Ans:** A) Lungs, B) Trachea, C) Alveoli
4. Parts of a plant involved in respiration? **Ans:** A) Stomata, B) Lenticels, C) Root hairs
5. Which organisms use anaerobic respiration?
Ans: A) Yeast, B) Bacteria, C) Human muscles
6. By-products of anaerobic respiration? **Ans:** A) Ethanol, B) Lactic acid, C) CO₂
7. Examples of respiratory gases? **Ans:** A) Oxygen, B) Carbon dioxide
8. Waste products of cellular respiration? **Ans:** A) Water, B) CO₂, C) Heat
9. Respiratory structures in animals? **Ans:** A) Gills, B) Lungs, C) Trachea
10. Functions of haemoglobin?
Ans: A) Oxygen transport, B) CO₂ transport, C) Blood buffering

V. Reasoning Type Questions:

1. **Assertion:** Aerobic respiration produces more energy than anaerobic respiration.
Reason: Aerobic respiration completely oxidizes glucose into CO₂ and H₂O.
Ans: (a) Both correct; Reason explains Assertion (complete oxidation yields more ATP).
2. **Assertion:** Glycolysis occurs in the cytoplasm of the cell.
Reason: Glycolysis does not require oxygen for the breakdown of glucose.
Ans: (b) Both correct but unrelated (glycolysis location ≠ oxygen requirement).
3. **Assertion:** Fermentation is a type of anaerobic respiration.
Reason: Fermentation occurs without oxygen and produces ethanol or lactic acid.
Ans: (a) Both correct; Reason explains Assertion.
4. **Assertion:** During inhalation, the volume of the lungs increases.
Reason: The ribs move outward and the diaphragm contracts during inhalation.
Ans: (a) Both correct; Reason explains Assertion.
5. **Assertion:** Breathing and respiration are the same process.
Reason: Respiration is a biochemical process, whereas breathing is a physical process.
Ans: (d) Assertion incorrect (breathing ≠ respiration); Reason correct.
6. **Assertion:** The diaphragm plays a vital role in breathing.
Reason: The diaphragm contracts and moves downward to create space for lung expansion.
Ans: (a) Both correct; Reason explains Assertion.
7. **Assertion:** Yeast can survive without oxygen.
Reason: Yeast undergoes anaerobic respiration, producing ethanol and CO₂.
Ans: (a) Both correct; Reason explains Assertion.

8. **Assertion:** Haemoglobin is responsible for transporting oxygen in the blood.
Reason: Haemoglobin has a high affinity for oxygen, forming oxyhaemoglobin.
Ans: (a) Both correct; Reason explains Assertion.
9. **Assertion:** Carbon dioxide is a waste product of respiration.
Reason: Carbon dioxide is produced due to the breakdown of glucose in the mitochondria
Ans: (a) Both correct; Reason explains Assertion.
10. **Assertion:** Fish respire through gills.
Reason: Gills extract dissolved oxygen from water and release carbon dioxide.
Ans: (a) Both correct; Reason explains Assertion.

VI. Find Odd Man Out:

1. **Ans: D) ATP** (Others: Gases)
2. **Ans: D) Esophagus** (Others: Respiratory parts)
3. **Ans: D) Kidney** (Others: Respiratory organs)
4. **Ans: C) Chlorophyll** (Others: Oxygen-binding pigments)
5. **Ans: D) Carbon dioxide** (Others: Energy carriers)
6. **Ans: D) Xylem** (Others: Gas exchange structures)
7. **Ans: D) Lactic acid** (Others: Reactants/products of respiration)
8. **Ans: A) Mitochondria** (Others: Non-respiratory organelles)
9. **Ans: D) Small intestine** (Others: Respiratory system parts)
10. **Ans: D) Amoeba** (Others: Multicellular organisms)

VII. Answer the Following (Key Points):

1. What is respiration? Explain its importance in living organisms.

Ans: Respiration is a biochemical process in which cells break down glucose molecules to release energy in the form of ATP (Adenosine Triphosphate). This energy is essential for various life processes such as movement, growth, repair, and maintenance of body functions. It involves the intake of oxygen, breakdown of food, release of energy, and elimination of carbon dioxide and water as waste. Without respiration, organisms cannot survive because they would not have the energy needed to carry out basic activities.

2. Differentiate between aerobic and anaerobic respiration with examples.

Ans: Aerobic respiration occurs in the presence of oxygen. In this process, glucose is completely broken down into carbon dioxide and water, releasing a large amount of energy (38 ATP). It takes place in most plants and animals.

Example: Respiration in humans and most animals.

Anaerobic respiration takes place in the absence of oxygen. It results in the partial breakdown of glucose into lactic acid or ethanol and carbon dioxide, releasing much less energy (2 ATP).

Example: Fermentation in yeast (produces ethanol), or muscle cells during intense exercise (produces lactic acid).

3. Describe the role of mitochondria in cellular respiration.

Ans: Mitochondria are known as the powerhouses of the cell because they are the main site of aerobic respiration. After glycolysis occurs in the cytoplasm, the resulting pyruvate enters the mitochondria, where it is completely oxidized to carbon dioxide and water through the Krebs cycle and the electron transport chain. This process generates a high amount of ATP, which is used to power various cellular functions.

4. What is glycolysis? Where does it occur, and what are its end products?

Ans: Glycolysis is the first step in cellular respiration, where one molecule of glucose is broken down into two molecules of pyruvic acid (pyruvate). This process occurs in the cytoplasm of the cell and does not require oxygen. The end products of glycolysis are 2 molecules of pyruvate, 2 ATP, and 2 NADH molecules. It is a common pathway for both aerobic and anaerobic respiration.

5. Explain the process of gas exchange in human lungs.

Ans: In humans, gas exchange takes place in the alveoli of the lungs. During inhalation, oxygen from the air enters the alveoli and diffuses across their thin walls into the blood capillaries. At the same time, carbon dioxide, which is a waste product of respiration, diffuses from the blood into the alveoli and is removed from the body during exhalation. This exchange occurs due to differences in the concentration of gases and helps maintain oxygen supply to the body while removing carbon dioxide.

6. How does respiration in plants differ from respiration in animals?

Ans: In plants, respiration occurs through stomata in leaves, lenticels in stems, and root hairs. It is a passive process mainly driven by diffusion and does not involve special organs. In contrast, animals have well-developed respiratory systems like lungs or gills to carry out respiration. Also, animals actively breathe using muscular movements, whereas plants rely on the passive movement of gases.

7. Describe the structure and function of alveoli in the human respiratory system.

Ans: Alveoli are tiny balloon-like air sacs located at the end of the bronchioles in the lungs. Each alveolus is surrounded by a network of capillaries and has a thin wall to allow easy gas exchange. They provide a large surface area and moist surface for oxygen to diffuse into the blood and carbon dioxide to diffuse out of it. There are about 300–400 million alveoli in the human lungs, making them highly efficient for gas exchange.

8. Why do muscles experience fatigue after vigorous exercise?

Ans: During vigorous exercise, the oxygen supply to muscle cells may become insufficient. As a result, the muscles switch to anaerobic respiration, which produces lactic acid. The accumulation of lactic acid in the muscles leads to a burning sensation and causes muscle fatigue. This is temporary, and once the exercise stops, oxygen is supplied again, which helps in breaking down lactic acid and relieving fatigue.

EXERCISE-3

I. Choose the Correct Answer:

1. The process of transporting substances within an organism is called:
Ans: B) Internal transport
2. The upward movement of water in plants is known as:
Ans: B) Ascent of sap
3. The tissue responsible for the transport of water in plants is:
Ans: A) Xylem
4. The movement of food from leaves to other plant parts is called:
Ans: B) Translocation
5. The functional unit of the kidney is:
Ans: B) Nephron
6. The largest artery in the human body is:
Ans: B) Aorta
7. Blood flows into the right atrium through:
Ans: C) Vena cava
8. The heart is enclosed in a double-layered membrane called:
Ans: A) Pericardium
9. The type of blood vessels that carry blood away from the heart:
Ans: B) Arteries
10. The heart has:
Ans: C) Four chambers
11. The pigment responsible for the red color of blood is:
Ans: B) Hemoglobin
12. The right ventricle pumps blood into the:
Ans: B) Pulmonary artery
13. Blood platelets help in:
Ans: B) Blood clotting
14. The liquid part of blood is called:
Ans: B) Plasma
15. The largest vein in the human body is:
Ans: C) Vena cava
16. The process by which plants lose water through stomata is called:
Ans: A) Transpiration
17. The valve between the right atrium and the right ventricle is:
Ans: B) Tricuspid valve
18. The heart beats approximately how many times per minute?
Ans: B) 72
19. The blood component responsible for immunity is:
Ans: B) WBCs
20. The excretory organ in humans is:
Ans: B) Kidney
21. The waste product removed by the kidneys is:
Ans: B) Urea
22. The main function of WBCs is:
Ans: B) Fighting infections
23. The xylem transports:
Ans: A) Water and minerals
24. The phloem transports:
Ans: C) Food
25. Blood is a type of:
Ans: B) Connective tissue
26. Which blood component helps in clotting?
Ans: C) Platelets
27. The heart pumps blood through the body via:
Ans: C) Circulation
28. The human circulatory system is:
Ans: B) Closed
29. RBCs are produced in:
Ans: C) Bone marrow
30. The normal human blood pH is around:
Ans: B) 7.4
31. The atria of the heart function as:
Ans: B) Receiving chambers
32. The blood vessel that carries deoxygenated blood from the heart to the lungs:
Ans: A) Pulmonary artery
33. The process of filtering waste from blood using an artificial kidney is:
Ans: B) Haemodialysis
34. The yellowish fluid that circulates in the lymphatic system is:
Ans: B) Lymph
35. The smallest blood vessels in the body are:
Ans: C) Capillaries

II. Say True or False:

1. Xylem transports food in plants. **Ans: False**
2. Phloem transports water in plants. **Ans: False**
3. The human heart has four chambers. **Ans: True**
4. Veins carry blood away from the heart. **Ans: False**
5. Arteries have thin walls. **Ans: False**
6. Blood is a connective tissue. **Ans: True**
7. WBCs fight infections. **Ans: True**
8. RBCs transport oxygen. **Ans: True**
9. The left ventricle pumps to the lungs. **Ans: False**
10. Lymph is colorless. **Ans: True**
11. Platelets help in clotting. **Ans: True**
12. The kidney filters waste from blood. **Ans: True**
13. Nephron is the unit of the kidney. **Ans: True**
14. The heart is a voluntary muscle. **Ans: False**
15. Excretion removes metabolic waste. **Ans: True**
16. The largest artery is the aorta. **Ans: True**
17. Translocation moves water in plants. **Ans: False**
18. Blood plasma is red in color. **Ans: False**
19. Transpiration occurs through stomata. **Ans: True**
20. The human heart is on the right side. **Ans: False**

III. Match the Following:

Set 1:

1. **Heart** → a) Pumps blood
2. **Arteries** → b) Carry oxygenated blood
3. **Veins** → c) Carry deoxygenated blood
4. **Capillaries** → d) Exchange of gases
5. **RBCs** → e) Carry oxygen

Set 2:

1. **Xylem** → a) Transports water
2. **Phloem** → b) Transports food
3. **Transpiration** → c) Water loss via stomata
4. **Root hairs** → d) Absorb water
5. **Stomata** → e) Gas exchange

Set 3:

1. **Plasma** → a) Fluid part of blood
2. **WBCs** → b) Fight infections
3. **Platelets** → c) Help in clotting
4. **Hemoglobin** → d) Oxygen transport
5. **Lymph** → e) Colorless fluid

IV. Multi-Correct Answer Type:

1. Which are components of blood?
Ans: A) RBCs, B) WBCs, C) Platelets
2. Which tissues help in transport in plants?
Ans: A) Xylem, B) Phloem
3. Which are chambers of the heart?
Ans: A) Left atrium, B) Right atrium, C) Left ventricle
4. Which are types of blood vessels?
Ans: A) Arteries, B) Veins, C) Capillaries
5. Which organs are part of the excretory system?
Ans: A) Kidney, B) Ureter, C) Urethra
6. Which are functions of blood?
Ans: A) Transport, B) Protection, C) Clotting
7. Which structures are in the nephron?
Ans: A) Glomerulus, B) Bowman's capsule, C) Loop of Henle
8. Which are types of WBCs?
Ans: A) Lymphocytes, B) Monocytes, C) Neutrophils
9. Which are components of plasma?
Ans: A) Proteins, B) Water, C) Nutrients
10. Which are functions of the kidney?
Ans: A) Filtration, B) Osmoregulation, C) Waste removal

V. Reasoning Type Questions:

1. **Assertion:** Veins carry deoxygenated blood in the body.
Reason: Veins have thick, elastic walls to handle high pressure.
Ans: (d) Assertion incorrect (veins carry deoxygenated blood *except pulmonary vein*); Reason incorrect (veins have thin walls).
2. **Assertion:** Xylem transports water in plants.
Reason: Xylem vessels and tracheids help in translocation of food.
Ans: (c) Assertion correct; Reason incorrect (xylem transports water, not food).
3. **Assertion:** The left ventricle has thicker walls than the right ventricle.
Reason: The left ventricle pumps blood to the entire body.
Ans: (a) Both correct; Reason explains Assertion (left ventricle pumps to the body).
4. **Assertion:** Blood platelets help in clotting.
Reason: Platelets release thromboplastin, which starts the clotting process.
Ans: (a) Both correct; Reason explains Assertion.

5. **Assertion:** Phloem transports food in plants.
Reason: Phloem moves food in only one direction.
Ans: (c) Assertion correct; Reason incorrect (phloem transports bidirectionally).
6. **Assertion:** The human heart is divided into four chambers.
Reason: The septum prevents mixing of oxygenated and deoxygenated blood.
Ans: (a) Both correct; Reason explains Assertion.
7. **Assertion:** Transpiration helps in the ascent of sap.
Reason: Water loss through stomata creates a suction force.
Ans: (a) Both correct; Reason explains Assertion (transpiration pull).
8. **Assertion:** WBCs help in fighting infections.
Reason: WBCs produce hemoglobin to transport oxygen.
Ans: (c) Assertion correct; Reason incorrect (WBCs fight infections, hemoglobin is in RBCs).
9. **Assertion:** The kidney removes nitrogenous waste from the blood.
Reason: Nephrons in the kidney filter blood and form urine.
Ans: (a) Both correct; Reason explains Assertion.
10. **Assertion:** Arteries have valves to prevent backflow of blood.
Reason: Arteries carry blood under high pressure from the heart.
Ans: (d) Assertion incorrect (veins have valves); Reason correct.

VI. Find Odd Man Out:

1. **Ans: C) Stomata** (Others: Vascular tissues).
2. **Ans: D) None of these** (All are blood components).
3. **Ans: C) Alveoli** (Others: Blood vessels).
4. **Ans: C) Nephron** (Others: Heart chambers).
5. **Ans: D) None of these** (All are major blood vessels).
6. **Ans: C) Photosynthesis** (Others: Plant transport processes).
7. **Ans: C) Urine** (Others: Body fluids).
8. **Ans: D) None of these** (All are organs).
9. **Ans: C) Stomata** (Others: Heart valves).
10. **Ans: C) Hemoglobin** (Others: WBC types).

VII. Answer the Following:

1. Explain the function of xylem and phloem in plants.

Ans: Xylem is a plant tissue responsible for the transport of water and minerals from the roots to other parts of the plant. It consists of non-living components like vessels and tracheids, and it facilitates the ascent of sap mainly through transpiration pull and cohesion.

Phloem is a living tissue that transports food (mainly glucose) produced during photosynthesis in the leaves to other parts of the plant. This process is called

translocation, and it involves components like sieve tubes, companion cells, and phloem parenchyma. Phloem transport is active and energy-dependent.

2. Describe the structure and function of the human heart.

Ans: The human heart is a four-chambered muscular organ located in the thoracic cavity. It consists of:

- Two atria (right and left) at the top, which receive blood
- Two ventricles (right and left) at the bottom, which pump blood

The right atrium receives deoxygenated blood from the body and passes it to the right ventricle, which sends it to the lungs for oxygenation. The left atrium receives oxygenated blood from the lungs and transfers it to the left ventricle, which pumps it throughout the body.

The heart has valves (bicuspid, tricuspid, semilunar) to prevent backflow of blood. It functions as a double circulatory system, maintaining separation of oxygenated and deoxygenated blood.

3. What is the role of platelets in blood clotting?

Ans: Platelets (thrombocytes) are small, disc-shaped cell fragments in the blood. When a blood vessel is injured, platelets:

- Aggregate at the injury site
- Release a chemical called thromboplastin
- Thromboplastin starts a chain reaction that converts fibrinogen into fibrin, forming a mesh
- This mesh traps RBCs and seals the wound, forming a clot and preventing excessive blood loss

4. How does the kidney help in excretion and osmoregulation?

Ans: The kidney filters waste materials from the blood, forming urine.

- The nephrons, its functional units, carry out three main steps:
 1. Ultrafiltration of blood in the glomerulus
 2. Reabsorption of useful substances like glucose, water, salts
 3. Secretion of excess ions and wastes into the filtrate
- The waste is removed as urea, uric acid, and excess salts
- The kidneys also maintain the water and ion balance (osmoregulation) of the body with the help of ADH hormone, ensuring the body's internal environment remains stable

5. What are the differences between arteries and veins?

Ans: Direction of Blood Flow:

- Arteries carry blood away from the heart to different parts of the body.
- Veins carry blood towards the heart from various parts of the body.

Oxygen Content:

- Arteries usually carry oxygen-rich blood (except pulmonary arteries).
- Veins usually carry oxygen-poor blood (except pulmonary veins).

Wall Structure:

- Arteries have thick, elastic, and muscular walls to withstand high pressure.
- Veins have thin and less elastic walls with valves to prevent backflow.

Pressure:

- Arteries carry blood under high pressure.
- Veins carry blood under low pressure.

6. Explain the process of transpiration in plants.

Ans: Transpiration is the process by which excess water absorbed by plant roots evaporates from the stomata in the leaves.

- It creates a suction force (transpiration pull) that helps draw water upward from the roots through xylem
- It helps in cooling the plant, mineral transport, and maintaining water balance
- Occurs mostly during the daytime when stomata are open

7. What is the importance of the lymphatic system in the human body?

Ans: The lymphatic system consists of lymph, lymph nodes, and vessels. Its functions are:

- Drains excess tissue fluid back into the blood
- Transports fats and fatty acids from the intestine
- Carries lymphocytes and antibodies to fight infection
- Helps in immune defense and localization of infections

Lymph is a colorless fluid lacking RBCs and plays a key role in fluid balance and immunity.

8. Describe the composition of blood and its functions.

Ans: Blood is a connective tissue made of:

- Plasma (55%): Liquid part with water, proteins, hormones, nutrients
- Blood corpuscles (45%):
 - o RBCs (Red Blood Cells): Carry oxygen using hemoglobin
 - o WBCs (White Blood Cells): Defend against infection
 - o Platelets: Help in blood clotting

Functions:

- Transport of oxygen, nutrients, hormones, waste
- Regulation of body temperature and pH
- Protection through immunity and clotting

9. How does the nephron function as a filtration unit in the kidney?

Ans: Each nephron filters blood in the kidney. Its main parts include Bowman's capsule, glomerulus, tubules, and Loop of Henle.

- **Ultrafiltration:** Blood is filtered in Bowman's capsule; water, salts, urea, glucose pass into the nephron
- **Reabsorption:** Useful substances like glucose and water are reabsorbed into blood
- **Secretion:** Waste ions and drugs are secreted into the tubule
- The remaining fluid becomes urine, which is passed to the ureters, bladder, and excreted

10. What are the different types of white blood cells and their functions?

Ans: White Blood Cells (WBCs) are of two main types:

1. **Granulocytes**

- **Neutrophils:** Destroy bacteria by engulfing them
- **Eosinophils:** Fight parasites, involved in allergy response
- **Basophils:** Release histamine in allergic reactions

2. **Agranulocytes**

- **Lymphocytes:** Produce antibodies to fight infections
- **Monocytes:** Engulf pathogens and dead cells

Together, WBCs protect the body from infections and diseases, acting as the defense system.

Chapter 4

I. Choose the Correct Answer:

1. The ability to respond to stimuli is called: **Ans: B) Coordination**
2. In plants, movement in response to a stimulus is regulated by: **Ans: B) Hormones**
3. Which of the following is a type of tropism? **Ans: A) Phototropism**
4. The part of the brain responsible for balance is: **Ans: B) Cerebellum**
5. Which plant hormone is responsible for cell elongation? **Ans: A) Auxin**
6. The structure that transmits electrical signals in the body is: **Ans: B) Nerves**
7. Reflex actions are controlled by: **Ans: B) Spinal cord**
8. Which part of the brain controls emotions? **Ans: C) Hypothalamus**
9. The longest part of a neuron is: **Ans: C) Axon**
10. The autonomic nervous system regulates: **Ans: B) Involuntary actions**
11. The functional unit of the nervous system is: **Ans: B) Neuron**
12. The "fight or flight" hormone is: **Ans: C) Adrenaline**
13. Which part of a neuron carries signals away from the cell body? **Ans: B) Axon**
14. The outer covering of the brain is called: **Ans: B) Meninges**
15. Which part of the brain controls breathing? **Ans: A) Pons**
16. The junction between two neurons is called: **Ans: B) Synapse**
17. The brain is protected by: **Ans: B) Skull**
18. The endocrine gland present in the neck is: **Ans: A) Thyroid**
19. The number of cranial nerves in humans is: **Ans: B) 12**
20. The nerve that controls eye movement is: **Ans: B) Oculomotor nerve**
21. Reflex actions are: **Ans: B) Involuntary**
22. Which hormone regulates sugar levels in the blood? **Ans: A) Insulin**
23. Which hormone controls the water balance in the body? **Ans: B) ADH**
24. Which hormone is responsible for growth in plants? **Ans: B) Gibberellin**
25. The pituitary gland is located in the: **Ans: A) Brain**
26. The structure responsible for detecting stimuli in animals is: **Ans: B) Receptor**
27. Which hormone helps in fruit ripening? **Ans: C) Ethylene**
28. The hormone that controls metabolism is: **Ans: B) Thyroxine**
29. Which endocrine gland is called the "master gland"? **Ans: B) Pituitary**
30. The hormone that regulates calcium levels in the blood is: **Ans: B) Parathyroid hormone**
31. Which organ is controlled by both nervous and endocrine systems? **Ans: A) Heart**
32. The response of a plant to gravity is called: **Ans: C) Geotropism**
33. The hormone responsible for leaf fall is: **Ans: C) Abscissic acid**
34. Which plant hormone promotes seed dormancy? **Ans: C) Abscissic acid**
35. The chemical substances that regulate plant growth are called: **Ans: C) Phytohormones**

II. Say True or False:

1. Ethylene promotes fruit ripening. **Ans: True**
2. Tropism is a type of plant movement. **Ans: True**
3. The brain controls all reflex actions. **Ans: False**
4. Axons carry signals to the cell body. **Ans: False**
5. The hypothalamus controls hunger. **Ans: True**
6. Cytokinins inhibit plant growth. **Ans: False**
7. The spinal cord is part of the CNS. **Ans: True**
8. Reflex actions are voluntary. **Ans: False**
9. The cerebrum controls balance. **Ans: False**
10. Phototropism is growth toward light. **Ans: True**
11. Hormones travel through the blood. **Ans: True**
12. Synapse is a gap between two neurons. **Ans: True**
13. The pituitary is the master gland. **Ans: True**
14. The brain has two hemispheres. **Ans: True**
15. The reflex arc involves the brain. **Ans: False**
16. Hydrotropism is response to light. **Ans: False**
17. Adrenaline is a stress hormone. **Ans: True**
18. The cerebellum controls emotions. **Ans: False**
19. Thyroxine regulates metabolism. **Ans: True**
20. The spinal cord has 31 nerve pairs. **Ans: True**

III. Match the Following:

Set 1:

1. **Phototropism** → A) Response to light
2. **Geotropism** → B) Response to gravity
3. **Hydrotropism** → C) Response to water
4. **Thigmotropism** → D) Response to touch
5. **Chemotropism** → E) Response to chemicals

Set 2:

1. **Pituitary** → D) Produces growth hormone
2. **Thyroid** → B) Produces thyroxine
3. **Adrenal** → C) Produces adrenaline
4. **Pancreas** → A) Produces insulin
5. **Ovaries** → E) Produces estrogen

Set 3:

1. **Knee jerk** → A) Tapping below the kneecap
2. **Blinking** → B) Dust particles in the eye
3. **Salivation** → C) Smell of food
4. **Coughing** → D) Irritation in throat
5. **Withdrawal** → E) Touching a hot object

IV. Multi-Correct Answer Type:

1. Which are parts of a neuron? **Ans:** A) Axon, B) Dendrite
2. Which are parts of the human brain? **Ans:** A) Cerebrum, B) Cerebellum, C) Medulla
3. Reflex actions involve which components? **Ans:** A) Receptors, B) Spinal cord, C) Effectors
4. Which are functions of the medulla? **Ans:** A) Breathing, B) Heartbeat
5. Which are parts of the central nervous system? **Ans:** A) Brain, B) Spinal cord
6. Which are types of tropism? **Ans:** A) Phototropism, B) Geotropism, C) Hydrotropism
7. Which are plant hormones? **Ans:** A) Auxin, B) Cytokinin, C) Gibberellin
8. Which hormones promote plant growth? **Ans:** A) Auxin, B) Gibberellin, C) Cytokinin
9. Which systems help in body coordination? **Ans:** A) Nervous, B) Endocrine
10. Which hormones regulate stress in plants? **Ans:** A) Absciscic acid, B) Ethylene

V. Reasoning Type Questions:

1. **Assertion:** The cerebrum is the largest part of the brain.
Reason: It controls voluntary actions, thinking, and memory.
Ans: (a) Both correct; Reason explains Assertion.
2. **Assertion:** Reflex actions are controlled by the spinal cord.
Reason: Reflex actions require conscious effort for execution.
Ans: (c) Assertion correct; Reason incorrect (reflex actions are involuntary).
3. **Assertion:** The medulla oblongata controls involuntary actions like breathing and heartbeat.
Reason: The cerebellum is responsible for maintaining balance and coordination.
Ans: (b) Both correct but unrelated (medulla $\neq$ cerebellum functions).
4. **Assertion:** Neurons cannot divide and regenerate.
Reason: Neurons lack a nucleus and DNA, making them non-living.
Ans: (c) Assertion correct; Reason incorrect (neurons have nuclei but rarely divide).
5. **Assertion:** The hypothalamus regulates body temperature.
Reason: The hypothalamus is also involved in hormone regulation and homeostasis.
Ans: (a) Both correct; Reason explains Assertion.
6. **Assertion:** The autonomic nervous system controls involuntary actions.
Reason: It includes the sympathetic and parasympathetic nervous systems.
Ans: (a) Both correct; Reason explains Assertion.
7. **Assertion:** The pancreas has both endocrine and exocrine functions.
Reason: The pancreas secretes insulin and digestive enzymes.
Ans: (a) Both correct; Reason explains Assertion.
8. **Assertion:** Absciscic acid promotes plant growth.
Reason: Absciscic acid is a plant growth inhibitor that induces dormancy.
Ans: (d) Assertion incorrect; Reason correct (absciscic acid inhibits growth).

9. **Assertion:** Hydrotropism is the movement of plant roots toward water.
Reason: The hormone cytokinin is responsible for hydrotropism.
Ans: (c) Assertion correct; Reason incorrect (hydrotropism is not hormone-driven).
10. **Assertion:** The pituitary gland is called the "master gland."
Reason: It controls the secretion of hormones from other endocrine glands.
Ans: (a) Both correct; Reason explains Assertion.

VI. Find Odd Man Out:

1. **Ans:** D) Kidney (Others: Brain parts).
2. **Ans:** D) Alveoli (Others: Neuron parts).
3. **Ans:** D) Chlorophyll (Others: Animal hormones).
4. **Ans:** D) Lungs (Others: Nervous system parts).
5. **Ans:** D) Phloem (Others: Brain parts).
6. **Ans:** C) Insulin (Others: Plant hormones).
7. **Ans:** D) Digestion (Others: Tropisms).
8. **Ans:** C) Nerve (Others: Plant tissues).
9. **Ans:** D) Hemoglobin (Others: Plant hormones).
10. **Ans:** D) Stomach (Others: Endocrine glands).

VII. Answer the Following (Key Points):

1. Explain the role of the nervous system in body coordination.

Ans: The nervous system helps coordinate the activities of different organs in the body by transmitting signals rapidly. It receives information from receptors (like eyes, ears, skin), processes it in the brain or spinal cord, and sends suitable responses to effectors like muscles or glands. This coordination enables us to perform complex tasks like walking, speaking, and reacting to danger. It works together with the endocrine system to ensure the body functions in a smooth and balanced way.

2. Describe the structure and function of a neuron.

Ans: A neuron is the basic unit of the nervous system that carries electrical signals. It has three parts:

- Cell body (Cyton): Contains the nucleus and controls cell activities.
- Dendrites: Small branches that receive messages from other neurons.
- Axon: A long fiber that carries signals away from the cell body to other neurons or muscles.

Neurons are connected in a network to carry messages throughout the body, helping us sense, think, and act.

3. What are reflex actions? Explain with an example.

Ans: Reflex actions are quick, automatic, and involuntary responses to stimuli, which help protect the body from harm. These actions happen without the brain's involvement and are controlled by the spinal cord through a reflex arc.

Example: When you accidentally touch something hot, you immediately pull your hand away without thinking. This is a reflex action that protects you from getting burned.

4. How do plants respond to stimuli in the absence of a nervous system?

Ans: Even though plants do not have a brain or nerves, they can respond to stimuli using chemical coordination through plant hormones (phytohormones). For example, auxins help plants bend toward light, and abscisic acid helps them close stomata during drought. Their responses include:

- Tropic movements (like growing toward light or water)
- Nastic movements (like Mimosa leaves folding when touched)

These movements are slower than animal responses but are essential for the plant's survival.

5. Differentiate between phototropism and geotropism with examples.

Ans: Phototropism is the growth of a plant part in response to light, while geotropism is the growth response to gravity.

- **Phototropism:** Shoots grow toward light (positive phototropism), like a sunflower bending toward the sun.
- **Geotropism:** Roots grow downward (positive geotropism) into the soil, while shoots grow upward (negative geotropism).

Both are controlled by plant hormones and help the plant grow in the right direction.

6. What is the function of the hypothalamus in the human body?

Ans: The hypothalamus is a part of the forebrain that controls many important body functions. It helps regulate body temperature, hunger, thirst, sleep, and emotions. It also controls the pituitary gland, which secretes many hormones. Because of this, the hypothalamus acts as a link between the nervous system and the endocrine system, helping maintain internal balance or homeostasis.

EXERCISE-5

I. Choose the correct answer:

1. What is the biological process of producing offspring called?

Ans: C) Reproduction

Explanation: Reproduction ensures the continuity of species by producing new individuals.

2. Which macromolecule carries genetic information?

Ans: B) DNA

Explanation: DNA (Deoxyribonucleic Acid) stores and transmits genetic instructions.

3. What is a primary sex organ in females?

Ans: B) Ovary

Explanation: Ovaries produce eggs (ova) and female hormones like estrogen.

4. In which type of reproduction is DNA replication essential?

Ans: C) Both A and B

Explanation: DNA replication occurs in both asexual and sexual reproduction.

5. Which disease is sexually transmitted?

Ans: B) HIV/AIDS

Explanation: HIV spreads through unprotected sexual contact, blood transfusions, or shared needles.

6. The menstrual cycle occurs every _____ days.

Ans: B) 28

Explanation: The average menstrual cycle lasts about 28 days.

7. How many parents are required for asexual reproduction?

Ans: A) One

Explanation: Asexual reproduction involves a single parent producing genetically identical offspring.

8. What type of cell division occurs in asexual reproduction?

Ans: A) Mitosis

Explanation: Mitosis produces two identical daughter cells.

9. Which of the following is NOT a method of asexual reproduction?

Ans: C) Pollination

Explanation: Pollination is a sexual reproduction process in flowering plants.

10. Which organism reproduces by binary fission?

Ans: B) Amoeba

Explanation: Amoeba splits into two identical cells during binary fission.

11. Binary fission results in _____ offspring.

Ans: B) Two

Explanation: One parent cell divides into two identical daughter cells.

12. Which type of fission occurs in Plasmodium?

Ans: B) Multiple fission

Explanation: Plasmodium divides into many daughter cells simultaneously.

13. Which of the following organisms reproduce by fragmentation?

Ans: B) Spirogyra

Explanation: Spirogyra breaks into fragments, each growing into a new organism.

14. Which artificial method of reproduction involves attaching a scion to a stock?

Ans: B) Grafting

Explanation: Grafting joins tissues of two plants to grow as one.

15. In which organism does budding occur?

Ans: B) Hydra

Explanation: Hydra forms a bud that detaches to become a new individual.

16. What type of reproduction occurs in fungi via spores?

Ans: C) Both A and B

Explanation: Fungi reproduce both sexually and asexually using spores.

17. What structure helps Rhizopus reproduce asexually?

Ans: B) Sporangium

Explanation: Sporangia produce spores for asexual reproduction in Rhizopus.

18. Which plant part is used in vegetative propagation?

Ans: D) None of these (All are used: leaves, stems, roots)

Explanation: Plants like Bryophyllum (leaves), potato (stems), and carrot (roots) propagate vegetatively.

19. What structure in a flower produces pollen?

Ans: B) Anther

Explanation: Anthers are part of the stamen and produce pollen grains.

20. Where does fertilization occur in humans?

Ans: B) Fallopian tube

Explanation: Sperm meets the egg in the fallopian tube.

21. What type of reproduction occurs in flowering plants?

Ans: C) Both A and B

Explanation: Flowering plants reproduce sexually (seeds) and asexually (vegetative propagation).

22. What is the surgical method of birth control for males?

Ans: B) Vasectomy

Explanation: Vasectomy blocks sperm transport by cutting the vas deferens.

23. What is the function of the stigma?

Ans: B) Receiving pollen

Explanation: Stigma traps pollen grains during pollination.

24. What part of a plant matures into a fruit?

Ans: A) Ovary

Explanation: After fertilization, the ovary develops into a fruit.

25. What is the male reproductive cell called?

Ans: C) Sperm

Explanation: Sperm is the male gamete in animals.

26. When does menopause usually occur in women?

Ans: C) 45-55 years

Explanation: Menopause marks the end of menstrual cycles, typically in late 40s–50s.

27. Where does fertilization occur in flowering plants?

Ans: A) Ovary

Explanation: Pollen tube delivers sperm to the ovule in the ovary.

28. What develops into a seed after fertilization?

Ans: B) Ovule

Explanation: The fertilized ovule becomes a seed.

29. What is the female reproductive organ that produces eggs?

Ans: B) Ovary

Explanation: Ovaries release eggs during ovulation.

30. Which organ produces sperm?

Ans: B) Testes

Explanation: Testes produce sperm and testosterone.

31. What type of fertilization occurs in flowering plants?

Ans: B) Double

Explanation: One sperm fertilizes the egg (zygote), another fuses with polar nuclei (endosperm).

32. The female reproductive organ in a flower is called _____.

Ans: C) Carpel

Explanation: The carpel consists of stigma, style, and ovary.

II. Say True or False

- | | |
|--|-------------------|
| 1. DNA carries genetic information. | Ans: True |
| 2. Reproduction is necessary for survival. | Ans: False |
| 3. Amoeba reproduces by budding. | Ans: False |
| 4. Binary fission produces one offspring. | Ans: False |
| 5. Plants reproduce only sexually. | Ans: False |
| 6. Hydra reproduces by budding. | Ans: True |
| 7. Pollen is produced in the ovary. | Ans: False |

- | | |
|---|-------------------|
| 8. Testes produce sperm. | Ans: True |
| 9. Ovule develops into a seed. | Ans: True |
| 10. Ovary develops into a fruit. | Ans: True |
| 11. Fertilization occurs in the uterus. | Ans: False |
| 12. Pollination occurs only by wind. | Ans: False |
| 13. Fungi reproduce by spores. | Ans: True |
| 14. Zygote is formed after fertilization. | Ans: True |
| 15. Human sperm has 46 chromosomes. | Ans: False |
| 16. Placenta provides nutrients to the fetus. | Ans: True |
| 17. Ovary produces female gametes. | Ans: True |
| 18. Rhizopus reproduces by fragmentation. | Ans: False |
| 19. Menstrual cycle occurs every 10 days. | Ans: False |
| 20. Asexual reproduction produces variations. | Ans: False |
| 21. Tubectomy is a birth control method. | Ans: True |
| 22. Bryophyllum reproduces through leaves. | Ans: True |
| 23. Double fertilization occurs in plants. | Ans: True |
| 24. Bacteria reproduce by binary fission. | Ans: True |
| 25. All plants reproduce sexually. | Ans: False |

III. Match the Following

Set 1:

- | | |
|-----------|-----------------------------|
| 1. Anther | → B. Produces pollen grains |
| 2. Stigma | → E. Receives pollen |
| 3. Ovary | → A. Produces ovules |
| 4. Petals | → C. Attracts pollinators |
| 5. Sepals | → D. Protects flower bud |

Set 2:

- | | |
|---------------|-----------------------|
| 1. Amoeba | → B. Binary fission |
| 2. Hydra | → A. Budding |
| 3. Spirogyra | → C. Fragmentation |
| 4. Yeast | → D. Budding |
| 5. Plasmodium | → E. Multiple fission |

Set 3:

- | | |
|---------------|--------------------------|
| 1. Condom | → C. Barrier method |
| 2. Copper-T | → B. Intrauterine device |
| 3. Tubectomy | → A. Surgical method |
| 4. Oral pills | → D. Hormonal method |
| 5. Vasectomy | → E. Male sterilization |

IV. Multi correct answer type question:

1. Which are types of reproduction?

Ans: A) Asexual, B) Sexual

2. Which organisms reproduce asexually?

Ans: A) Hydra, B) Amoeba, C) Yeast

3. Which are types of contraception?

Ans: A) Condoms, B) Oral pills, C) Copper-T

4. Which processes occur in sexual reproduction?

Ans: A) Gamete formation, B) Fertilization, C) DNA replication

5. Which structures are involved in plant reproduction?

Ans: A) Stigma, B) Anther, C) Ovary

6. Which organisms reproduce by budding?

Ans: A) Yeast, B) Hydra

7. Which are methods of vegetative propagation?

Ans: A) Cutting, B) Grafting, C) Layering

8. Which plants reproduce by underground stems?

Ans: A) Ginger, B) Potato

9. Which methods involve spore formation?

Ans: A) Fungi, B) Ferns

10. Which features belong to asexual reproduction?

Ans: A) Single parent, B) No fertilization, C) Identical offspring

V. Reasoning Type Questions:

1. **Assertion:** Reproduction ensures the continuity of species.

Reason: It is necessary for the survival of an individual.

Ans: (b) Both correct, but Reason doesn't explain Assertion.

2. **Assertion:** HIV/AIDS spreads through sexual contact.

Reason: It is caused by a bacterial infection.

Ans: (d) Assertion correct (HIV is sexually transmitted), Reason incorrect (virus, not bacteria).

3. **Assertion:** Sexual reproduction increases genetic variation.

Reason: It involves the fusion of gametes from two parents.

Ans: (a) Both correct; gamete fusion increases variation.

4. **Assertion:** Variation in DNA leads to evolution.

Reason: Mutations and recombination create genetic diversity.

Ans: (a) Both correct; mutations/recombination drive diversity.

5. **Assertion:** Fertilization restores the diploid chromosome number.
Reason: Gametes carry half the number of chromosomes.
Ans: (a) Both correct; fertilization restores diploidy (2n).
6. **Assertion:** Binary fission is a type of sexual reproduction.
Reason: It involves fusion of two gametes.
Ans: (d) Assertion incorrect (binary fission is asexual), Reason incorrect.
7. **Assertion:** Budding produces a new organism from an outgrowth.
Reason: Hydra and yeast reproduce by budding.
Ans: (b) Both correct, but Reason doesn't explain Assertion.
8. **Assertion:** Spore formation occurs in fungi and bacteria.
Reason: Spores are thick-walled structures that help in reproduction.
Ans: (a) Both correct; spores aid reproduction.
9. **Assertion:** Vegetative propagation helps in rapid reproduction.
Reason: It allows the plant to grow from non-seed parts.
Ans: (a) Both correct; vegetative propagation is rapid.
10. **Assertion:** Regeneration in animals results in new individuals.
Reason: All body cells in animals have the ability to regenerate.
Ans: (c) Assertion correct (regeneration), Reason incorrect (not all cells regenerate).

VI. Find Odd One Out

1. **Ans: D) Gamete** (Others are macromolecules).
2. **Ans: C) Pollination** (Others are asexual methods).
3. **Ans: D) Ovule** (Others are flower parts; ovule is inside ovary).
4. **Ans: D) Fallopian tube** (Others are primary sex organs).
5. **Ans: D) Photosynthesis** (Others relate to reproduction).
6. **Ans: D) Mango** (Others reproduce asexually).
7. **Ans: D) Budding** (Others are vegetative propagation).
8. **Ans: D) Wheat** (Others use vegetative propagation).
9. **Ans: D) Ovulation** (Others are contraception methods).
10. **Ans: D) Paramecium** (Others are plants).

VII. Answer the following questions.

1. What is the significance of reproduction in organisms?

Ans: Reproduction is a biological process through which organisms produce offspring of their own kind. It ensures the continuity of species across generations. Although not necessary for the survival of an individual, it is crucial for the survival of the species. Reproduction allows for the transfer of genetic information from one generation to the next, and through variations, it contributes to evolution and adaptation to changing environments.

2. Explain the process of fertilization in flowering plants.

Ans: Fertilization in flowering plants occurs when the male gamete (from pollen) fuses with the female gamete (in the ovule). After pollination, the pollen grain germinates on the stigma and forms a pollen tube that grows down through the style to reach the ovule in the ovary. Inside the embryo sac, one male gamete fuses with the egg cell to form a zygote (syngamy), and the other fuses with the two polar nuclei to form a triploid endosperm nucleus (triple fusion). This process is called double fertilization, unique to flowering plants.

3. How does variation occur in a species during reproduction?

Ans: Variation occurs during reproduction mainly due to errors in DNA replication and genetic recombination. In asexual reproduction, small changes may arise due to occasional replication errors. In sexual reproduction, DNA from two different individuals combines, resulting in unique gene combinations. These variations help species adapt to changing environments and are essential for evolution.

4. Differentiate between asexual and sexual reproduction.

Ans:

Feature	Asexual Reproduction	Sexual Reproduction
No. of parents	One	Two
Gamete fusion	Not involved	Involves fusion of male and female gametes
Genetic variation	No/less variation	Produces genetic variation
Speed	Faster	Slower
Examples	Binary fission in Amoeba, budding in Hydra	Humans, flowering plants

5. Describe the structure and function of a flower in sexual reproduction.

Ans: A flower is the reproductive part of a plant. It has four main parts:

- Sepals (Calyx): Protect the bud
- Petals (Corolla): Attract pollinators
- Stamens (Androecium): Male reproductive parts, made of anther (produces pollen) and filament
- Carpels (Gynoecium): Female reproductive parts, include stigma (receives pollen), style, and ovary (contains ovules)

Sexual reproduction begins with pollination, followed by fertilization, and ends in seed formation.

6. Describe binary fission with an example.

Ans: Binary fission is an asexual reproduction method in which a single parent cell divides into two equal and identical daughter cells. It is common in unicellular organisms like Amoeba and Paramecium. The nucleus divides first (karyokinesis), followed by

cytoplasm division (cytokinesis). Each daughter cell grows independently and undergoes further division.

7. Explain budding in Hydra with a diagram.

Ans: Budding is a type of asexual reproduction where a small bud forms on the body of the parent due to repeated cell division. In Hydra, the bud grows and develops tentacles and a mouth. Once mature, it detaches and becomes a new individual. This process helps Hydra multiply quickly.

(You can draw a simple diagram showing parent Hydra, bud formation, development, and detachment of new Hydra.)

8. How does fragmentation help in the reproduction of organisms like Spirogyra?

Ans: In fragmentation, the body of a simple organism breaks into two or more parts, and each part grows into a complete new organism. In Spirogyra (a filamentous alga), if a filament breaks due to mechanical injury or natural decay, each fragment develops into a new filament, thus reproducing the organism without gametes.

9. Describe the functions of male and female reproductive organs in humans.

Ans: Male reproductive system includes:

- Testes: Produce sperm and testosterone
- Vas deferens: Transports sperm
- Seminal vesicles and prostate gland: Add fluids to sperm (forming semen)
- Penis: Delivers semen to the female body

Female reproductive system includes:

- Ovaries: Produce eggs and female hormones
- Fallopian tubes: Site of fertilization
- Uterus: Where embryo implants and develops
- Vagina: Receives sperm and serves as birth canal

10. What are the advantages and disadvantages of vegetative propagation?

Ans: Advantages:

- Fast and easy method
- Produces genetically identical plants
- Useful for plants without viable seeds
- Maintains desirable traits
- Commercially beneficial (e.g., bananas, sugarcane)

Disadvantages:

- No genetic variation
- Disease-prone plants due to lack of variation
- Low vigor in vegetatively propagated plants

EXERCISE-6

I. Choose the correct answer.

1. The process of passing traits from parents to offspring is called: **Ans: C) Heredity**
2. The differences in traits among individuals of a species are known as: **Ans: A) Variation**
3. The study of heredity and variation is called: **Ans: B) Genetics**
4. The term "genetics" was coined by: **Ans: C) Bateson**
5. The basic unit of heredity is: **Ans: A) Gene**
6. The physical expression of a trait is called: **Ans: A) Phenotype**
7. The genetic makeup of an organism is called: **Ans: A) Genotype**
8. The process that ensures genetic variation in sexual reproduction is: **Ans: B) Meiosis**
9. Mendel conducted his experiments on: **Ans: B) Pea plant**
10. The scientist known as the "Father of Genetics" is: **Ans: B) Gregor Mendel**
11. The type of reproduction that produces genetically identical offspring is: **Ans: B) Asexual**
12. A pair of contrasting traits is called: **Ans: B) Alleles**
13. The genetic material present in the nucleus is: **Ans: C) DNA**
14. The different forms of a gene are called: **Ans: C) Alleles**
15. Inheritance of traits is due to: **Ans: B) DNA**
16. A dihybrid cross involves: **Ans: B) Two traits**
17. Traits that appear in every generation are: **Ans: B) Dominant**
18. The probability of having a male or female baby is: **Ans: B) 50%**
19. The sex chromosomes in a human male are: **Ans: B) XY**
20. A mutation is a: **Ans: B) Permanent change in DNA**
21. The unit of inheritance is: **Ans: C) Gene**
22. The number of chromosomes in a human gamete is: **Ans: A) 23**
23. The F₂ generation in a monohybrid cross has a phenotypic ratio of: **Ans: B) 3:1**
24. A monohybrid cross involves how many contrasting traits? **Ans: A) One**
25. The genotype for a heterozygous tall pea plant is: **Ans: B) Tt**
26. A dihybrid cross gives a phenotypic ratio of: **Ans: B) 9:3:3:1**
27. A trait that is not inherited but developed during life is: **Ans: B) Acquired trait**
28. The genetic constitution of an individual is: **Ans: B) Genotype**
29. The sex of an organism is determined by: **Ans: B) Sex chromosomes**
30. The father of evolution is: **Ans: B) Darwin**
31. The study of heredity is important for: **Ans: C) Evolution**
32. Gregor Mendel used which plant for his experiments? **Ans: B) Pea**
33. The first filial generation (F₁) in Mendel's experiment is obtained by: **Ans: B) Cross-pollination**
34. The law that states that one trait may dominate over another is: **Ans: C) Law of Dominance**
35. Which chromosome is smaller? **Ans: B) Y**

II. Say True or False:

- | | |
|--|-------------------|
| 1. Heredity transfers traits to offspring. | Ans: True |
| 2. Genes are located on chromosomes. | Ans: True |
| 3. Mendel worked with pea plants. | Ans: True |
| 4. Variation leads to evolution. | Ans: True |
| 5. Sex is determined by autosomes. | Ans: False |
| 6. DNA is the genetic material. | Ans: True |
| 7. Recessive traits always appear. | Ans: False |
| 8. Males have XX chromosomes. | Ans: False |
| 9. Asexual reproduction causes variation. | Ans: False |
| 10. Mutation changes DNA. | Ans: True |
| 11. Phenotype is the physical appearance. | Ans: True |
| 12. Genotype controls phenotype. | Ans: True |
| 13. Homozygous means different alleles. | Ans: False |
| 14. F1 generation is the first offspring. | Ans: True |
| 15. Dihybrid cross studies one trait. | Ans: False |
| 16. Genes come in pairs. | Ans: True |
| 17. Dominant traits mask recessive traits. | Ans: True |
| 18. Mendel is the Father of Genetics. | Ans: True |
| 19. Plants inherit acquired traits. | Ans: False |
| 20. Gametes carry two copies of genes. | Ans: False |
| 21. Only males determine baby's sex. | Ans: False |
| 22. Chromosomes are made of RNA. | Ans: False |
| 23. Law of Segregation explains allele separation. | Ans: True |
| 24. Offspring always look like parents. | Ans: False |
| 25. Mutation is always harmful. | Ans: False |

III. Match the Following

Set 1:

- | | |
|---------------|-----------------------------|
| 1. Heredity | → A. Transmission of traits |
| 2. Gene | → B. Unit of inheritance |
| 3. DNA | → C. Genetic material |
| 4. Chromosome | → D. Carries genes |
| 5. Variation | → E. Differences in traits |

Set 2:

- | | |
|-----------------|---------------------------------|
| 1. Phenotype | → A. Physical appearance |
| 2. Genotype | → B. Genetic makeup |
| 3. Homozygous | → C. Identical alleles |
| 4. Heterozygous | → D. Different alleles |
| 5. Allele | → E. Alternative form of a gene |

Set 3:

1. Monohybrid Cross → A. One trait studied
2. Dihybrid Cross → B. Two traits studied
3. F1 Generation → C. First offspring
4. F2 Generation → D. Second offspring
5. 3:1 Ratio → E. Monohybrid F2 result

IV. Multi-Correct Answer Type Questions:

1. Genetic material in a cell **Ans:** A) DNA, B) RNA, C) Chromosome
2. Mendel studied these traits in pea plants
Ans: A) Seed color, B) Plant height, C) Flower position
3. Types of reproduction **Ans:** A) Sexual, B) Asexual
4. Examples of inherited traits **Ans:** A) Eye color, B) Blood group, C) Hair type
5. Genetic disorders **Ans:** A) Hemophilia, B) Sickle cell anemia, C) Down syndrome
6. Components of a chromosome **Ans:** A) DNA, B) Proteins, C) Histones
7. Sex chromosomes in humans **Ans:** A) XX, B) XY, C) X and Y
8. Sources of variation in species **Ans:** A) Mutation, B) Recombination, C) Crossing over
9. Gametes in humans **Ans:** A) Sperm, B) Egg, C) Haploid cells
10. Factors affecting heredity **Ans:** A) Genes, B) Environment, C) Mutation

V. Reasoning Type Questions:

1. **Assertion:** Mendel is known as the Father of Genetics.
Reason: He discovered the structure of DNA.
Ans: (c) Assertion correct (Mendel = Father of Genetics), Reason incorrect (he didn't discover DNA structure).
2. **Assertion:** Variation is important for evolution.
Reason: Variation helps species adapt to environmental changes.
Ans: (a) Both correct; variation enables adaptation and evolution.
3. **Assertion:** Recessive traits may not appear in the F1 generation.
Reason: Dominant traits always mask recessive traits in heterozygous conditions.
Ans: (a) Both correct; dominant traits mask recessives in F1 (Tt shows tall phenotype).
4. **Assertion:** Genes are present on chromosomes.
Reason: Chromosomes are made up of DNA and proteins.
Ans: (b) Both correct, but Reason doesn't explain Assertion.
5. **Assertion:** Sex in humans is determined by the father.
Reason: The sperm carries either an X or Y chromosome, deciding the child's sex.
Ans: (a) Both correct; Y chromosome from sperm determines maleness.
6. **Assertion:** Mutations can be beneficial, harmful, or neutral.
Reason: All mutations lead to diseases.
Ans: (c) Assertion correct (mutations vary), Reason incorrect (not all cause diseases).

7. **Assertion:** Identical twins have the same genotype.
Reason: Identical twins are formed from a single fertilized egg that splits.
Ans: (a) Both correct; identical twins share DNA from one zygote.
8. **Assertion:** In a monohybrid cross, the F₂ phenotypic ratio is 3:1.
Reason: This ratio results from the segregation of alleles.
Ans: (a) Both correct; 3:1 ratio reflects allele segregation (TT:Tt:tt).
9. **Assertion:** Dihybrid crosses involve two traits.
Reason: They follow a 9:3:3:1 phenotypic ratio in the F₂ generation.
Ans: (a) Both correct; dihybrid crosses yield 9:3:3:1 ratio.
10. **Assertion:** Asexual reproduction produces genetically identical offspring.
Reason: There is no genetic recombination in asexual reproduction.
Ans: (a) Both correct; asexual reproduction clones parents.
11. **Assertion:** Evolution occurs due to natural selection.
Reason: Favorable traits increase survival
Ans: (a) Both correct; natural selection favors advantageous traits.
12. **Assertion:** Acquired traits cannot be inherited.
Reason: Acquired traits do not change the genetic material of germ cells.
Ans: (a) Both correct; acquired traits (e.g., scars) don't alter germ cells.

VI. Choose Odd Man Out:

1. **Ans: D) Mutation** (Others are reproduction types).
2. **Ans: D) Chlorophyll** (Others are genetic components).
3. **Ans: C) Root length** (Mendel didn't study this).
4. **Ans: C) YY** (Non-viable in humans).
5. **Ans: D) Cloning** (Others are genetic crosses).

VII. Answer the following questions:

1. Define heredity and explain its significance in biology.

Ans: Heredity is the process by which traits or characteristics are passed from parents to their offspring through genes.

Significance:

- Ensures continuity of characteristics in a species.
- Helps in understanding how traits are inherited.
- Forms the basis of genetics, evolution, and selective breeding in agriculture and medicine.

2. What is the difference between inherited and acquired traits? Give examples.

Ans: Inherited traits: Traits passed from parents to offspring through genes.

Example: Eye color, blood group, height.

Acquired traits: Traits developed during an individual's lifetime due to environment or experience, not passed to offspring.

Example: Learning to ride a bicycle, a scar from an accident.

3. Describe Mendel's experiments on pea plants and their conclusions.

Ans: Experiments:

- Mendel used pea plants with contrasting traits (e.g., tall vs. dwarf).
- He performed monohybrid and dihybrid crosses.
- In a monohybrid cross (Tall × Dwarf), all F₁ plants were tall.
- In F₂ generation, the ratio was 3 tall : 1 dwarf.

Conclusions:

- Traits are controlled by pairs of factors (genes).
- One trait may be dominant, the other recessive.
- Traits segregate independently during gamete formation.

4. What are dominant and recessive traits? Explain with an example.

Ans: Dominant trait: The trait that appears in the offspring even if only one copy is present (e.g., tallness in peas).

Recessive trait: The trait that appears only when both copies are present (e.g., dwarfness in peas).

Example:

In a cross between TT (Tall) and tt (Dwarf):

F₁ generation: All plants are Tt (Tall – dominant).

F₂ generation: 3 tall : 1 dwarf.

5. What is the role of DNA in inheritance?

Ans: DNA (Deoxyribonucleic Acid) contains genes, which carry instructions for traits.

During reproduction:

- DNA from both parents is passed to offspring.
- Genes control the development of traits by producing proteins.

6. Describe the Law of Segregation with a suitable example.

Ans: Law of Segregation: Each individual has two alleles for a trait, which separate during gamete formation, and only one allele is passed to each gamete.

Example:

In a hybrid tall pea plant (Tt):

- Gametes will carry either T or t.
- Self-pollination of Tt × Tt gives: TT, Tt, Tt, tt → phenotypic ratio: 3 tall : 1 dwarf.

7. Explain the role of chromosomes in heredity.

Ans:

- Chromosomes are thread-like structures in the nucleus made of DNA and proteins.
- Genes are located on chromosomes.
- During reproduction, chromosomes pass genes from parents to offspring, ensuring inheritance of traits.

8. What is the difference between genotype and phenotype?

Ans: **Genotype:** The genetic makeup of an organism (e.g., TT, Tt, tt).

Phenotype: The physical appearance or expression of a trait (e.g., tall or dwarf plant).

9. How does sexual reproduction lead to genetic variation?

Ans: Sexual reproduction causes variation due to:

- Mixing of genes from two parents.
- Crossing over during meiosis.
- Random fertilization of gametes.

This leads to unique combinations of genes in offspring, contributing to evolution.

10. What is mutation? How does it affect an organism?

Ans: Mutation is a sudden, permanent change in the DNA sequence.

Effects:

- May lead to new traits (beneficial or harmful).
- Can cause genetic disorders or evolutionary changes.
- In some cases, beneficial mutations improve adaptability.

EXERCISE-7

I. Choose the correct answer.

1. What is the causative agent of malaria? **Ans:** Plasmodium
2. Which microorganism causes tuberculosis? **Ans:** Mycobacterium
3. What type of disease is diabetes? **Ans:** Non-infectious
4. The common cold is mainly caused by which virus? **Ans:** Rhinovirus
5. Which mosquito transmits dengue fever? **Ans:** Aedes
6. Which disease is caused by a protozoan parasite? **Ans:** Malaria
7. What is the vector for filariasis? **Ans:** Mosquito
8. Ringworm is caused by which type of pathogen? **Ans:** Fungus
9. Which vitamin deficiency causes night blindness? **Ans:** Vitamin A
10. HIV primarily affects which type of cells in the immune system? **Ans:** T-helper cells
11. Which of the following diseases is NOT caused by bacteria? **Ans:** Dengue
12. The BCG vaccine is used to prevent which disease? **Ans:** Tuberculosis
13. What is the main method of preventing AIDS? **Ans:** Safe sex practices
14. Which of the following is a viral disease? **Ans:** Influenza
15. What is a major symptom of pneumonia? **Ans:** Difficulty breathing
16. Which of the following is an example of a prion disease? **Ans:** Mad Cow Disease
17. What is the primary cause of cancer? **Ans:** Genetic mutation
18. What type of immunity is present from birth? **Ans:** Innate immunity
19. Which type of pathogen causes dengue fever? **Ans:** Virus
20. Which microorganism is used in the production of penicillin? **Ans:** Penicillium
21. What is the main function of biofertilizers? **Ans:** Fixing nitrogen
22. The main component of a vaccine is: **Ans:** Weakened pathogens
23. Which mosquito transmits malaria? **Ans:** Anopheles
24. Which disease is caused by Wuchereria bancrofti? **Ans:** Filariasis
25. What is a characteristic symptom of chikungunya? **Ans:** Severe joint pain
26. Which of the following is a helminthic disease? **Ans:** Ascariasis
27. Which microorganism is responsible for biogas production? **Ans:** Methanogenic bacteria
28. Which of the following is used in sewage treatment? **Ans:** Bacteria
29. The influenza virus primarily affects which body system? **Ans:** Respiratory system
30. The major symptom of typhoid is: **Ans:** High fever
31. What is the major mode of transmission of cholera? **Ans:** Contaminated water
32. Which of the following is a fungal infection? **Ans:** Athlete's foot
33. What type of pathogen causes polio? **Ans:** Virus
34. Which bacteria cause pneumonia? **Ans:** Streptococcus pneumonia
35. Which of the following is a biofertilizer? **Ans:** Rhizobium

II. Say True or False:

- | | |
|--|-------------------|
| 1. Malaria is caused by a protozoan. | Ans: True |
| 2. Filariasis is transmitted by mosquitoes. | Ans: True |
| 3. HIV is a bacterial infection. | Ans: False |
| 4. Typhoid fever can cause intestinal perforation. | Ans: True |
| 5. Pneumonia is caused by a fungus. | Ans: False |
| 6. Tuberculosis is caused by viruses. | Ans: False |
| 7. The common cold is caused by bacteria. | Ans: False |
| 8. Cancer is caused by genetic mutations. | Ans: True |
| 9. The body fights infections with antibodies. | Ans: True |
| 10. Typhoid is a viral disease. | Ans: False |
| 11. Amoebiasis is caused by a bacterium. | Ans: False |
| 12. Bacteria cause all infectious diseases. | Ans: False |
| 13. Filariasis affects the nervous system. | Ans: False |
| 14. Ringworm is caused by bacteria. | Ans: False |
| 15. Chikungunya is caused by a fungus. | Ans: False |
| 16. Malaria is spread through mosquito bites. | Ans: True |
| 17. Ascariasis is caused by fungi. | Ans: False |
| 18. Biofertilizers improve soil health. | Ans: True |
| 19. HIV is transmitted by sharing food. | Ans: False |
| 20. BCG vaccine protects against tuberculosis. | Ans: True |

III. Match the Following

Set 1

Column A	Column B
1. Malaria	→ B. Plasmodium
2. Typhoid	→ A. Salmonella typhi
3. Tuberculosis	→ C. Mycobacterium tuberculosis
4. Dengue	→ D. Dengue virus
5. Pneumonia	→ E. Streptococcus pneumoniae

Set 2

Column A	Column B
1. Bacteria	→ D. Mycobacterium
2. Virus	→ A. Influenza virus
3. Protozoa	→ B. Plasmodium
4. Fungi	→ C. Candida
5. Helminths	→ E. Ascaris lumbricoides

Set 3

Column A

1. High fever with chills
2. Severe joint pain
3. Persistent cough
4. Swollen lymph nodes
5. Skin rashes

Column B

- A. Dengue
→ B. Chikungunya
→ C. Tuberculosis
→ D. Filariasis
→ E. Ringworm

IV. Multi-Correct Answer Type Questions

1. Which of the following are bacterial diseases?

Ans: A) Tuberculosis, B) Typhoid, C) Cholera

2. Which of these are fungal infections?

Ans: A) Ringworm, B) Candidiasis, C) Athlete's Foot

3. Which diseases spread through contaminated water?

Ans: A) Cholera, B) Typhoid, C) Amoebiasis

4. Which diseases are caused by viruses?

Ans: A) Influenza, B) Rabies, C) Dengue

5. Which diseases are caused by fungi?

Ans: A) Ringworm, B) Athlete's Foot, C) Candidiasis

6. Which of these are parasitic diseases?

Ans: A) Malaria, B) Filariasis, C) Ascariasis

7. Which are vector-borne diseases?

Ans: A) Malaria, B) Dengue, C) Chikungunya

8. Which of these cause food poisoning?

Ans: A) Salmonella, B) Clostridium, C) Staphylococcus

9. Which of these diseases affect the respiratory system?

Ans: A) Pneumonia, B) Tuberculosis, C) Common Cold

10. Which of these are helminthic infections?

Ans: A) Ascariasis, B) Filariasis, C) Taeniasis

V. Reasoning Type Questions

1. **Assertion:** Malaria is caused by a protozoan parasite.

Reason: Plasmodium is a type of helminth that causes malaria.

Ans: (c) Assertion is correct, but Reason is incorrect.

2. **Assertion:** Vaccines help prevent infectious diseases.

Reason: Vaccines stimulate the immune system to produce antibodies.

Ans: (a) Both Assertion and Reason are correct, and Reason is the correct explanation.

3. **Assertion:** Dengue fever is transmitted by female Aedes mosquitoes.
Reason: Aedes mosquitoes breed in stagnant water.
Ans: (a) Both Assertion and Reason are correct, and Reason is the correct explanation.
4. **Assertion:** AIDS is caused by the HIV virus.
Reason: HIV attacks the red blood cells in the human body.
Ans: (c) Assertion is correct, but Reason is incorrect.
5. **Assertion:** Tuberculosis is an airborne disease.
Reason: Mycobacterium tuberculosis spreads through respiratory droplets.
Ans: (a) Both Assertion and Reason are correct, and Reason is the correct explanation.
6. **Assertion:** Antibiotics are effective against viral infections.
Reason: Viruses replicate inside host cells, making them difficult to target with antibiotics.
Ans: (d) Assertion is incorrect, but Reason is correct.
7. **Assertion:** Filariasis is also known as Elephantiasis.
Reason: It is caused by the bacterium Wuchereria bancrofti.
Ans: (c) Assertion is correct, but Reason is incorrect.
8. **Assertion:** Candidiasis is a fungal infection.
Reason: Candida albicans is a fungus that can cause infections in humans.
Ans: (a) Both Assertion and Reason are correct, and Reason is the correct explanation.
9. **Assertion:** Typhoid spreads through contaminated food and water.
Reason: The causative agent of typhoid is Vibrio cholerae.
Ans: (c) Assertion is correct, but Reason is incorrect.
10. **Assertion:** The BCG vaccine is given to protect against tuberculosis.
Reason: BCG vaccine helps develop immunity against Mycobacterium tuberculosis.
Ans: (a) Both Assertion and Reason are correct, and Reason is the correct explanation.
11. **Assertion:** Common cold is caused by rhinoviruses.
Reason: Common cold spreads through contaminated food and water.
Ans: (c) Assertion is correct, but Reason is incorrect.
12. **Assertion:** Biofertilizers improve soil fertility.
Reason: Rhizobium bacteria fix nitrogen in the soil.
Ans: (a) Both Assertion and Reason are correct, and Reason is the correct explanation.

VI. Find Odd One Out

1. **Ans:** C. Tuberculosis
Reason: Malaria, Dengue, and Chikungunya are vector-borne diseases (spread by mosquitoes), while Tuberculosis is airborne.
2. **Ans:** C. Penicillin
Reason: BCG, MMR, and Polio are vaccines, while Penicillin is an antibiotic.

3. **Ans:** C. Plasmodium

Reason: Streptococcus, Salmonella, and Mycobacterium are bacteria, while Plasmodium is a protozoan.

4. **Ans:** D. Tuberculosis

Reason: Typhoid, Cholera, and Amoebiasis are water-borne diseases, while Tuberculosis is airborne.

5. **Ans:** D. Fungi

Reason: Mosquito, Housefly, and Rat are animals (vectors), while Fungi are microorganisms causing infections.

VII. Answer the following Questions

1. What is the difference between infectious and non-infectious diseases?

Ans:

- Infectious diseases are caused by pathogens (bacteria, viruses, fungi, protozoa) and can spread from person to person (e.g., malaria, tuberculosis).
- Non-infectious diseases are not caused by pathogens and do not spread. They result from lifestyle, genetics, or environmental factors (e.g., diabetes, cancer).

2. Explain how vaccines help in disease prevention.

Ans: Vaccines contain weakened or inactive pathogens that stimulate the immune system to produce antibodies.

This helps the body recognize and fight the real pathogen in future, thus preventing disease without causing illness.

3. Describe the life cycle of Plasmodium in the human body.

Ans:

- Plasmodium enters the bloodstream via a bite from an infected female Anopheles mosquito.
- It travels to the liver, multiplies, and then infects red blood cells, causing their rupture.
- This cycle results in symptoms like fever and chills.
- Some forms mature into gametocytes, which are taken up by a mosquito during a bite, continuing the cycle.

4. What are the symptoms and prevention methods for dengue fever?

Symptoms:

- High fever, severe body and joint pain, headache, rashes, and in severe cases, internal bleeding.

Prevention:

- Avoid mosquito bites (use repellents, nets, protective clothing).
- Eliminate mosquito breeding sites (stagnant water).

5. How does HIV/AIDS affect the immune system?

Ans:

- HIV attacks T-helper cells (white blood cells), weakening the immune response.
- As immunity declines, the body becomes vulnerable to infections and cancers, leading to AIDS—the final, severe stage.

6. Explain the role of microbes in sewage treatment.

- Microbes (bacteria, protozoa) decompose organic waste in sewage.
- In treatment plants, these microbes break down pollutants, helping to purify water before it is discharged or reused.
- Methods include activated sludge process and anaerobic digestion.

7. What are biofertilizers, and how do they help in agriculture?

Ans: Biofertilizers are natural fertilizers containing beneficial microorganisms.

They help in:

- Nitrogen fixation (e.g., Rhizobium in legumes)
- Phosphorus absorption (e.g., Mycorrhiza)
- Improving soil fertility, reducing dependence on chemical fertilizers, and promoting sustainable farming.

8. Name and describe three waterborne diseases.

Ans: Cholera: Caused by *Vibrio cholerae*; symptoms: watery diarrhea, dehydration.

Typhoid: Caused by *Salmonella typhi*; symptoms: high fever, abdominal pain.

Amoebiasis: Caused by *Entamoeba histolytica*; symptoms: diarrhea, stomach cramps.

9. What are the causes and effects of drug and alcohol abuse on human health?

Ans: Causes: Peer pressure, stress, lack of awareness.

Effects:

- **Physical:** Liver damage, heart disease, brain impairment.
- **Mental:** Anxiety, depression.
- **Social:** Poor academics, legal issues, family problems.

10. How do antibiotics work against bacterial infections?

Ans: Antibiotics kill or inhibit the growth of bacteria by:

- Disrupting cell wall synthesis.
- Interfering with protein production or DNA replication.

They are ineffective against viruses.