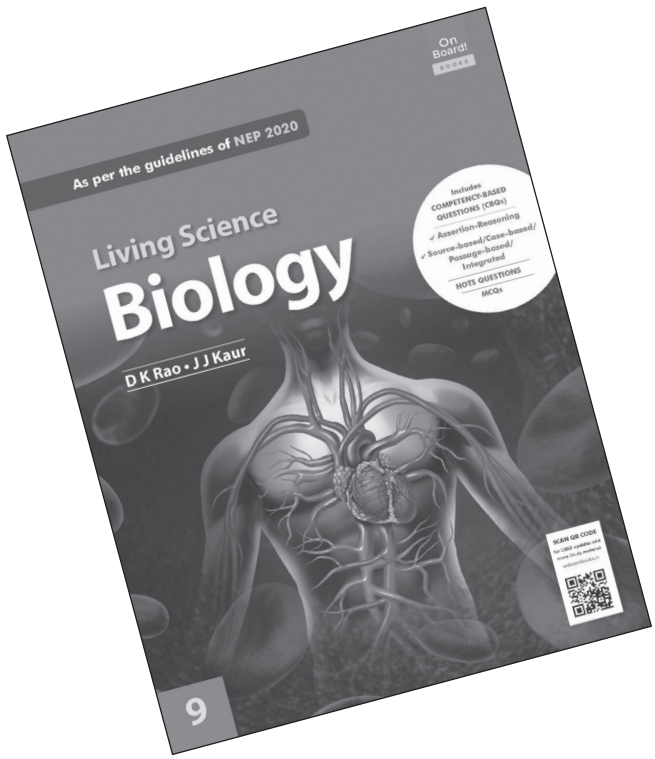
TEACHER'S HANDBOOK

CBSE Living Science
BIOLOGY
Book 9



On Board! BOOKS

An imprint of Ratna Sagar P. Ltd.

Contents

CHAPTER – 1

THE FUNDAMENTAL UNIT OF LIFE

P. 20 CHECK YOUR PROGRESS 1

A. Name the following.

1. Cell **2.** Robert Hooke

3. Fungi, plants **4.** Cell wall

5. Protoplasm

B. Name the part of the cell which:

1. Cell wall

2. Plasma membrane

3. Cytoplasm

C. The cell was discovered by Robert Hooke in 1665. He observed a thin slice of cork under his compound microscope. He observed that the cork slice had a large number of compartments resembling honeycomb-like structure. He named these compartments as cells.

D. Cell is called the structural unit of life because cell is the basic building block of all living organisms. Each cell is capable of performing basic functions of life, like respiration, nutrition, removal of waste, synthesis of proteins, etc., due to organisation of its membrane and cytoplasmic organelles. Hence, cell is the functional unit of life.

E. Plasma membrane is called a selectively permeable membrane because it allows the entry and exit of only selected substances across it and prevents the movement of other substances across it.

F. Substances like carbon dioxide and water move in and out of the cell by the process of diffusion. During cellular respiration, waste like carbon dioxide is produced and accumulated in the cell in high concentration. The concentration of CO_2 outside the cell is lower than inside. As a result, CO_2 diffuses out of the cell. Oxygen is regularly needed inside the cell for respiration and other metabolic reactions. Thus, the concentration of oxygen inside the cell decreases and oxygen diffuses into the cell.

G.

Diffusion	Osmosis
Diffusion is the movement of molecules or ions of a substance from a region of their higher concentration to a region of their lower concentration.	It is the diffusion of water molecules from a dilute solution to a concentrated solution through a semi-permeable membrane.
It does not require any semi-permeable membrane	It requires a semi-permeable membrane.
Diffusion occurs in solid, liquid or gaseous medium.	Osmosis occurs only in liquid medium.

H. Two functions of the nucleus are:

(i) The nucleus controls cell metabolism and other activities of the cell.

(ii) Chromatin part of the nucleus possess all the genetic information that is required for growth and development of the organism, its reproduction, metabolism and behaviour.

I. State whether the following statements are true (T) or false (F).

1. F **2.** T **3.** F **4.** T

P. 26 CHECK YOUR PROGRESS 2

A. Fill in the blanks.

1. plant cells

2. proteins

3. Golgi apparatus

4. animal

B. Match the following.

1. d **2.** c **3.** e **4.** a **5.** b

C. Each cell contains cell organelles which perform specific function like synthesis of new material, removal of wastes, release of energy etc. If the organization of a cell is destroyed, the function of cell organelles will be disturbed, then the ability of cell to perform all living function will be affected resulting in death of the cell.

D. A lysosome is a membrane bound sac like structure which contains powerful digestive enzymes. If it bursts, the enzymes are released in the cytoplasm and digests the content of the cell resulting in cell death. Hence, they are called suicide bags of the cell.

E. Mitochondria and plastids.

F. Rough endoplasmic reticulum

G. Mitosis and meiosis

P. 30 EXERCISES

A. Objective Type Questions

I. Choose the most appropriate answer.

1. b. **2.** c. **3.** a. **4.** b.

5. b. **6.** a. **7.** c. **8.** c.

9. a. **10.** d. **11.** d. **12.** a.

II. Fill in the blanks.

1. Robert Hooke
2. cell wall
3. Cellulose, phospholipids and proteins
4. Tonoplast
5. DNA and proteins
6. Lysosomes
7. Plant

III. Match the items in column A with those in column B.

Column A	Column B
1	f
2	h
3	b
4	c
5	a
6	g
7	d
8	e

IV. Write true or false.

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

V. Assertion–Reasoning type questions. CBQ

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

VI. Name the following.

1. Unicellular
2. Plasma membrane
3. Cytoplasm
4. Nuclear membrane
5. Chromatin network
6. Imbibition
7. Endoplasmic reticulum
8. Ribosomes
9. Mitochondria
10. Vacuoles
11. Osmosis

VII. Very short answer type questions.

1. A prokaryotic cell is one that does not have a nuclear membrane covering its nucleus. The nuclear region is termed as nucleoid. It also lacks other membrane-bound organelles. Examples: Bacteria and blue-green algae.
2. Eukaryotic cells are much more complex and evolved than the prokaryotic cells. They contain a membrane-bound nucleus having genetic material, i.e. the DNA in it. Besides the nucleus, it contains many cell-organelles like mitochondria, endoplasmic reticulum and Golgi bodies. Plant cells in addition have chloroplasts, large vacuoles and cell walls. Examples: plant cell, animal cell.
3. Plasma membrane being a selectively permeable membrane, allows the entry and exit of only selected materials in and out of the cell. This prevents the entry of unwanted materials inside the cell and the exit of essential materials from the cell.
4. Plasma membrane is the selectively permeable membrane that surrounds the cell and allows the entry and exit of selected materials into and out of the cell. If it ruptures, cell loses its integrity, the contents of the cell will come in direct contact with the surrounding medium and not only unwanted material will be able to enter freely into the cell, but useful material will also find its way out of the cell easily. This will seriously disrupt the various metabolic activities of the cell and will result in its immediate death.
5. Plants, bacteria and fungi.
6. If there were no Golgi apparatus, the material synthesised by endoplasmic reticulum would not be carried to the various parts inside and outside the cell. Also, as the Golgi apparatus performs the function of storage and modification of the material synthesised in the cell, these material could not be stored and modified further. Moreover, there will be no production of lysosomes which will cause the accumulation of waste material, viz. worn out and dead cell organelles within the cell which will ultimately lead to cell death.
7. Mitochondria
8. A cell is the fundamental structural and functional unit of life.
9. Cell organelles are small structures or compartments in a cell that perform specific functions such as producing energy, making new materials (proteins, etc), clearing up waste materials etc.
10. Plasma membrane is the outermost covering of the cell which separates the contents of the cell from its external environment. By virtue of its selective permeability it allows the passage of certain substances through it, protects the cell from injury, allows exchange of materials and information between different organelles within the cell as well as between one cell and another.
11. Mitochondria can manufacture its own proteins.

B. Short Answer Type-I Questions.

1. All cells have a genetic material (DNA), cytoplasm and plasma membrane.

2. Cell theory states that

(i) Cell is the basic structural and functional unit of all living beings.

(ii) All cells arise from pre-existing cells.

Cell theory was propounded by Matthias Schleiden and Theodore Schwann.

3. Differences between prokaryotic cell and eukaryotic cell are as under:

Prokaryotic Cell	Eukaryotic Cell
(i) Prokaryotic cells are generally small in size. (1–10 μm).	**(i)** Eukaryotic cells are comparatively larger in size (5–100 μm).
(ii) The nuclear material is undefined having no nuclear membrane and containing single molecule of DNA.	**(ii)** A true nucleus having a nuclear membrane is present.
(iii) A single chromosome is present and is called nucleoid.	**(iii)** More than one chromosomes are present.
(iv) It does not contain membrane-bound cell organelles.	**(iv)** It contains membrane-bound cell organelles like mitochondria, plastids, etc.
(v) Nucleolus is absent.	**(v)** Nucleolus is present.

4. Mitochondria are the site of energy (ATP) generation. Hence, they are called powerhouses of the cell.

5. The differences between plant cells and animal cells are as follows:

Plant Cells	Animal Cells
(i) Plant cells are larger in size.	**(i)** Animal cells are comparatively smaller in size.
(ii) They contain cell wall made of cellulose, which is present outside the plasma membrane.	**(ii)** Cell wall is absent.
(iii) They contain plastids, i.e. chloroplasts, leucoplasts and chromoplasts.	**(iii)** Plastids are absent.
(iv) Centrosomes and centrioles are absent.	**(iv)** Centrosomes and centrioles are present.
(v) Large vacuole is present.	**(v)** Vacuoles are either absent or very small in size.
(vi) Food is stored in the form of starch.	**(vi)** Food is stored in the form of glycogen.
(vii) Golgi body components are diffused and are called dictyosomes.	**(vii)** Golgi bodies are well-developed and present near nucleus.

C. Short Answer Type-II Questions.

1. The outward diffusion of water through a semi-permeable membrane when the surrounding solution is more concentrated is called exosmosis. For example, a grape shrinks when placed in salt water.

The inward diffusion of water through a semi-permeable membrane when the surrounding solution is less concentrated is called endosmosis. For example, a dried raisin swells when placed in pure water.

2. Nucleus is called the control centre of the cell as it controls all the metabolic activities going in the cell directly or indirectly and also information of various cell organelles by controlling the synthesis of proteins. If the nucleus is removed, the cell will die.

3. False. Plants carry out photosynthesis. But they also respire as they are living things. Being eukaryotic they possess mitochondria which is the site of respiration.

4. Different types of plastids include chloroplasts, leucoplasts and chromoplasts. Chloroplast contains the green pigment chlorophyll and are involved in photosynthesis. Leucoplasts are colourless plastids and they store starch, oils and proteins. Chromoplasts are meant for imparting colour to flowers and fruits.

5. Cell wall, chloroplasts and leucoplasts are found only in plant cells whereas centrosome is found only in animal cells.

D. Long Answer Type Questions

1. When two solutions separated by a semipermeable membrane are of same concentration, they are called isotonic solutions. When the concentration of solution is higher than that of the cell kept in it, the solution is called hypertonic solution. When the concentration of the solution is lesser than that of the cell kept in it, the solution is called hypotonic solution.

   A normal cell in isotonic solution retains the same size, in hypotonic solution swells up and in hypertonic solution shrinks.

2. Cell organelles found in plant cell are as follows:

   (i) **Endoplasmic Reticulum:** It is a network of membranous canals filled with fluid. They are the transport system of the cell, involved in transporting materials throughout the cell. It may be smooth or rough depending on absence or presence of ribosomes on it. It acts as a skeletal framework of a cell. It helps in synthesis and transport of proteins and fats.

   (ii) **Golgi Apparatus:** It is a membrane-bound organelle, which is mainly composed of a series of flattened, stacked pouches called cisternae. This cell organelle is primarily responsible for transporting, modifying, and packaging proteins and lipids to targeted destinations.

   (iii) **Ribosomes:** These are nonmembrane-bound and important cytoplasmic organelles found in close association with the endoplasmic reticulum. The primary function of the ribosomes includes protein synthesis in all living cells that ensure the survival of the cell.

   (iv) **Plastids:** These are large, membrane-bound organelles which contain pigments. Based on the type of pigments, plastids are of three types: chromoplasts, chloroplasts and leucoplasts. Chloroplasts, the green plastids, help in photosynthesis; chromoplasts impart colour to flowers and fruits; and leucoplasts help in storage of food.

   (v) **Mitochondria:** These are called the powerhouses of the cell as they produce energy-rich molecules for the cell. It is a double membrane-bound, sausage-shaped organelle, found in almost all eukaryotic cells.

   (vi) **Vacuole:** Vacuoles are fluid-filled organelles enclosed by a membrane. Plant cell has a large single vacuole. The vacuole stores the food or a variety of nutrients that a cell might need to survive. In addition to this, it also stores waste products.

   (vii) **Lysosomes:** These are membranous sacs budded off from Golgi bodies. They have a resistant membrane covering which protects the cell from digestive enzymes contained inside them. They help in intracellular digestion and also bring about cellular breakdown during ageing.

E. Source-based/Case-based/Passage-based/ Integrated assessment questions CBQ

1. **a.** (ii) **b.** (iii) **c.** (i) **d.** (ii) **e.** (iii)
2. **a.** (iv) **b.** (ii) **c.** (iv) **d.** (iv) **e.** (iii)

P. 34 HIGHER ORDER THINKING SKILLS (HOTS) QUESTIONS

A. 1. The potato cubes placed in water increase in size because of osmosis. Water is hypotonic to the cells of potato. Since the water concentration is higher outside the cell, water will move into the cell and make the potato cubes swell.

2. The potato cubes placed in sugar solution decrease in size because sugar solution is hypertonic to the cells of potato. Since the water concentration is higher inside the cell, water will move out of the cell and make the potato cubes shrink.

3. Osmosis. The diffusion of water molecules through a semi-permeable membrane from a region where water is more concentrated to the region where it is less concentrated is called osmosis.

B. 1. The cell is shrunken due to exosmosis (plasmolysed condition).

2. Plasma membrane

3. If placed in distilled water instead of strong sugar solution the cell would not have plasmolysed as distilled water is hypotonic.

4. In the cytoplasm

5. Cell wall

C. Dried raisins kept in pure water swell because pure water is hypotonic to the raisins. The water molecules move into the region where the water concentration is lesser (i.e. into the raisins). If these raisins are placed in saline solution, they will shrink because saline is hypertonic and water will move out of the raisins thereby causing them to shrink.

D.

Drawing Number	Name of the Organelle	Primary Function
1	Rough endoplasmic reticulum	Helps in protein synthesis

2	Nucleus	Controls metabolic activities
3	Mitochondria	Energy generation

E. 1. Animal cell

2. a. Nucleus,

b. Smooth endoplasmic reticulum,

c. Mitochondria,

d. Rough endoplasmic reticulum,

e. Golgi apparatus.

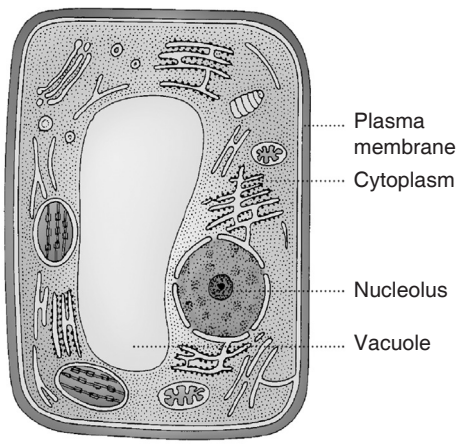
3. Part **d** – rough endoplasmic reticulum

4. Part **c** – Mitochondria is also known as powerhouse of the cell. It releases energy in the form of ATP molecules.

5. Storage and transmission of genetic information.

F. 1. Plant cell

2.



3. Cell wall and chloroplast

4. Plasma membrane

G. Cell organelles are responsible for the organization of a cell, and of these organelles, some perform specific functions. Naturally, if a few of these organelles are destroyed, some of the functions of the cell will be stopped and it may result in the death of the cell.

P. 35 VALUE-BASED QUESTIONS (OPTIONAL)

1. a. Yes, Sunil did a wrong thing. We should always have a healthy competition with our classmates and should be honest.

b. Osmosis process was being studied in the experiment.

c. In Mohit's experimental set-up, potato cubes will shrink as concentrated sugar solution was present in both the containers. In Sunil's experimental set-up, potato cubes placed in water and concentrated sugar solution will swell and shrink respectively. This is because:

(i) The potato cubes placed in water increase in size because of endosmosis. Water is hypotonic to the cells of potato. Since the water concentration is higher outside the cell, water will move into the cell and make the potato cubes swell.

(ii) The potato cubes placed in sugar solution decrease in size because sugar solution is hypertonic to the cells of potato. Since the water concentration is higher inside the cell, water will move out of the cell and make the potato cubes shrink.

2. a. The raisins swell when kept in plain water because plain water is hypotonic to the raisins. The water molecules move into the region where the water concentration is lesser (i.e. into the raisins). This phenomenon is known as endosmosis.

b. If these raisins are kept in concentrated sugar solution, they will shrink because concentrated sugar solution is hypertonic and water will move out of the raisins, thereby causing them to shrink.

CHAPTER – 2

TISSUES

P. 44 CHECK YOUR PROGRESS 1

A. Answer the following questions.

1. A tissue is a group of cells that are similar in structure and origin, which are organized together to perform a specific task.
2. In multicellular organisms there is division of labour. Cells are grouped together to form tissues which are specialised to carry out a particular function efficiently. This improves the performance of life processes in a multicellular organism.
3. Sclerenchyma.
4. Suberin
5. Vascular bundles are conducting tissues in plants which transport water, minerals and food throughout the plant body. The tissues forming vascular bundles are xylem and phloem.
6. The constituents of phloem are sieve tubes, companion cells, phloem parenchyma and phloem fibres.
7. Functions of xylem are as follows:
   - **(i)** It is mainly concerned with the conduction of water and minerals through roots to all parts of the plant.
   - **(ii)** It provides mechanical support to the plant.

   Functions of phloem are as follows:
   - **(i)** Phloem is the chief food conducting tissue of plants. It carries food prepared by leaves to other parts of plant.
   - **(ii)** They store food.

B. Name the following.

1. Apical meristems, lateral meristems and intercalary meristems.
2. Parenchyma, collenchyma and sclerenchyma.
3. Chlorenchyma, aerenchyma.
4. Phloem.
5. Phloem fibres.

P. 52 CHECK YOUR PROGRESS 2

A. Name the following.

1. Epithelial tissue.
2. Simple squamous epithelium.
3. Adipose tissue.
4. Tendon.
5. Muscular tissue.

B. Two functions of connective tissue are:

- **(i)** The main function of connective tissue are binding, supporting and packing different organs of the body together.
- **(ii)** Connective tissue transports nutrients to different organs.

C. Areolar connective tissue binds the skin with muscles and attaches blood vessels and nerves to the surrounding tissues. It fills the space inside the organs and supports internal organs. It also helps in repair of tissues. Overall, it acts as a supporting and packing tissue between organs lying in the body cavity.

D. Striated muscles – limbs, tongue

Unstriated muscles – iris of eye, ureter.

E. Cardiac muscles work rapidly, rhythmically and tirelessly, contracting and relaxing endlessly from early embryonic stage until death.

F.

1. **Squamous epithelium:** Lining of the blood vessels, oesophagus, mouth, nose skin, alveoli of lungs, skin.
2. **Ciliated epithelium:** Fallopian tubes, sperm ducts, urinary tubules of kidney, nasal passage and bronchioles.
3. **Osteocytes:** Bone tissues.
4. **Harvesian system:** Bone tissues.
5. **Smooth muscles:** Iris of eye, ureter, bronchi of lungs.
6. **Cardiac muscles:** Heart.

P. 54 EXERCISES

A. Objective Type Questions

I. Choose the most appropriate answer.

1. a.	**2.** b.	**3.** b.	**4.** c.
5. d.	**6.** b.	**7.** a.	**8.** c.
9. c.	**10.** a.	**11.** c.	**12.** b.
13. a.	**14.** b.	**15.** c.	**16.** a.

II. Fill in the blanks.

1. Meristematic tissue
2. Permanent tissue
3. Meristematic tissue, permanent tissue
4. Xylem
5. Phloem
6. Collenchyma
7. Sclerenchyma

8. Osteocytes
9. Areolar connective tissue
10. Adipose
11. Epithelial
12. Axon ending

III. Match the items in column A with the items in column B.

Column A	Column B
1.	d.
2.	a.
3.	e.
4.	b.
5.	c.

IV. Write true or false.

1. False **2.** False **3.** True **4.** False
5. True **6.** True **7.** True

V. Assertion–Reasoning type questions. CBQ

1. (c) **2.** (b) **3.** (b) **4.** (a)
5. (c) **6.** (b) **7.** (b) **8.** (a)

VI. Name the following.

1. Tissue **2.** Apical meristems
3. Xylem **4.** Phloem
5. Squamous epithelium **6.** Epithelial tissue
7. Adipose tissue **8.** Blood and lymph
9. Tendon **10.** Muscular tissue

VII. Very short answer type questions.

1. A tissue which is made up of a single type of cells is called simple tissue and a tissue which is made up of cells of more than one type of cells is called a complex tissue.

2. Meristematic cells are very active, they have dense cytoplasm, thin cellulose walls and prominent nuclei. They lack vacuole.

3. Yellow fibres and white fibres

4. Osteocytes

5. Striated muscles help in voluntary movement.

6. Because smooth muscles lack transverse striations.

7. A group of cells that are similar in structure (size, shape) and / or performing the same function.

8. Meristematic tissue is a group of cells in plant that has the capacity of active cell division.

9. Apical meristem, intercalary meristem and lateral meristem.

10. Epidermis, cortex, pith, leaf mesophyll, xylem and phloem.

11. Skeletal tissue.

12. Contraction and relaxation of heart.

13. Nervous tissue

B. Short Answer Type-I Questions

1. Sclerenchyma provides mechanical strength to the plant and its parts. They also protect the plant from environmental forces like strong winds.

2. Cells of sclerenchyma tissue are dead whereas cells of parenchyma tissue are living. The cell wall of sclerenchyma is thick at the corners due to deposition of lignin whereas the cell wall of parenchyma is thin and is made up of cellulose.

3. Chlorenchyma and aerenchyma. Chlorenchyma contains chlorophyll and helps in photosynthesis. Aerenchyma in aquatic plants gives buoyancy to plants and help them float in water.

4. Xylem consists of four type of cells – xylem vessels, tracheids, xylem fibres and xylem parenchyma. Xylem parenchyma are the only living components of xylem.

5. Xylem parenchyma are connected with the storage of the food and sideways conduction of water.

6. Phloem parenchyma helps in storage of food and also helps in transport of food.

7. Blood flows to all parts of the body and connects every part of the body. It transports gases (oxygen and carbon dioxide), digested food, hormones and other materials to different parts of the body.

8. Connective tissue binds different structures with one another. These also form a supporting framework of cartilage and bones in the body.

C. Short Answer Type-II Questions

1. The meristematic tissues are living cells having the capacity of active cell division.

They have thin cellulose wall, have dense granular cytoplasm and a large and prominent nucleus. The cells are compactly arranged without intercellular spaces or vacuoles.

2. According to their positions in the plant body, meristems are divided into three categories. These are apical meristem, lateral meristem and intercalary meristem.

Apical Meristem: Apical meristem is found at the apices of stem, root and their branches. It consists of a group of cells which give rise to primary permanent tissues that together constitute the primary body of the plant. Due to the growth of apical meristems, the stems and roots increase in length.

Lateral meristem: Lateral meristem occurs on the sides and is responsible for increase in the diameter of the plant roots and stem (girth). These tissues are also responsible for an increase in thickness by the addition of secondary tissue and this phenomenon is called secondary growth. The cambium of the vascular bundles and the cork cambium are examples of lateral meristems.

3. Differences between simple and complex plant tissues are given as follows:

Simple Tissues	Complex Tissues
These are made up of only one type of cells.	These are made up of more than one type of cells.
All cells have same origin and are similar in structure.	The cells of complex tissues have different origin as well as structure.
Their main functions are storage of food and providing mechanical support. Examples – Parenchyma, collenchyma and sclerenchyma.	Their main function is transport of water, minerals, sugars and other metabolites. Examples – Xylem and phloem.

4. Sclerenchyma tissues are of two types – fibres and sclereids. The fibres provide mechanical support to the plant as a whole. The sclereids provide mechanical support to that part in which they are present.

5. Phloem is a complex permanent tissue which conducts organic materials inside the plant. It consists of four types of cells.

   (i) **Companion Cells.** They are narrow, elongated, nucleated cells.

   (ii) **Phloem Parenchyma.** There cells store food and take part in its slow lateral conduction.

   (iii) **Phloem Fibres.** They provide mechanical strength.

   (iv) **Sieve Tubes.** They are elongated tubular conducting channels.

6. Plant permanent tissues are group of cells which have lost the ability to divide. They get differentiated after their formation to perform specialized or particular functions. Permanent tissues may be living for example, parenchyma or dead for example sclerenchyma. Three types of permanent tissues are parenchyma, collenchyma and sclerenchyma.

   Functions:

   Parenchyma stores food material in the form of proteins, starch, oil and fats.

   Collenchyma provides tensile strength to the plants.

   Sclerenchyma provides mechanical strength to the plant and its parts.

7. Protective tissue is a tissue usually present in the outermost layer of an organism such as leaves, stem and roots in case of a plant. It is either single-layered or multi-layered and covered with cutin which protects the underlying tissues present in the plant body.

   Epidermis is the outermost protective layer of plant organs. It is usually single-layered but in the leaves of some plants growing in dry habitats, it is multi-layered and thick. This is to protect the plant from water loss. The epidermis covers the entire surface of the plant. Cells of epidermis form a continuous layer without intercellular spaces to protect the plant tissues. Epidermal cells of aerial parts of the plant secrete a waxy, water resistant layer on their outer surface. It protects them against loss of water, mechanical injury and any attack by pathogenic fungi.

D. Long Answer Type Questions

1. A meristematic tissue is a group of young cells that have the capacity of active cell division. This tissue is found in all the growing parts of a plant, such as root tip, shoot tip, etc.

   Structure of meristematic tissue:

   They are living cells and are very active. They have thin cellulose walls and dense granular cytoplasm. The nucleus is large and prominent. They have compactly arranged cells without intercellular spaces. Meristematic cells are capable of dividing indefinitely. They are usually found in the apices of root and shoot.

   According to their positions in the plant body, meristems are divided into three categories. They are:

   Apical Meristem: Apical meristem is found at the apices of stem, root and their branches. It consists of a group of cells which give rise

to primary permanent tissues that together constitute the primary body of the plant. Due to the growth of apical meristems, the stems and roots increase in length.

Lateral meristem: Lateral meristem occurs on the sides and is responsible for increase in the diameter of the plant roots and stem (girth). These tissues are also responsible for growth in thickness by the addition of secondary tissue and this phenomenon is called secondary growth. The cambium of the vascular bundles and the cork cambium are examples of lateral meristems.

Intercalary meristem: This is the part of apical meristem which gets separated from the apex due to the development of permanent tissue in-between. Intercalary meristem helps in elongation of the organs and is present mostly at the base of nodes, internodes (space on either side of node) and leaves.

2. Based on the structure and organization of the component cells, the epithelial tissue can be classified as follows:

Squamous epithelium: It is formed by flattened, scale-like polygonal cells and these are closely fitted like tiles in a mosaic floor. There are two types of squamous epithelium – simple squamous epithelium and stratified squamous epithelium. Simple squamous epithelium lines the blood vessels or alveoli in lungs, where transportation of substances occurs through selectively permeable membrane. It is made up of extremely thin and simple flat cells that form a delicate lining. Stratified squamous epithelium contains cells arranged in a pattern of layers. For example, skin is arranged in pattern of many layers. It protects the underlying parts from mechanical injury, germs, drying up, etc.

Columnar epithelium: Columnar means pillar-like. It is formed of tall pillar-like cells, lying side by side. They appear as polygonal in shape in the surface view. It consists of cells which are much taller than they are wide. The nuclei lie in the basal part. The columnar epithelium is found in organs where absorption and secretion occurs just like inner lining of intestine. It facilitates the movement across the epithelial barrier. It is present in the stomach, intestines and the gall bladder. It is also present in gastric and intestinal glands. The cells having simple hair-like projections called cilia on the outer surfaces of epithelial cells are known as ciliated columnar epithelium. These cilia can move and push the mucus forward to clear it of any unwanted particles. It is found in the respiratory tract.

Cuboidal epithelium: It is made up of cup-shaped cells, which are more or less square-shaped. In the surface view, they look polygonal in shape. The nuclei are round in the shape and lie in the centre of the cells. It is present in the lining of kidney tubules and ducts of salivary glands, where it provides mechanical strength. It is also present in sweat glands, and thyroid glands.

Glandular epithelium: Glands develop from epithelial tissue. Sometimes there is inward folding of epithelial tissue forming multicellular gland. This is known as glandular epithelium. These glands secrete substances at the epithelial surface.

3. Both blood and lymph are liquid connective tissues. They help in transportation of oxygen, nutrients and hormones to various cells and tissues and also remove CO_2 and other wastes from cell.

Blood consists of plasma and blood corpuscles. Plasma is a straw-coloured fluid which contains water, inorganic salts, organic substances like blood proteins, and hormones. Red blood cells (RBCs), white blood cells (WBCs) and platelets are suspended in the plasma. Blood flows to all parts of the body and connects every part of the body. It transports gases (oxygen and carbon dioxide), digested food, hormones and waste materials to different parts of the body.

Lymph is a transparent, light yellow fluid. It is not red in colour due to the absence of RBCs. It contains white blood corpuscles called leucocytes. Lymph is present in the intercellular spaces, hence it is also called tissue fluid. It plays a major role in immunity of an organism.

4. It is the simplest and most widely distributed connective tissue in the animal body. Areolar connective tissue binds the skin with muscles, attaches blood vessels and nerves to the surrounding tissues. It fills the space inside the organs, supports internal organs. It also helps in repair of tissue.

Significance:

- Supports the internal organs
- Assists in tissue repair of muscles and skin.
- Acts as a packaging tissue between organs by filling the space inside the organs.

E. Source-based/Case-based/Passage-based/ Integrated assessment questions CBQ

1. a. (iv) **b.** (ii) **c.** (iii) **d.** (iv) **e.** (i)

2. a. (iii) **b.** (i) **c.** (i) **d.** (ii) **e.** (iii)

P.57 HIGHER ORDER THINKING SKILLS (HOTS) QUESTIONS

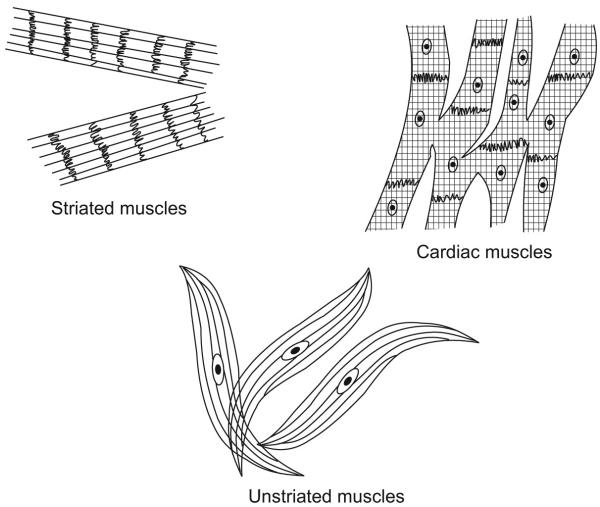
A. Study the given diagram and answer the following questions.

1. Ciliated columnar epithelium

2. **a** – cilia **b** – nucleus **c** – cytoplasm

3. In respiratory tract. The cilia can push the mucus forward to clear it of any unwanted particles.

B. With the help of a diagram, show the differences between the three types of muscle fibres. Three types of muscle fibres are:



Types of Muscle Fibres

C. Study the diagrams and answer the following questions.

1. a. Squamous epithelium because it is having extremely thin and simple flat cells forming a delicate lining and they are closely fitted like tiles.

b. Unstriated or involuntary muscle because the cells are spindle-shaped with pointed ends and no striations. Also they have only nucleus.

2. Squamous epithelium lines the blood vessels, oesophagus, lining of mouth, alveoli of lungs and skin. It protects the underlying parts form mechanical injury.

Unstriated muscles are found in the iris of the eye, in the ureter and in the bronchi of lungs. They bring about involuntary contractions.

D. Given below are certain drawing of plant tissues. Identify tissues and complete the table.

Drawing Number	Name of the Tissue	Primary Function
1	Parenchyma	Storage of food material
2	Collenchyma	Provides tensile strength
3	Sclerenchyma	Provides mechanical strength
4	Phloem tissue	Transport of food

P. 58 VALUE-BASED QUESTIONS (OPTIONAL)

1. a. No, action of Rajesh is not appropriate. We should always have a healthy competition in every field and should be honest.

b. Rajesh disturbed the experimental set-up of Ayush and replaced water with acetic acid in jar B. However, there will be no visible difference in results of Ayush. The root will not grow even in the presence of water in jar B as the root tips are removed while roots will grow in jar A.

P. 58 ENRICHMENT ACTIVITIES

A. 1. The onion bulb in jar A has longer roots. This is because the root tips (apical meristem part) of onion bulb in jar B were cut, which stopped growing further, while the root tips in onion bulbs in jar A (with intact apical meristem) were still in contact with water and continued to grow.

2. No, the roots stopped growing in jar B after their root tips were removed.

The meristematic tissue is responsible for the growth of plants. The apical meristem is present at the growing tips of roots and stem, and increases the length of roots and stem. Since in jar B the root tips containing apical meristematic tissue were cut on day 4, the root tips stopped growing.

3. We can conclude that growth of plants takes place only in certain regions. Meristematic tissues are located in these regions and are responsible for growth.

B. 1. Transverse sections (TS) of root, stem and leaves show pink colour in xylem tissues. The other part of the transverse section do not show pink colour.

2. From the second set up (xylem removed from shoot), transverse section of root shows pink colour in xylem tissue while TS of stem and leaf do not show any trace of pink colour.

3. The given set ups clearly indicate that only xylem tissue transports water from root to other parts of a plant. Removal of xylem in the shoot portion in second set up shows the absence of water in stem and leaves.

CHAPTER – 3

DIVERSITY IN LIVING ORGANISMS

P. 64 CHECK YOUR PROGRESS 1

1. We need to classify organisms as it makes the study of wide variety of living organisms convenient and easier. It also helps to understand the relationship and evolutionary history of different organisms.
2. Classification based on how closely organisms are related to each other is known as phylogenetic classification. In otherwords it is based on evolutionary relationships.
3. The primary characteristic on which the first division of organism is made is whether the organism is prokaryotic or eukaryotic.
4. The mode of food procurement helps to classify the organisms as autotrophs or heterotrophs.
5. Plants and animals are put into different groups based on their mode of nutrition. Plants are autotrophic while animals are heterotrophic. In addition plant cells have cell wall while animal cells lack cell wall.
6. Primitive organisms have simple body design which have not changed much over a period of time. On the other hand, advanced organisms have complex body design which have been acquired quite recently.
7. Classification of an organism is done on the basis of relative similarities and differences present in them. They are similar because they have arisen from common ancestors and difference in them is due to adaptation to different type of environment. The classification shows the orderly increase in the complexity of the organisms which indicate the concept of evolution. Thus, classification is linked to evolution.
8. Binomial nomenclature is a system of scientifically naming of organisms which is internationally accepted and used to identify an organism anywhere in the world. Under this system, each organism has a scientific name consisting of two parts. First part is genus and second part is species.

P. 66 CHECK YOUR PROGRESS 2

A. Name any two organisms belonging to following kingdoms.

1. Bacteria, Blue-green algae
2. *Amoeba*, *Euglena*
3. *Penicillium*, *Agaricus*
4. *Cycas*, *Chara*
5. Human, frog

B. Organisms belonging to Monera are prokaryotic and unicellular while organisms belonging to Protista are eukaryotic and unicellular.

C.

	Monera	Protista
(i)	Prokaryotic, unicellular organisms	Eukaryotic unicellular organisms
(ii)	Usually non-motile organisms (cilia and flagella usually absent)	Have cilia or flagella for locomotion

D. Protista

E. 1. Monera
2. Protista
3. Fungi
4. Plantae

P. 71 CHECK YOUR PROGRESS 3

A. General characteristics of kingdom Plantae are:

1. All organisms are multicellular, eukaryotic, autotrophic.
2. Their cell has cell wall made up of cellulose, enclosing cytoplasm with a large vacuole.
3. They perform photosynthesis due to chlorophyll present in chloroplasts.
4. They are non-motile.

B. Thallophyta

Bryophyta

Pteridophyta

C. Bryophyta are known as amphibians of the plant kingdom because they need water to complete their life cycle. These plants are terrestrial but they need water for sexual reproduction.

D. Write any four characteristics of the following.

1. **Division Bryophyta**
   (i) These are the simplest land plants with no true roots.
   (ii) The body of the plants is simple, flat and usually differentiated into stems and leaf-like structures.
   (iii) They lack vascular tissues (xylem and phloem).

(iv) They develop hair-like structure called rhizoid at their lower ends, which help in facing plant to the soil and absorbing nutrients.

2. Division Pteridophyta

(i) The body of pteridophyta is differentiated into true stem, leaves and roots like higher plants.

(ii) They possess well developed vascular tissues – Xylem and phloem for conduction of water and other substances from one part of plant body to another.

(iii) They reproduce through spores produced inside sporangia.

(iv) They grow in a wide range of habitats such as rock crevices, deserts, mountains and in moist and shady areas.

3. Sub-division Gymnospermae

(i) Gymnospermae includes vascular plants which produce naked ovules, i.e. they are not enclosed within the ovaries.

(ii) The plants are differentiated into roots, stem and leaves.

(iii) The stem is erect. It may be branched as in *Pinus* or unbranched as in *Cycas*.

(iv) After fertilization, the ovules develop into seeds so that the mature seeds are not enclosed within the fruits.

4. Sub-division Angiospermae

(i) These are flowering plants whose seeds are enclosed in a fruit.

(ii) The seeds contain cotyledons called seed leaves as in many cases they emerge and become green when the seed germinates.

(iii) After fertilization, ovary changes into fruit.

(iv) Xylem contains vessels and phloem contains companion cells.

E. Give any three differences between

1.

Bryophyta	Pteridophyta
(i) Bryophyta lack true roots, stems and leaves.	(i) Plant body is differentiated into true root, stem and leaf.
(ii) They lack vascular tissues like xylem and phloem.	(ii) Vascular tissues like xylem and phloem are present in pteridophyta.
(iii) The cells in the plant body are haploid. e.g. *Riccia*, *Funaria*	(iii) The cells in the plant body are diploid. e.g. Ferns, Horse-tails.

2.

Gymnospermae	Angiospermae
(i) Flowers are absent in gymnospermae, instead they posses cones.	(i) Flowers are present in angiospermae.
(ii) Seeds are naked, i.e. they are not enclosed inside fruit.	(ii) Seeds are enclosed inside fruit.
(iii) Xylem vessel and companion cells are absent in vascular tissues. e.g. *Cycas*, *Pinus*	(iii) Xylem vessel and companion cells are present in vascular tissues. e.g. Neem, Rice

F. Give two examples of each

1. Bryophytes – *Ricca*, *Marchantia*

2. Pteridophytes – *Ferns*, *Marsilea*

3. Gymnospermae – *Cycas*, *Pinus*

4. Angiospermae – Rice, Mango

P. 83 CHECK YOUR PROGRESS 4

A. Poriferan animals have cellular level organisation while coelenterates have tissue level organisation.

B. Various classes of vertebrata are

(i) Pisces

(ii) Amphibia

(iii) Reptilia

(vi) Aves

(v) Mammalia

C.

Aves	Mammal
(i) Aves include birds which are oviparous.	(i) Mammals include those animals which are viviparous.
(ii) They lack mammary glands.	(ii) They have mammary glands for milk production to feed their young ones.
(iii) Body is covered by feathers.	(iii) Skin of mammals has hair and sweat and oil glands.

D. Differentiate between

1.

Platyhelminthes	Nemathelminthes
(i) They have dorsoventrally flattened body so they are known as flat worms.	(i) They have cylindrical body so they are known as round worms.
(ii) The body cavity is acoelomate.	(ii) Body cavity is pseudocoelomate.
(iii) They have incomplete digestive system. Example: *Planaria*, Tapeworm.	(iii) They have complete digestive system. Example: *Ascaris*, *Wuchereria*.

2.

Annelida	Arthropoda
(i) Body has metameric segmentation.	(i) Body is divided into head, thorax and abdomen.
(ii) They have closed circulatory system.	(ii) They have open circulatory system.
(iii) The body is provided with setae or parapodia for locomotion. Example: Earthworm, Leech	(iii) They have jointed appendage. Example: Housefly, Prawn.

3.

Non-chordata	Chordata
(i) Notochord is absent.	(i) Notochord is present.
(ii) Nerve cord is solid and ventral.	(ii) Nerve cord is hollow, tubular and dorsal.
(iii) Gill slits are absent. Example: Star fish, Jelly fish	(iii) Gill slits are present. Example: Snake, Cat

4.

Pisces	Amphibia
(i) They have two chambered heart.	(i) Amphibians have three chambered heart.
(ii) Respiration through gills.	(ii) Respiration through skin and lungs.
(iii) Body is covered with scales. Example: Rohu, Dog fish.	(iii) They have smooth skin covered by mucus, which keeps the skin moist and slippery. Example: Frog, Salamander

5.

Aves	Mammalia
(i) They are oviparous.	(i) They are viviparous.
(ii) Mammary glands are absent.	(ii) Mammary glands are present.
(iii) Body covered with feathers.	(iii) Body covered with hair.
(iv) Forelimbs modified into wings. Example: Crow, Penguin.	(iv) Wings are absent. Example: Bat, Whale, Human.

E. Give three examples each of

1. **Class Reptilia**
   Snakes, Turtles, Chameleon
2. **Class Aves**
   Crow, Penguin, House sparrow
3. **Class Mammalia**
   Whale, Elephant, Human.

F. Write four characteristics each of

1. **Class Pisces**
   (i) They are cold blooded animals which have cartilaginous or bony skeleton.
   (ii) They have gills for respiration.
   (iii) Heart is two chambered.
   (iv) Fertilisation is external.
2. **Class Amphibia**
   (i) They are cold blooded animals which live partly in water and partly on land.
   (ii) Respiration takes place through lungs or skin.
   (iii) Heart is three chambered.
   (iv) Most amphibians lay eggs in water, which after fertilisation develop into tadpole. The

tadpoles after metamorphosis change into adults which can live on land as well as on water.

3. Class Aves

(i) They are warm blooded animals.

(ii) Their forelimbs are modified to form wings for flight.

(iii) Heart is four chambered.

(iv) They have lungs for respiration.

(v) They are oviparous.

4. Class Mammalia

(i) They are warm blooded animals.

(ii) They possess mammary gland which secrete milk to feed their young ones.

(iii) They are viviparous.

(iv) Heart is four chambered.

P. 85 EXERCISES

A. Objective Type Questions

I. Choose the most appropriate answer.

1. b	**2.** a	**3.** b	**4.** c	**5.** b
6. b	**7.** d	**8.** b	**9.** b	**10.** c
11. a	**12.** a	**13.** d	**14.** c	**15.** a

II. Fill in the blanks.

1. Echinodermata

2. Species

3. Genus, species

4. Monera

5. Bryophytes

6. Pteridophytes

7. Gymnosperms

8. Arthropoda

III. Match the items in column A with those in column B.

1. c	**2.** a	**3.** b	**4.** d	**5.** e
6. j	**7.** k	**8.** g	**9.** f	**10.** h
11. i				

IV. Write true or false.

1. F	**2.** F	**3.** T	**4.** T	**5.** F

V. Assertion–Reasoning type questions. CBQ

1. (b)	**2.** (b)	**3.** (d)	**4.** (b)
5. (b)	**6.** (c)	**7.** (b)	**8.** (c)

VI. Name the following.

1. Engler and Prantl

2. Genus

3. Monera

4. Fungi

5. Cryptogamae and Phanerogamae

6. Thallophyta, Bryophyta, Pteridophyta

7. Porifera

8. Coelenterata

9. Arthropoda

10. Aves

11. Phylum Chordata, Class Mammalia

VII. Very short answer type questions

1. Carl Linnaeus

2. According to Whittaker's classification there are five kingdoms of life. They are Monera, Protista, Fungi, Plantae and Animalia.

3. Yeast, mushroom

4. Conifer, *Hibiscus*

5. Phanerogamae

6. *Pinus, Gingko*

7. Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata, Chordata.

8. *Pila*, Octopus

B. Short Answer Type-I Questions

1. Binomial nomenclature means a two-name system of naming. Under binomial system of nomenclature, each organism has scientific name consisting of two parts. First part is genus and second part is the species. For example, the scientific name of mango is *Mangifera indica*.

2. Bryophytes are simplest land plants with no true roots. The body of the plant is simple, flat and is sometimes differentiated into stems and leaf-like structures.

They do not have specialized tissues for conduction of water and other substances. Thus they are non-vascular cryptogamic plants.

Plant develops a number of hair-like structures at its lower end. These are known as rhizoids. Rhizoids help in fixing the plant in the soil and absorbing nutrients. They have chlorophyll and thus, they can manufacture their own food through photosynthesis.

Bryophytes show alternation of generations, i.e. they possess two types of generations– gametophyte and sporophyte.

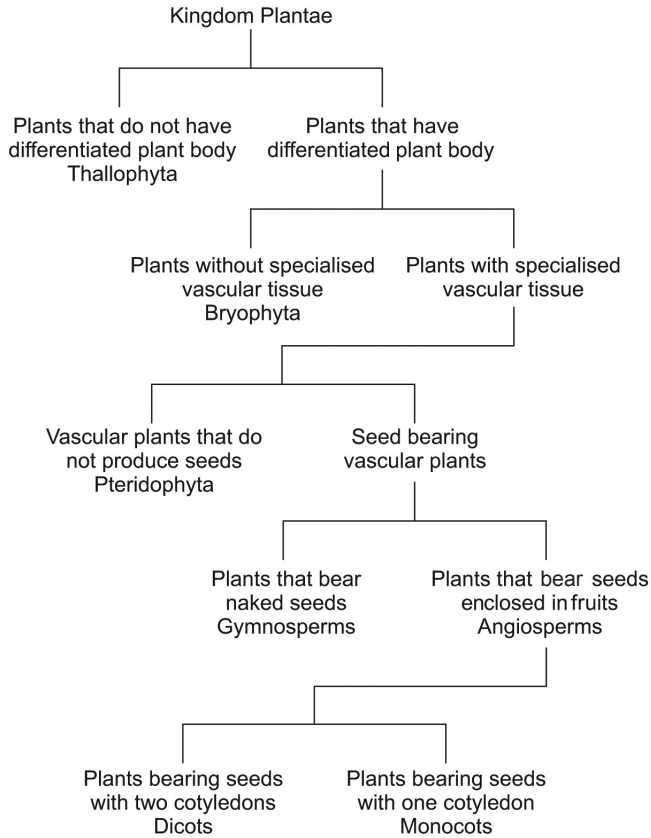
3. Characteristic feartures of Pteridophyta are as follows:
   (i) The body of pteridophytes is differentiated into true stem, leaves and roots like higher plants.
   (ii) They possess well-developed vascular tissues – xylem and phloem for conduction of water and other substances from one part of plant body to another.
4. Two characteristic features of phylum Platyhelminthes:
   (i) Body is bilaterally symmetrical, elongated and dorsoventrally flattened.
   (ii) They possess a mouth but no anus.
5. **a.** Characteristic features of class Aves are as follows:
   (i) They have feathers and scales covering their bodies. The two forelimbs are modified for flight.
   (ii) They are warm blooded animals (i.e. their body temperature does not change with outside temperature).

   b. Characteristic features of class Amphibia:
   (i) They live partly in water and partly on land. Larval stage has a tail and live in water. Adults may live in water as well as on land.
   (ii) They have smooth skin, rich glands and slippery cover with mucus.

C. Short Answer Type-II Questions

1. The cell organization is the basis on which the organisms have been classified into kingdom Monera and Protista. Prokaryotes belong to kingdom Monera and single-celled eukaryotes belong to kingdom Protista.
2. Characteristic features of sub-division Angiospermae are as follows:
   (i) These are flowering plants whose seeds are enclosed within a fruit.
   (ii) After fertilization, ovary develops into a fruit.
   (iii) Xylem contains vessels, phloem contains companion cells.
3. On the basis of number of cotyledons, angiosperms are divided into two classes – monocytoledonous or monocot (seeds with a single cotyledon) and Dicotyledonous or dicots (seeds with two cotyledons). Wheat and rice are examples of monocots. Peas and beans are examples of dicots.

4.



5.

Poriferan Animals	Coelenterate Animals
These organisms have minute pores called ostia all over the body and a large opening called osculum at the top for the exit of water.	These organisms have a single pore.
Body is made up of a single layer of cells.	Body is made of two layers of cells, one making the outer lining and the other the inner lining of the body.
Canal system is present for circulating water through the body.	No water canal system is present in the body.
External skeleton present. The body design involves very little differentiation and division into tissues.	Skeleton absent. More body design differentiation is shown by these animals.

These are non-motile animals and are attached to some solid support.	These are motile animals. Some species of this group live in colonies while others have a solitary life-span.
Tentacles are absent.	Tentacles are present.

6. The two examples of Arthropoda are centepedes and scorpion and three characteristic features of Arthropoda are:

(i) The body is bilaterally symmetrical and segmented.

(ii) Body cavity is reduced and filled with blood, thus called haemocoel. There is an open blood circulatory system and the blood does not flow in well defined blood vessels.

(iii) Body is segmented and can be differentiated into two regions – cephalothorax (head and thorax together) and abdomen, or three regions – head, thorax and abdomen.

D. Long Answer Type Questions

1.

Class	Respiratory organ	Heart
Pisces	Gills	Two-chambered heart
Amphibians	Gills or lungs	Three-chambered heart
Reptiles	Lungs	Four-chambered heart
Aves	Lungs	Four-chambered heart
Mammals	Lungs	Four-chambered heart

2. Kingdom animalia has nine phyla as mentioned below:

Porifera

(i) these are non motile organisms.

(ii) body has pores.

Examples: sponges and *Sycon*.

Coelenterata

(i) body has no head and no segmentation.

(ii) mouth is surrounded by tentacles.

Examples: *Hydra* and *Obelia.*

Platyhelminthes

(i) body is bilaterally symmetrical.

(ii) they possess a mouth but no anus.

Examples: *Planaria* and tapeworm.

Nematoda

(i) body is bilaterally symmetrical.

(ii) sexes are separate.

Examples: *Ascaris* and *Enterobius.*

Annelida

(i) body is triploblastic.

(ii) they have a well developed brain, ventral nerve cord, dorsal and ventral blood vessels.

Examples: *Nereis* and *Pheretima*

Arthropoda

(i) body is bilaterally symmetrical.

(ii) they have jointed legs

Examples: housefly and butterfly.

Mollusca

(i) body is triploblastic.

(ii) they have muscular foot.

Examples: *Chiton* and *Pila.*

Echinodermata

(i) body is triploblastic.

(ii) body is unsegmented.

Examples: *Holothuria* and starfish.

Chordata

(i) presence of notochord and internal skeleton.

(ii) nerve cord is hollow, tubular and dorsal.

Examples: Frog and human beings

3. The main features of chordates are given as follows:

(i) They possess a solid notochord at some stages of their life.

(ii) The body has bilateral symmetry.

(iii) Vertebrata have a true vertebral column.

(iv) They have a dorsal hollow nerve cord.

(v) They are triploblastic.

(vi) The terrestrial animals respire through lungs and aquatic animals through gills.

(vii) They are true coelomate animals.

Five classes of vertebrates with examples are as follows:

(i) Pisces. Examples: angler fish, lion fish

(ii) Amphibians. Examples: frogs, salamanders

(iii) Reptiles. Examples: crocodiles, lizards

(iv) Aves. Examples: crow, sparrow

(v) Mammalia. Examples: human beings, elephants.

4. Kingdom Animalia possesses muscle and nerve cells.

Main features of kingdom Animalia are as given below:

(i) All animals are multicellular, eukaryotic heterotrophs.

(ii) The cell does not contain cell wall, but contains only cell membrane.

(iii) They are heterotrophic, i.e. they do not perform photosynthesis and depend on others for food.

(iv) Digestive, respiratory, circulatory and excretory systems are present in most of the animals.

(v) Most animals are capable of locomotion and relatively rapid movement compared to plants and other organisms.

(vi) Most of the animals reproduce sexually by means of differentiated haploid cells (gametes).

E. Source-based/Case-based/Passage-based/ Integrated assessment questions CBQ

1. a. (ii) **b.** (iii) **c.** (iv) **d.** (iii) **e.** (ii)

2. a. (iii) **b.** (iv) **c.** (iv) **d.** (i) **e.** (iii)

P. 88 HIGHER ORDER THINKING SKILLS (HOTS) QUESTIONS

A. Moss like *Funaria* are bryophytes which are amphibians of plant kingdom. They cannot complete their life cycle without water. Though these organisms live in moist soil, they cannot complete their sexual reproduction without water. The male and female gametes are released in water during sexual reproduction and the male gamete swims to the female gamete to fertilize the egg.

B. All vertebrates are chordates but all chordates are not vertebrates. This is because vertebrata is a sub-phylum of chordata. In vertebrates the notochord is replaced by vertebral column. Chordata includes another sub-phylum, protochordata in which the notochord is very rudimentary. Hence all chordates are not vertebrates.

C. Whales are warm-blooded animals having four chambered heart. They give birth to young ones like other mammals and they possess mammary gland to feed their young ones. They breathe through lungs. Unlike fishes which are cold-blooded animals having two chambered heart. Fish lay egg and breathe through gills.

D. Given below is a graphic representation showing classification of group chordata. Complete the graphic representation by filling the parts numbered 1 to 6.

1. Protochordata

2. Vertebrata

3. Pisces

4. Amphibia

5. Reptilia

6. Aves

P. 88 VALUE-BASED QUESTIONS (OPTIONAL)

1. No, Ankur's classification is not correct. Tortoise, crocodile, snakes and wall lizard are reptiles whereas toad is amphibian. Reptiles have horny scales covering their body and are mostly terrestrial. Amphibians live partly in water and partly on land and have smooth skin which is covered by mucus, which keeps the skin moist and slippery. Ankur arranged all of them in class Reptilia. So, it is incorrect.

2. Yes. Biodiversity boosts ecosystem productivity where each species have an important role to play. For example, A larger number of plant species means a greater variety of crops. Greater species diversity ensures natural sustainability for all life forms. Uncontrolled cutting of forests and flora can directly lead to biodiversity loss when animal species that live in the trees no longer have their habitat, cannot relocate, and therefore become extinct. Deforestation can lead certain tree species to permanently disappear, which affects biodiversity of plant species in an environment.

CHAPTER – 4

WHY DO WE FALL ILL

P. 92 CHECK YOUR PROGRESS 1

1. Health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity.

2. Two conditions essential for maintaining good health are:

(i) Good social environment.

(ii) Proper nutrition and balanced diet.

3. Two conditions essential for being free of diseases are:

(i) Person should maintain personal and community hygiene.

(ii) Person should take balance diet.

4. Our immediate environment plays a crucial role in deciding our health. Dirty and unhygienic surrounding due to improper garbage disposal, stagnation of water in drains, breeding of mosquitoes, flies, etc. will lead to poor health.

P. 96 CHECK YOUR PROGRESS 2

A.

	Symptoms	Signs
(i)	A symptom is a change in normal functioning of the body which is felt by the patient.	A sign of a disease is a change in bodily function or structure which can be observed by a physician.
(ii)	Symptoms are subjective. They are not physically visible and cannot be verified.	Signs are objective, they are visible and can be verified.
(iii)	Examples: Headache, Fever, Nausea, Sore throat.	Examples: Rashes, Yellowing of skin, Sticky red eyes.

B. The diseases which last for very short period of time are called acute diseases. Once treated, these diseases generally do not have any long term effect on our health. For example, Common cold, typhoid. Chronic diseases, on the other hand, last for a long time, even as much as a lifetime. These diseases result into a prolonged poor health and have drastic long term effect on people's health. For example, Tuberculosis, Diabetes.

C. Chronic disease is more dangerous to health since it lasts for a long period of time. Chronic diseases result into a prolonged poor health, so they have drastic long term effect on people's health.

D. Various levels of causes of diseases are:

(i) **Level one –** *Immediate or primary cause*: Infection by microorganisms which causes disease is the immediate cause of a diseases.

(ii) **Level two –** *Contributory or secondary causes*: Unclean environment, deficiency of nutrients in diet are the contributory causes of a disease. Contributory causes cannot cause a disease without immediate cause.

(iii) **Level three –** *Lack of public services:* These services resulting in unclean environment is the tertiary cause of a disease.

E. Infectious and non-infectious diseases

F.

	Infectious diseases	Non-infectious diseases
(i)	These diseases are caused by some pathogens like bacteria, viruses, protozoa, worms or fungi.	These diseases can be caused due to some specific factors such as malfunctioning of vital organs or deficiency of nutrients.
(ii)	These are spread from one person to another through contact, water, air, food, etc.	These diseases do not spread from one person to another by contact, water, air, food, etc.

G. Those diseases which spread from an unhealthy or infected person to a healthy person are known as infectious diseases. These are caused by a variety of microorganisms like virus, bacteria, fungi and protozoan. Examples: Common cold, Typhoid, Malaria, Tuberculosis.

H. Jaundice.

P. 104 CHECK YOUR PROGRESS 3

1. Virus, bacteria, fungi, worms and protozoans.

2. Bacteria — Tuberculosis, Cholera
Virus — Hepatitis, AIDS
Fungi — Ringworm, Athlete's foot.

3. Proper knowledge of the category of microorganism causing a disease is necessary for prevention and treatment of a disease because members of each one of these groups of viruses, bacteria, fungi, protozoa, etc., have many biological characteristics in common. Each member of a group is closely related to each other as compared to members of the

other groups. Many important life processes are similar in members of a group and are not shared with members of other groups. As a result, drugs that block one of these life processes in one member of the group is likely to be effective against many other members of the group. But the same drug will not work against microbe belonging to a different group.

4. Various means of spread of infectious diseases are:

(i) Through air

(ii) Through water/food

(iii) Through sexual contact

(iv) By vectors

5. Precautions to be taken to prevent spread of infectious diseases in school can be:

(i) Provide clean and safe drinking water.

(ii) Encouraging students to take vaccination against infectious diseases.

(iii) Proper sanitation and cleanliness in and around school premises so that mosquitoes do not breed.

(iv) Encouraging students to stay home when infected with an infectious disease.

(v) Encouraging students to adopt healthy eating practices to develop strong immunity against diseases.

6. An intermediary organism that carries and transmits an infectious pathogen from the reservoir of infection to a healthy person is known as vector, For example, Mosquito, Housefly.

Vectors like houseflies carry the causative organisms of cholera, typhoid, dysentery and tuberculosis on their legs and mouthparts from the faeces and sputum to food and drinks and contaminate them. When this contaminated food is taken by a healthy person, he/she gets infected. Vectors like mosquitoes feed on warm blooded animals including human and in turn transmit disease from one person to another.

7. There are two methods of treatment of an infectious disease:

(i) By reducing the effects of the disease – For this, the treatment is provided to reduce the symptoms because of inflammation. Thus, medicines can be given to patient to bring down fever, reduce pain or loose motion. However, it only provides temporary relief.

(ii) By killing the cause of the disease – Microbes can be killed by taking medicines which affect the biochemical processes of a particular group of microbes like bacteria, virus, fungi, protozoa, etc.

8.

Immunization	Vaccination
Immunization is the process by which the body acquires immunity against a disease.	Vaccination is the process of administrating vaccine into the body for developing resistance against a particular disease.

P.105 EXERCISES

A. Objective Type Questions

I. Choose the most appropriate answer.

1. b **2.** c **3.** c **4.** d **5.** b

6. c **7.** c **8.** a **9.** c **10.** c

II. Fill in the blanks.

1. Viruses, bacteria

2. Fungi

3. Droplet

4. BCG

5. AIDS

6. HIV

7. Anti-viral vaccines, anti-bacterial

8. Edward Jenner

9. Immunization

10. Chronic diseases

III. Match the disease in column A with the group of pathogens in column B.

1. b **2.** c **3.** a **4.** e **5.** d

IV. Assertion-Reasoning type questions. CBQ

1. c **2.** b **3.** b **4.** d **5.** d

6. c **7.** b **8.** a

V. Very short answer type questions

1. Congenital diseases are those diseases which are present since birth. Such diseases are caused due to a genetic abnormality or malfunctioning of any organ or organ system. These diseases may be inherited.

2. Malaria, dengue are examples of acquired diseases.

3. *Leishmania donovani*

4. Infectious diseases communicate from an unhealthy or diseased person to a healthy person. They are caused by some biological

agents or microorganisms (pathogens) such as viruses, bacteria, fungi, protozoa or helminthes (worms). Examples, Common cold, cholera.

5. Houseflies and mosquito
6. Malaria and amoebiasis
7. Malaria is caused by a protozoan. Its pathogen is *Plasmodium*.
8. BCG
9. HIV – Human Immunodeficiency Virus, Acquired Immuno Deficiency Syndrome.
10. Polio
11. The diseases which last for long time, even as much as a lifetime, are called chronic diseases. Examples: Cancer, elephantiasis.
12. Level one cause of a disease is the immediate cause of a disease which directly affects the sufferer. In case of communicable disease, infection by microorganisms like bacteria, virus, fungi and protozoa is the immediate cause of the disease.
13. Kwashiorkor and marasmus
14. Communicable diseases are diseases which spread from an unhealthy or diseased person to a healthy person. They are caused by some biological agents or microorganisms (pathogens) such as viruses, bacteria, fungi, protozoa or helminthes (worms).
15. Arthritis
16. Allergy is caused due to the hypersensitivity of the body to foreign substances like pollen grains, dust, silk, nylon, egg, fish, certain drugs, etc. Asthma and bronchitis are some examples of allergies.
17. Polio, hepatitis
18. Droplets are airborne. The infected person throws out tiny droplets of mucus by coughing, sneezing, spitting or even talking. These droplets may contain pathogens (viruses, bacteria). By inhaling the air containing the droplets, a healthy person may get the infection. Diseases like common cold, pneumonia, etc., are spread by droplet infection.
19. Immunisation is the process of developing immunity against a particular pathogen.

B. Short Answer Type-I Questions

1. For good health, proper and sufficient food is necessary. This food can be obtained only if one has sufficient money. Good economic conditions in the society will make the population of a nation healthy. If the economy is poor, due to insufficient food, deficiency diseases will prevail. Also weak immune system will make one susceptible to several infectious diseases.
2. No, good health and being free from diseases are not the same. One can be in poor health, without suffering from any identifiable disease.
3.

Infectious Diseases	Non-infectious Diseases
These are caused by some biological agents or pathogens like bacteria, protozoans, helminths or fungi.	These diseases can be due to some specific factors, such as malfunctioning of some vital organs, deficiency of nutrients or due to disorders.
These can spread from one person to another.	These diseases do not spread form one person to another.
These diseases are the concern of society as these are related to community health.	These diseases are the concern of the individual only.

4. The pathogens of certain diseases react and infect a healthy person directly without any intermediate agents. This is called direct transmission. It can take place by direct contact or droplet infection. The pathogens of certain diseases reach the human body through some intermediate agents. This is called indirect transmission. It can take place by various means such as vectors, air, water objects or dirty hands and fingers.
5. Two causes, responsible for the spread of AIDS, are sexual contact with an infected person and transfusion of blood infected with the HIV.

C. Short Answer Type-II Questions

1. Health is a state of complete physical, mental and social well being and not merely an absence of disease or infirmity. Good health keeps a person away from diseases. As it is said, a sound mind in a sound body, the mind of a healthy person will also be peaceful and will improve his capacity to do work.
2. Three steps that could be taken to maintain environmental hygiene are as follows:
   (i) Educating people to consume safe, uncontaminated water.

(ii) Avoiding dumping of organic waste on the roads and maximizing the use of dustbins.

(iii) Creating awareness about various preventive measures by using posters and pamphlets.

3. There are three limitations to deal with infectious diseases.

(i) If someone falls sick, his body functions are damaged which may not recover completely.

(ii) Treatment will take time, which will keep a person bedridden for some time even if he gets proper treatment.

(iii) The person suffering from disease can serve as a source of infection and spread disease to others.

Therefore, prevention of a disease is better than cure.

4. HIV is Human Immunodeficiency Virus, (the causative agent) whereas AIDS is Acquired Immuno Deficiency Syndrome (the disease) caused by HIV. HIV can be treated by using anti-viral drugs.

5. Differentiate between the following.

a. Acute diseases last only for a short period of time whereas chronic diseases last for long period of time, sometimes even throughout life.

b. Congenital diseases are the diseases which are present in a person since birth whereas acquired diseases are the diseases that one acquires during his lifetime.

c. Immediate cause of a disease is an infectious agent whereas contributory cause include factors like genetic disorders, lack of nourishment, unhygienic conditions, etc.

d. Communicable diseases are the diseases which are caused by infectious agents and can spread from an infected person to a healthy person.

Non-communicable diseases are those which do not spread from an infected person to a healthy person. They may be hereditary, due to deficiency of some food material; due to malfunctioning of body organs or due to bad eating habits which may cause obesity and heart diseases.

e. Infectious diseases spread from one person to another through contact, water, air, etc. whereas non-infectious diseases do not spread from an infected person to a healthy person.

f. General way of preventing diseases involve maintenance of hygiene in general but is not with respect to any particular disease whereas specific way of prevention involves immunity, which is body's ability to fight off foreign substances by producing antibodies or cells that can kill or neutralize these foreign substances.

D. Long Answer Type Questions

1. Any physical or functional change from the normal state that causes discomfort or disability or impairs the health of a person may be called a disease.

Infectious diseases spread by the following modes:

(i) Through air: When an infected person coughs or sneezes, the microbes spread into the air and enter the body of healthy man. A few diseases that spread through air include common cold, T.B. (tuberculosis) pneumonia, etc.

(ii) Through water: The microbes from the excreta of a person suffering from a gut (alimentary canal) disease enter the body of a healthy person when he drinks polluted and contaminated water.

(iii) Through sexual contact: Microbial diseases like AIDS and syphilis are transmitted by sexual contact with an infected person.

(iv) By vectors: Some organisms work as vectors of diseases (causing agent) and spread diseases, for example, female *Anopheles* mosquito (which spreads malaria).

2. If a pathogen (infectious microbe) enters the body, the immune system will recognize it and responds against it and then remembers each foreign substance and pathogen that enters the body. For each type of pathogen, the immune system produces cells that are specific for that particular pathogen. Next time if the same pathogen enters the body, the immune system responds with even greater vigour, eliminating the infection even more quickly than the first time. This cycle goes on each time the pathogen enters the body.

3. Infectious diseases spread by the following modes:

(i) Through air: When an infected person coughs or sneezes, the microbes spread into the air and enter the body of healthy man. A few diseases that spread through air include common cold, T.B. (tuberculosis) pneumona etc.

(ii) Through water: The microbes from the excreta of a person suffering from a gut (alimentary canal) disease enter the body of a healthy person when he drinks polluted and contaminated water.

(iii) Through sexual contact: Microbial diseases like AIDS and syphilis are transmitted by sexual contact with an infected person.

(iv) By vectors: Some organisms work as vectors of disease causing agent and spread diseases, for example, female Anopheles mosquito (which spread malaria).

4. The viruses that cause dengue are transmitted by mosquitoes. These mosquitoes breed mainly in water collections. Hence, it can be rightly said that stagnant water can cause dengue.

5. General ways of preventing infections are:

(i) Preventing exposure to infectious microbes:

a. For airborne microbes, we can provide living conditions which are not overcrowded.

b. For waterborne microbes, we can prevent exposure by providing clean and safe drinking water. Water can be treated to kill microbial contamination by boiling or other means.

c. For vector borne infections, we can provide clean environment so that these disease carrying vectors do not flourish there. Thus, public hygiene is a basic key to the prevention of infectious diseases.

(ii) Providing proper and sufficient food:

a. There is system known as immune system in our body that keeps on fighting the disease causing microbes.

b. Each time a microbe enters our body, our immune cells go into action and manage to kill of infection before it assumes a major disease.

c. Functioning of immune system is dependent upon the type of nourishment we receive. It will not be good if we do not get proper nourishment and food.

Thus, providing proper and sufficient food is very necessary for prevention of a disease.

E. Source-based/Case-based/Passage-based/ Integrated assessment questions CBQ

1. **a.** (ii) **b.** (iii) **c.** (iii) **d.** (iv) **e.** (ii)

2. **a.** (ii) **b.** (iii) **c.** (ii) **d.** (i) **e.** (iv)

P. 108 HIGHER ORDER THINKING SKILLS (HOTS) QUESTIONS

A. The person is suffering from AIDS because AIDS is the infectious disease that leads to immuno deficiency and wasting of body parts. It is caused by Human Immunodeficiency Virus (HIV). HIV attacks white blood corpuscles (WBCs) of blood and reduces the immunity power of person, which makes the body more prone to various infections. It can be controlled by using sterilised needles, blades, etc., by ensuring that the blood to be transfused is free from AIDS virus and by avoiding sexual contact with the infected person.

B. There must be stagnant water favouring the breeding of mosquitoes which in turn are spreading the disease. Malaria can be controlled by maintaining mosquito free environment by not letting and any water get stagnated using nets and mosquito repellents. The canals have to be cleaned regularly.

C. BCG vaccine will protect the child against tuberculosis and DPT will protect the child against diseases like diphtheria, tetanus and whooping cough.

D. Typhoid, cholera and dysentery. These water borne diseases can be prevented from spreading by consuming boiled/filtered and safe water.

E. Fill in the blanks numbered 1–6 in the following table and then answer the questions that follow.

1. protozoa

2. dengue

3. bacteria

4. caused by *Mycobacterium tuberculosis*

5. Virus

6. Weakens the immune system of the patient

7. Dengue fever

8. Tuberculosis

9. AIDS, dengue, tuberculosis and sleeping sickness (all are acquired diseases).

10. AIDS

P. 109 VALUE-BASED QUESTIONS (OPTIONAL)

1. **a.** There must be stagnant water in the locality which is a breeding ground for mosquitos. Open sanitation, drainage system also contribute mosquito breeding.

b. Ways to prevent mosquito breeding in our surrounding and home are:

(i) Discard unwanted containers or junks that can collect rainwater.

(ii) Remove stagnant water from flower pot plate or plant saucers.

(iii) Keep rain gutters clean and free-flowing.

(iv) Change water regularly in air coolers.

(v) Make sure the fish pond and pool water moving.

c. Protection from mosquito-borne diseases includes:

- Using of insect repellents any time you are outdoors.
- Wearing long-sleeved clothing.
- Scheduling outdoor activities to avoid the hours from dusk to dawn during peak mosquito season.
- Removing of standing water from the areas around home.
- Repairing of damaged window and door screens.

2. a. It can be said by studying their behaviour that Amita is happy but Roshan is not. Happiness comes from the proper healthy condition i.e, total well being of physical, mental and social conditions of a person. Amita's positive attitude towards social life reflects her happiness and healthy mind and body whereas Roshan's negative attitude reflects his unwell condition.

b. (i) Being physically active, sound sleep

(ii) Ability to form and maintain good relationships with others, ability to learn

3. Three diseases during rainy season:

(i) Dengue

(ii) Malaria

(iii) Typhoid

Necessary steps to prevent these diseases during rainy season:

- Measures to keep home and surroundings mosquito free.
- Using of boiled water if there is any contamination.
- Maintenance of hygienic condition for food preparation.
- Removing of standing water from the areas around home.

4. a. Sneha is suffering from common cold or flue as predicted from signs.

b. Two preventive measures of common cold or flue:

- Washing of hands regularly with soap and warm water
- Taking nutritional food; fruits rich in Vitamin C should be taken to boost immunity

c. Yes, Ankita did right thing. The reason is, common cold and flue are very contagious as it spreads through sneezing and coughing.

5. Malaria cannot spread through direct contact or through air or water. Malarial parasites need a vector i.e mosquito for spreading the disease. Therefore, Rohan do not get malaria by visiting his friend in hospital if the area is free from mosquito. He has to be careful about any mosquito bite by taking preventive measures.

Protection from mosquito borne diseases include:

- Using of insect repellents.
- Wearing long-sleeved clothing.
- Scheduling outdoor activities to avoid the hours from dusk to dawn during peak mosquito season.
- Removing of standing water from the areas around home.

6. Doctors should take care of the following things to avoid sickness:

- Wearing gloves during patient visit.
- Washing hands before and after the patient have received medication.
- Daily cleaning of the workplace using phenyl etc. and sterilising equipment.
- Wearing clean clothes.

7. Loss of water from the body tissues can be caused by various diseases like, cholera, diarrhoea, dysentery, typhoid etc.

To prevent the loss of water from the body tissues plenty of fluids and oral rehydration solution (ORS) should be taken.

8. A balanced diet is the one which contains a variety of foods in such quantities and proportions that the need for energy, amino acids, vitamins, minerals, water and roughage is adequately met for maintaining health, vitality and general well being.

Without balanced nutrition, body is more prone to disease, infection, fatigue, and low performance. Children who don't get enough healthy food

may face growth and developmental problems, poor academic performance, and frequent infections.

9. Antibiotics are the chemical substances that are produced by bacteria and that can kill or inhibit the growth of other microorganisms.

Antibiotics are non-effective against viral diseases, for example, polio, hepatitis.

10. Municipal solid waste have a potential to cause air, water and land pollution besides affecting aesthetics and creating health hazard which again has a potential to cause disease. The chemicals and non-biodegradable material in the waste affect the physical environment and the waterways by contaminating groundwater and soil.

The area has become a breeding ground for mosquitoes and flies. Therefore, several food and water-borne diseases, and mosquito borne diseases like malaria, dengue can prevail in that area.

To control this situation, locals must visit the municipal office and submit an application detailing the situation of that area.

CHAPTER – 5

NATURAL RESOURCES

P. 119 CHECK YOUR PROGRESS 1

1. Pollution may be defined as an undesirable change in the physical, chemical and biological characteristics of our surroundings that harms human life and other living beings.

The substances that cause pollution are called pollutants.

2. Various sources of air pollution are:

(i) Burning of fossil fuels in household, factories, power stations and automobiles.

(ii) Forest fire.

(iii) Volcanic eruptions.

(iv) Decomposition of plant and animal residue.

(v) Burning of crop residue.

(vi) Burning of wood, cowdung cakes, etc.

3. Automobiles and industries release large amount of toxic gases by the burning of fossil fuels. These gases include carbon dioxide, which is a green house gas; carbon monoxide a highly poisonous gas and oxides of nitrogen and sulphur which cause acid rain. In addition, particulate matter released from industries and automobiles cause smog and other problems.

4. Carbon monoxide is more toxic to human beings because it has higher affinity for haemoglobin as compared to oxygen. When the polluted air containing large amount of carbon monoxide is inhaled, the carbon monoxide combines with haemoglobin to form a highly poisonous compound which reduces the availability of oxygen to the body tissues leading to suffocation and finally death.

5. Carbon monoxide is capable of forming a complex with haemoglobin (carboxy-haemoglobin) which is more stable than oxygen-haemoglobin complex.

6. Smog is a mixture of smoke, dust particles and small drops of fog formed due to condensation of water.

7. When rain water contains excessive acids like nitric acid and sulphuric acid due to burning of fossil fuel, it is known as acid rain.

Gases like oxides of nitrogen and sulphur produced by burning of fossil fuel cause acid rain. These acids dissolve in rainwater and fall as acid rain.

8. (i) Using environment friendly fuels, such as CNG in automobiles instead of petrol/diesel.

(ii) Planting more trees surrounding industrial establishments and along roadside.

(iii) Avoiding burning of leaves, trash and other material.

(iv) By avoiding usages of crackers.

9. Air move from high-pressure areas to low-pressure areas. The bigger the difference between the pressures, the faster the air will move from the high to the low pressure. That rush of air is the wind we experience.

P. 122 CHECK YOUR PROGRESS 2

1. Organisms need water because:

(i) It is prime constituent of all living cells. All cellular processes take place in aqueous medium in our body.

(ii) Water is needed for transportation of various substances such as nutrients form one part of our body to another.

2. Underground water and river water are the major sources of fresh water in my city.

3. Water pollution may be defined as a change in physical, chemical and biological properties of water by addition of undesirable substances or the removal of desirable substances from water bodies or a change in temperature of water, which may have harmful effects on human and aquatic life.

4. Our industries produce lot of waste containing high concentration of oil, heavy metals and detergents. This waste is dumped into rivers or lakes. These substances when added to water adversely affect the aquatic life. The toxic substances in water may enter the food chain and cause serious health hazards to human beings and other aquatic animals. In addition, there are many industries which use water for cooling in various operations and later return this hot water to water bodies, which raises its temperature. A sudden change in temperature may be dangerous for aquatic organisms or affect their breeding. The eggs and larva of various organisms are particularly susceptible to temperature changes, which cannot survive drastic change in temperature.

5. Measures to control pollution in rivers are:

(i) Avoiding contamination of rivers, lakes and ponds by washing clothes, bathing, etc.

(ii) Using of phosphate – free soaps and detergents.

(iii) Generating public awareness about maintenance of river in rural and urban areas.

6. The domestic effluent should be treated properly so that they become environmentally safe. Adequate care should be taken to ensure that effective sewage treatment process is in place and that contaminated water does not get mixed with the environment. Septic tanks should be used in houses so that direct dumping of faecal matter and other wastes does not take place.

P. 125 CHECK YOUR PROGRESS 3

1. Soil is formed by the process of breaking down of huge pieces of rocks and its minerals into fine particles due to continuous action of physical, chemical and biological agents. This process is also called weathering.

   (i) **Sun:** During day time, rocks get heated due to sun's energy. As a result, they expand. During night, these rocks cool down and contract. Since all parts of rocks do not expand or contract at the same rate, this causes the formation of cracks in these rocks. Ultimately huge rocks break down into smaller pieces.

   (ii) **Water:** Water plays an important role in the soil formation in two ways:

   a. It gets into the cracks of the rock which are formed due to uneven heating by the sun. When this water freezes, it causes the crack to widen helping in weathering of rock.

   b. Running water wears away hard rocks over long period of time. Water moving in fast speed carries big and small particles of rock downstream. These rocks rub against each other, resulting in breaking down of rocks. These smaller particles are carried away by running water and deposited down its path.

   (iii) **Wind:** Strong winds erode rocks down. They also carry sand from one place to another like water does.

   (iv) **Living organisms:** Organisms like lichens and mosses grow on the surface of rocks. While growing, they release certain substances that erode the rock surface to powder and form a thin layer of soil. When other small plants like moss, grow on this surface, they further break it down. The roots of big trees go into the cracks in the rocks and as the rocks grow bigger, the cracks become wider leading to weathering.

2. The removal and transportation of the top layer of soil from its original position to another place by flowing water or wind is called soil erosion.

3. Strong wind, heavy rain, large scale deforestation, improper farming, dust storms, frequent flood and indiscriminate human activities are the various causes of soil erosion.

4. Soil erosion can be effectively prevented by growing more and more trees on a barren land, terrace farming, sowing grasses, planting xerophytes, contour binding and making proper drainage canals around the fields.

5. Vegetation cover checks soil erosion. Roots of plants bind soil particles and prevent them from getting washed away with water or blown away by wind.

P. 131 CHECK YOUR PROGRESS 4

1. The circulation of biogenic nutrient elements like carbon, hydrogen, oxygen, nitrogen, phosphorus, calcium, water and energy between biotic and abiotic component of the ecosystem is known as biogeochemical cycles.

   Examples: Nitrogen cycle, carbon cycle, etc.

2. Water is found in different states during the process of water cycle. In the solid state, it is found in the form of snow or ice. As a liquid, it exists as water which falls as rain. It is present as water vapour and clouds in the gaseous state.

3. Nucleic acid and protein.

4. Nitrogen fixing bacteria can be free-living like *Azotobacter* and *Clostridium* or symbiotic like *Rhizobium* which lives in the root nodules of leguminous crops. Certain blue-green algae like *Anabaena* and *Nostoc* and non-leguminous plants like *Ginkgo* can also fix atmospheric nitrogen into nitrates.

5. The warming up of the earth's atmosphere due to the trapping of sun's heat rays by carbon dioxide, methane, water vapour and other gases present in the atmosphere is called greenhouse effect.

   Global warming is a phenomenon occurring due to greenhouse effect. Human beings are adding large amount of carbon dioxide, methane and other green house gases to the atmosphere by burning of fossil fuels, deforestation, etc. These greenhouse gases trap the heat reflected by earth. This heats up the atmosphere leading to an increase in earth's temperature. This phenomenon is called global warming occurring due to green house effect.

P. 133 EXERCISES

A. Objective Type Questions

I. Choose the most appropriate answer.

1. b **2.** a **3.** b **4.** c

5. d **6.** c **7.** a

II. Write true or false.

1. F **2.** T **3.** F **4.** T **5.** F

6. T **7.** F **8.** T **9.** T **10.** T

III. Assertion-Reasoning type questions. CBQ

1. d **2.** a **3.** b **4.** a **5.** c

6. a **7.** a **8.** c

IV. Name the following.

1. Lithosphere

2. Biosphere

3. Carbon monoxide

4. Sulphur dioxide

5. Smog

6. *Rhizobium*

7. Carbon dioxide

8. Chlorofluorocarbons (CFC)

V. Very short answer type questions

1. The life-supporting zone of earth is called biosphere. The atmosphere, hydrosphere and lithosphere are the zones which interact and make life possible in biosphere.

2. Atmosphere covers the earth like a blanket. Oxygen, one of the major components of our atmosphere is very much essential for the survival of all living organisms on earth. Ozone layer in atmosphere absorbs harmful ultraviolet radiation coming from Sun. Atmosphere also helps to keep the average temperature of earth fairly steady.

3. The process in which fine particles of top soil are carried away by flowing water or wind is called soil erosion.

4. The circulation of matter or nutrient elements like carbon, hydrogen, oxygen, nitrogen, phosphorus, calcium, water, and energy between biotic (living) world and abiotic (physical/non-living) world is known as the biogeochemical cycles.

5. Rainfall at a place is decided by the direction of the air and wind blowing. As the air moving from sea to land brings lot of moisture with it and brings rain also.

6. Smog is a mixture of smoke, dust particles and small drops of fog.

7. Carbon monoxide

8. CO_2

9. Removal of useful components from the soil and addition of other substances which adversely affect the fertility of the soil and kill the diversity of organisms that live in it, is called soil pollution. The removal and transportation of the top layer of soil from its original position to another place by flowing water or wind is called soil erosion.

10. The circulation of matter or nutrient elements like carbon, hydrogen, oxygen, nitrogen, phosphorus, calcium, water, and energy between biotic (living) world and abiotic (physical / non living) world is known as the biogeochemical cycle.

11. CO_2

12. Chlorofluorocarbons.

B. Short Answer Type-I Questions

1. Photosynthesis and formation of $CaCO_3$ are the two processes which cause the removal of carbon dioxide from the atmosphere.

2. Combustion of fuels in automobiles leads to emission of carbon dioxide and carbon monoxide.

Industries manufacturing chemicals emit sulphur dioxide and carbon monoxide.

3. Burning of fossil fuels releases sulphur dioxide which gets mixed with rain and forms sulphuric acid and falls as acid rain. Marble is composed of calcium carbonate. The sulphuric acid reacts with the marble and removes its lustre. That is why old marble palace is getting damaged and loosing its lustre.

4. Carbon monoxide, unburnt petrol and nitrogen oxides.

5. Carbon dioxide and carbon monoxide

6. Living organisms directly or indirectly depend on the soil. All living beings depend on soil for food. Plants obtain nutrients from the soil and prepare food by the process of photosynthesis for themself as well as other organisms.

Aquatic green plants get dissolved minerals from water. These minerals are obtained from soil. There is a continuous supply of nutrients from soil to water bodies.

7. An increase in the percentage of certain gases in the atmosphere would increase the average temperature worldwide, this is

called the greenhouse effect. An increase in the percentage of carbon dioxide gas in the atmosphere is responsible for greenhouse effect.

8. In the upper atmosphere, ozone layer absorbs the dangerous ultraviolet (UV) rays of the sun thus preventing the harmful radiations from sun reaching the earth by absorbing it. Chlorofluorocarbon is causing damage to the ozone.

9. In the upper atmosphere, ozone is like a life cover that protects us by screening the dangerous ultraviolet (UV) rays of the sun. It prevents the harmful radiations from sun reaching the earth by absorbing it. Without the ozone layer shield, the organisms on the earth would be subjected to life threatening radiation from sun. It is difficult to imagine the consequences for life on earth if ozone layer depletion continues further.

10. There are many man-made compounds such as chlorofluorocarbons (CFCs) found persisting in the atmosphere. These are carbon compounds having both fluorine and chlorine, which are very stable and cannot be degraded by any biological processes. Since, CFCs are very stable molecules, they persist for decades, even centuries, once released. When they diffuse into the atmosphere, they react with the UV radiations from sun and release chlorine atoms that destroy ozone. This results in the reduction of the ozone layer.

    We should use air-conditioners and refrigerators that do not release CFCs into atmosphere.

C. Short Answer Type-II Questions

1. Carbon dioxide is one of the natural gases present in the atmosphere and is used by plants for photosynthesis. It is chiefly produced during the combustion of fuels in households, factories, power stations, etc. The level of carbon dioxide has increased over the period. Carbon dioxide is injurious to health and it may lead to rise in atmospheric temperature due to greenhouse effect.

2. Various effects of air pollution on human health are as follows:

    (i) Carbon monoxide combines with the haemoglobin molecules in human blood and causes suffocation.

    (ii) Depletion of ozone layer due to CFCs causes skin cancer as a result of over exposure of the human skin to ultraviolet rays.

    (iii) Sulphur dioxide originated smog blocks the human respiratory system leading to the death of the sufferer.

    (iv) Sulphur dioxide pollutant also causes diseases of the eyes, throat, nose and lung infections. It also causes acid rain.

    (v) Nitric oxide (NO) in high concentration causes respiratory problems, internal bleeding, oxygen deficiency, pneumonia and lung cancer.

    (vi) Air pollutants like suspended particulate matter (SPM) cause asthma, lung cancer and asbestosis. Air pollution reduces soil moisture and thus, agricultural crops are damaged resulting in heavy economic losses to farmers.

3. Substances which cause pollution are called pollutants.

    a. **Carbon monoxide:** automobiles, factories and burning of fossil fuels

    b. **Carbon dioxide:** automobiles, factories and burning of fossil fuels

    c. **Sulphur dioxide:** industries, automobiles

    d. **Chlorofluorocarbons:** refrigerators

4. Acid rain is caused by emissions of sulphur oxides and nitrogen oxides which react with water in atmosphere to produce acid rains. Acid rain causes lot of damage to buildings. It also has adverse effects on fruit and vegetable.

5. The factory will produce a lot of toxic pollutants which will be discharged in the river water and pollute it. The people living downstream will be adversely affected because the toxic pollutants in the water will enter the body of the individuals when they use this polluted water for drinking and other purposes. Also the pollutants in the water enter the food chain and our body when we consume the fish living in the water.

6. Ozone (O_3) is made up of three atoms of oxygen. It is produced in the atmosphere by the action of ultraviolet radiations on oxygen molecule. O_3 thus forms a layer in the upper atmosphere. It is very essential for the life on this planet. It shields the surface of the earth from ultra-violet radiation (UV) coming from sun as these radiations are very harmful to us.

    Chemicals like chlorofluorocarbons (CFCs) are used in refrigerators, air conditioners (as coolants), fire extinguishers and in aerosol sprayers. The chlorofluorocarbons (CFCs)

thus released by these sources enter into air and destroy ozone in the ozone layer. Due to the depletion of ozone layers, UV rays reach the earth's surface and cause following harmful effects:

(i) They cause skin cancer.

(ii) UV rays cause eye disease called cataract.

(iii) They damage immune system, thus lowering body's resistance to diseases.

7. Carbon dioxide is used by the plants for carrying out the process, photosynthesis, and hence the oxygen is produced only if there is carbon dioxide in the atmosphere. It also prevents the escape of heat form the surface of earth and keeps the earth warm. But excess of carbon dioxide will lead to global warming.

Hence the carbon dioxide content must be balanced.

Ozone is found in the stratosphere. Before reaching the earth, the sunrays pass through the stratosphere. The ozone layer present there absorbs the UV rays present in the radiation and prevents them from reaching the earth. These UV rays are very harmful to us and thus ozone layer is very important for the life to sustain on planet earth.

D. Long Answer Type Questions

1. a. Effects of air pollution on human health:

(i) Carbon monoxide combines with the haemoglobin molecules in human blood and causes suffocation.

(ii) Depletion of ozone layer due to CFC causes skin cancer as a result of over exposure to ultraviolet rays.

b. Effects of air pollution on plants:

(i) The growth of plants will be stunted.

(ii) Flowering will be reduced.

c. Effects of pollution on weather and climate.

(i) Emission of sulphur oxides and nitrogen oxide cause acid rain.

(ii) As a greenhouse gas, excessive emission of carbon dioxide in atmosphere is leading to global warming.

2. a. Carbon dioxide in the air comes from respiration, burning of fossil fuels, factories, volcanic eruptions.

b. Carbon dioxide is a greenhouse gas. An increase in the content of greenhouse gases causes more heat to be retained by the atmosphere leading to increase in the temperature worldwide called global warming.

c. This type of pollution can be minimised by reducing the usage of fossil fuels. Using alternate sources of energy like solar energy, wind energy, etc. Also pollution should be checked in vehicles and more trees should be planted.

3. Greenhouse gases prevent the escape of heat form earth's atmosphere and this is called greenhouse effect. An increase in the content of greenhouse gases causes more heat to be retained by the atmosphere leading to increase in the temperature worldwide called global warming.

Carbon dioxide and methane are two examples of greenhouse gases.

4. Ozone layer absorbs ultraviolet radiation. Upon disappearance of ozone layer UV rays would reach the earth's surface causing the following harmful effects:

(i) They cause skin cancer.

(ii) UV rays cause eye disease called cataract.

(iii) They damage immune system, thus lowering body's resistance to diseases.

5. The windows of the car allows the solar radiation to pass through them. However, the reflected rays are not allowed to escape by the glass walls. This entrapment of heat energy makes the air inside the car warmer than outside. This phenomenon is known as greenhouse effect.

E. Source-based/Case-based/Passage-based/ Integrated assessment questions CBQ

1. a. (ii) **b.** (iv) **c.** (ii) **d.** (iii) **e.** (ii)

2. a. (iii) **b.** (iii) **c.** (ii) **d.** (ii) **e.** (i)

P. 136 HIGHER ORDER THINKING SKILLS (HOTS) QUESTIONS

A. Yes. The contamination will persist when reaches to colony B because it is situated downward. But the concentration of the pollutants will get reduced because the pollutants will get diffused into water.

B. Due to industrialization, the consumption of fossil fuels has increased. Due to that, production of pollution causing gases like CO, SO_2, SO_3, NO_2 and CO_2 has also increased.

Five common air pollutants, sources and their effects on environment are as follows:

	Air pollutants	Sources	Effects on environment
(i)	CO_2	Combustion of fossil fuels	Causes greenhouse effect
(ii)	SO_2	Burning of fossil fuels	Causes acid rain
(iii)	CFCs	Aerosol propellants	Ozone layer depletion
(iii)	SPM	Smoke, dusts	Causes smog
(iii)	CO	Vehicular exhaust	Forms CO_2 in air, responsible for global warming

The following measures should be taken to check air pollution.

(i) Planting more and more trees, as they purify air by the consumption of CO_2 gas. This will reduce the greenhouse effect.

(ii) Reducing the consumption of fossil fuels.

(iii) Laying emphasis on the use of non-conventional sources of energy like wind energy, solar energy, tidal energy, etc.

C. 1. Carbon dioxide is responsible for global warming. It is called a greenhouse gas, because it is the gas in atmosphere that absorbs and emits radiation within the thermal infrared range and prevents the escape of heat from earth. This leads to global warming.

2. Automobile exhaust releases harmful gases like carbon monoxide, nitrogen oxide into the air. These gases contribute to air pollution and adversely affect the environment. This can be controlled by planting more trees and minimizing the use of fossil fuels.

D. 1. Air pollution is the occurrence of foreign particles, gases and other materials in air which have adverse effects on biological communities and physical surroundings.

2. Sulphur dioxide (SO_2) combines with water and forms acid rain that damages crops and monuments.

Carbon monoxide (CO) combines with haemoglobin forming carboxyhaemoglobin that reduces the oxygen carrying capacity of blood leading to suffocation.

Hydrogen sulphide (H_2S) causes skin and eye irritation.

P. 137 VALUE-BASED QUESTIONS (OPTIONAL)

1. Air pollutants such as, sulphur oxides and nitrogen oxides from the industrial emissions cause acid rain in that area that can cause damage to the marble palace.

Sulphur and nitrogen oxides are produced in the process of burning coal and other fossil fuels. An effective way to reduce acid rain is to produce energy without using fossil fuels. Industries can use alternate energy sources like, renewable energy sources, such as solar and wind power.

2. Yes, our immediate surroundings determine our health.

The following steps can be taken to maintain environment hygiene:

(i) We should ban the use of plastic.

(ii) Reduce usage of chemicals and pesticides.

(iii) Recycle the waste products

3. Global warming is the long-term heating of Earth's climate system due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere.

CFCs also act to trap heat in the lower atmosphere, causing the earth to warm and climate and weather to change. CFCs contribute 14% of greenhouse gases.

Usages of refrigerators and air-conditioner that do not release CFCs into atmosphere could limit this harmful effects.

4. Sulfur dioxide affects the respiratory system, particularly lung function, and can irritate the eyes. Sulfur dioxide also cause acid rain that damage environment.

One measure to control SO_2 pollution is to use coal that contains less sulfur. The power plant can also install equipment called scrubbers, which remove the sulfur dioxide from gases.

5. Most of the farming activities are responsible for water pollution due to excessive use of pesticides and chemical fertilizers, which ultimately leaches in groundwater and drains into surface water bodies.

This can be prevented by using organic farming techniques and avoiding use of pesticides and other herbicides.

6. Management of natural resources requires a long-term perspective because natural resources

are limited and with the increase in population, the demand for the natural resources is also increasing exponentially. Therefore, in order to meet the future needs and demands, the natural resources have to be used judiciously.

7. Burning of fossil fuels cause release of CO_2 which is a greenhouse gas and can cause global warming. Fossil fuels also contain small amounts of nitrogen and sulphur. When these fuels are burnt, different oxides of nitrogen and sulphur are produced. The oxides of nitrogen and sulphur combine with water to form nitric acid and sulphuric acid, respectively. These acids dissolve in rainwater and fall as acid rain. Acid rain causes lot of damage to monuments and buildings as well as vegetation.

8. Burning of fossil fuels produces CO_2, water and oxides of nitrogen and sulphur. When combustion takes place in insufficient oxygen, carbon monoxide is formed.

   Fossil fuels are produced by the degradation of biomass. These resources are available in limited amount. Once exhausted, it will take millions of years to be replenished. So, we need to conserve these non-renewable sources of energy.

   Solar energy, wind energy etc. are alternative renewable sources of energy.

9. Despite nature's monsoon bounty, failure to sustain water availability underground has resulted largely from the loss of vegetation cover, diversion for high water-demanding crops etc. There is also a lack of proper planning and infrastructure to conserve water.

   The effect of continuous depletion of ground water along coastal regions will lead to movement of saline sea water into fresh water wells then spoiling their quality.

   Groundwater can be artificially recharged by redirecting water across the land surface through canals, infiltration basins, or ponds. In flood irrigation also, excess water percolates to the groundwater table.

10. **a.** Values shown by Rakesh are awareness, eco-friendliness and health consciousness.

    b. Vehicle exhaust produces smoke, particulate matter and harmful gases like carbon dioxide, carbon monoxide, sulphur dioxide and oxides of nitrogen which adversely affect our health. It may cause respiratory disease like asthma, bronchitis, lung cancer, etc.

    c. Catalytic converters are used in automobiles to reduce the emission of poisonous gases. They convert unburnt hydrocarbons to carbon dioxide and water; carbon monoxide and nitrogen dioxide are converted to carbon dioxide and nitrogen gas respectively.

11. **a.** Values shown by Pratap are awareness, community service and social responsibility.

    b. Kerosene lamps emit fine particulates, carbon monoxide, nitric oxides, and sulphur dioxide when burned. These by-products may cause carbon monoxide poisoning, reduce lung function and increase risks of asthma and cancer.

12. **a.** CO_2, NO_2, SO_2 and fly ash are produced from the combustion of coal. Therefore a coal based thermal power plant may be located in the area.

    b. These pollutants affect the health of the people living in the area adversely. It may cause respiratory disease like asthma, bronchitis, lung cancer, etc. Non metal oxides like CO_2, NO_2, SO_2 causes acid rain which may also affect the crops growing in the area.

    c. They should wear mask to protect themselves from harmful effect of these gases and particulate matter.

CHAPTER – 6

IMPROVEMENT IN FOOD RESOURCES

P. 140 CHECK YOUR PROGRESS 1

1. Agriculture is the cultivation of food crops in the field for food requirements.

Humans depend on plants and animals for food as:

(i) Food is the ultimate source of energy for all living beings. Since, plants can prepare their own food, they are the ultimate source of food on earth.

(ii) Food supplies many nutrients like proteins carbohydrates, fats, vitamins, minerals as well as water.

(iii) It is required for growth, development and repair of worn out tissues of our body.

2. It is necessary to regularly improve the food production from agriculture and animal husbandry to meet the requirement of the increasing population of the country. As the population is increasing drastically, the demand for food is also increasing but the land for agriculture is limited and almost all available land is already extensively cultivated. Thus, it is necessary to efficiently utilize the existing farming land and increase the efficiency of production of both crops and livestock.

3. Rabi crops are winter season crops grown from November to April. Examples: Wheat, gram, peas, mustard, etc. In contrast, kharif crops are monsoon crop which are grown from June to October. Examples: paddy, soyabean, cotton, etc.

P. 142 CHECK YOUR PROGRESS 2

1. Plant breeding can be defined as the science of improving genetic make-up of plants in relation to their economic use.

2. Hybridization is the process of crossing two genetically dissimilar plants to obtain a progeny with the desired traits. This crossing could be intervarietal, interspecific or intergeneric.

3. Characteristics of good plant variety are as follows:

(i) The new varieties of crops should produce high yields under different climatic conditions found in different geographical areas.

(ii) The seeds should be of good quality and all seeds should be of the same variety and germinate under same conditions.

(iii) Varieties should be capable of growing in diverse climatic conditions since weather conditions are unpredictable.

(iv) The new variety should be tolerant to high soil salinity.

4. Desirable agronomic characteristics for crop improvement are:

(i) Increased crop yield

(ii) Improved nutritional content

(iii) Short height or dwarfness

(iv) Increased resistance against pests

(v) Change in maturity duration

(vi) Profuse branching

P. 144 CHECK YOUR PROGRESS 3

1. Plants get nutrients from air, water and soil. Carbon is obtained from air. Hydrogen and oxygen are obtained from water. Soil provides other essential elements like nitrogen, phosphorus, potassium, magnesium, sulphur, etc.

2. Nutrients are essential for the better growth and development of the plants. They are used in building up of plant body and various protoplasm constituents. They are also used as an activator of certain enzymes.

3. Plants need certain chemical elements that are indispensable for their better growth, development and metabolic activities. These are known as essential elements. Rest of the elements found in plant body are known as non-essential elements.

4. Micronutrients are those nutrients which are required by plants in small quantities for their proper growth and development. Examples: iron, manganese, boron, molybdenum.

Macronutrients are those nutrients which are utilized by plants in relatively large quantities. For example, nitrogen, phosphorus, potassium.

5. **Micronutrients:** Zinc, molybdenum, chlorine, manganese.

Macronutrients: Magnesium, calcium, carbon.

6. Macronutrients are those nutrients which are required by plants in larger quantities for its proper growth and development. Since they are required in large quantities, they are known as macronutrients. Examples: nitrogen, phosphorus, potassium, calcium, magnesium and sulphur.

P. 147 CHECK YOUR PROGRESS 4

1. Repeated cultivation of same crops on the same agricultural land depletes the mineral nutrition and other useful contents of the soil. This results in reduced soil fertility due to which there is decreased crop production.

This problem can be overcome by adding manure and fertilizers to the soil.

2. Manuring is done to replenish soil nutrients and to restore the soil texture for better retention of water and aeration.

3. Advantages of manures are as follows:

(i) Manure maintains the humus content of the soil.

(ii) Manure restores the soil texture for better retention of water and aeration.

Disadvantages of manures are as follows:

(i) Manures are relatively bulky. Therefore, it is difficult to store and transport them.

(ii) Manures are not nutrient specific. So, they cannot be used to treat any specific nutrient deficiency.

4. Green manure is prepared from young, fast growing green leguminous crop plants, like sunn hemp and guar, about two months old by ploughing them back into the soil.

Prior to sowing of main crop, the green manure crops are grown in the field for about 6-8 weeks.
↓
At tender stage, these plants are ploughed into field
↓
Left buried for 1 to 2 months
↓
Decomposed
↓
Ploughed again and mixed in the field

5. Various types of fertilizers are:

(i) Single nutrient or straight fertilizer.

For example – Urea, superphosphate.

These fertilizers provide a single nutrient (N, P or K).

(ii) Multinutrient fertilizers or complex fertilizers, which provide two or more nutrients like N and P. For example – NPK fertilizer, monoammonium phosphoric (NK) fertilizer.

6. Advantages of using chemical fertilizers:

(i) They are nutrient specific that provide nitrogen, phosphorus and potassium as per requirement.

(ii) They are required in small quantity and hence can be easily stored and transported.

Disadvantages of using chemical fertilizers:

(i) Continuous use of chemical fertilizers can make the soil acidic resulting in killing the soil microorganisms and hence destroying soil fertility.

(ii) These chemicals get washed away due to excessive irrigation polluting rivers lake and other water bodies.

7.

	Manures	Fertilizers
(i)	It is not nutrient specific and removes general deficiency.	It is nutrient specific and can provide specific nutrients to the soil.
(ii)	It is not easily soluble in water and does not readily absorbed by plants.	It is easily soluble in water and is readily absorbed by plants.
(iii)	It provides humus to the soil.	It does not provide humus to the soil.

P. 149 CHECK YOUR PROGRESS 5

1. The process of supplying water to the crops by means of canals, reservoirs, ponds, lakes, wells, tubewells and tank is known as irrigation.

We need to irrigate crops because:

(i) Irrigation provides moisture to the soil for the germination of seeds.

(ii) Irrigation loosens the soil and supports the growth and elongation of the roots.

(iii) Nutrients from the soil dissolve in water which is easily absorbed by the roots of the plants.

2. Depending upon the kind of water resources available, several irrigation systems are adopted in India to supply water to the agricultural land. These include the wells, canal system, river lift system, tanks and river valley system.

3. These include wells, canals, rivers and tanks.

(i) **Wells:** There are two types of wells, namely dug wells and tubewells. In a dug well, water is collected from water bearing strata. Tubewells can tap water from the deeper strata.

(ii) **Canals:** Canals receive water from one or more reservoirs or from rivers. The main canal is divided into branch canals having further distributaries to irrigate fields.

(iii) **Tanks:** These are small storage reservoirs, which intercept and store the run-off of smaller catchment areas.

(iv) **River sift systems:** Water is directly drawn from the rivers for supplementing irrigation in areas close to rivers.

(vi) **River valley system:** It utilises the run-off and discharge flows of the river during the rainy season.

P. 152 CHECK YOUR PROGRESS 6

1. Growing two or more crops simultaneously on the same piece of land is known as mixed cropping.

2. Intercropping can be defined as growing two or more crops simultaneously in the same field in a definite row pattern.

3. Advantages of mixed cropping:

(i) **No risk of crop failure:** Growing two crops of different nature simultaneously reduces the risk of total failure due to uncertain monsoon.

(ii) **Increase in yield:** Cereals and legumes are often mixed. Legumes have nitrogen fixing bacteria, *Rhizobium* in their root nodules. These bacteria fix atmospheric nitrogen as nitrates in the soil. It benefits the cereals increasing its yield.

(iii) **Improves soil fertility:** When a cereal crop is grown along with a leguminous crop, it helps in maintaining soil fertility.

(iv) **Less input of labour:** Mixed farming involves greater flexibility of the distribution of labour and recovers the investment in much less time.

4. Soybean + Pigeon pea

Sorghum + Pigeon pea

Groundnut + Sunflower

Maize + Urad bean

5. In crop rotation, the leguminous crops like pulses, peas, beans and groundnut are sown in between the seasons of cereal crops like wheat, maize and pearl millet. If a cereal crop is grown in a field then most of the nitrogen present in the soil is absorbed and the soil becomes deficient in nitrogen, reducing the soil fertility. If the next crop grown is a leguminous crop, it will fix atmospheric nitrogen to form nitrogenous compounds in the soil. As a result, the deficiency of nitrogen containing compounds in the soil is removed, restoring the fertility of the soil.

6. *Rhizobium* bacteria. These bacteria fix atmospheric nitrogen as nitrates in the soil, thus increasing the fertility of the soil.

7. Crop rotation

8. Leguminous crops

9. In the root nodules of leguminous crops, *Rhizobium* bacteria is present which fixes atmospheric nitrogen into nitrates. Hence, growing a leguminous crop during the rotation adds nitrogen to the soil at no cost.

P. 154 CHECK YOUR PROGRESS 7

A. Weeds are the unwanted wild plants, which grow with crop plants in the cultivated field.

For example: *Amaranthus*

B. (i) Weeds grow in the crop field and compete for soil nutrients, water, space and sunlight with the main crop plants thus lowering the crop yield.

(ii) Weeds may sometimes act as an alternate host for microorganisms and different insects, which feed on weeds and attack the crop plants, finally destroying them.

C. Weeds can be controlled by many methods such as mechanical, cultural, biological and chemical.

(i) **Mechanical methods:** Weeds are removed manually by uprooting them using hands, harrow, ploughing, etc.

(ii) **Cultural method:** This involves preparation of proper seed bed, timely sowing of seeds, inter cropping and crop rotation.

(iii) **Biological methods:** It involves the use of insects, which feed selectively on a particular weed. Certain microorganisms that cause diseases in the weed plants and eliminate them are also used in this method.

(iv) **Chemical methods:** Certain chemicals called weedicides which kill weeds are used to control weeds. For example, 2, 4-D.

D. Weedicides are chemicals that kill weeds or unwanted weed plants in the crop field.

E. Define the following:

1. Pesticide: Any organism, which damages or destroys a crop plant is called a pest. Chemicals used to control pests are called pesticides.

2. Weedicide: Chemicals used to control unwanted wild plants or weeds in the crop field.

3. Rodenticide: Chemicals used to kill rodents.

4. Fungicide: Chemicals used to kill fungi.

5. Insecticide: Chemicals used to kill insects.

F. (i) Using resistant varieties of crops.

(ii) Sowing crop at their optimum time of sowing.

G. Characteristics of a good pesticide:

(i) It should selectively kill the harmful pests only. It should not kill the friendly insects.

(ii) It should not be toxic to humans.

H. Crop diseases are classified on the mode of occurrence and transmission. There are three categories of crop diseases:

(i) Soil-borne diseases

(ii) Air-borne diseases

(iii) Water-borne diseases

I. Pesticides can be poisonous to human beings and other animals. Animals including human may be poisoned by pesticide residue that remain on food.

Pesticide also cause environmental pollution. Often, pesticides kill beneficial species such as natural enemies of pests and increases the chances of development of pests resistant to pesticide.

P. 156 CHECK YOUR PROGRESS 8

1. Biotic as well as abiotic factors affect the storage of agricultural produce. Biotic factors include insects, rodents, mites, microorganisms, birds and other animals which causes storage loss to the agricultural produce. Abiotic factors include inappropriate moisture and temperature in the place of storage.

2. Dry storage and cold storage.

3. The food grain should be first dried in the sun and then in the shade before storing containers or gunny bags.

4. Preventive measures before foodgrain storage:

(i) Any foreign material like sand, stone pieces straw, etc., should be removed from the foodgrains before storage.

(ii) The moisture content of the grain be reduced to safe level of storage by drying in the sun followed by drying in the shade before storage.

(iii) Storage houses like godowns, stores etc., should be properly cleaned before storage of food grains in them.

(iv) Before storage, the storage houses should be fumigated.

5. Chemicals which can exist in gaseous state in sufficient concentration that can kill pests are known as fumigants.

P. 160 CHECK YOUR PROGRESS 9

1. Cross-breeding method is commonly used for improving cattle breeds. This is a traditional method of breeding which takes place by cross-breeding between the desi or local breed and the exotic breed by the natural physical mating process. The exotic breeds usually have long lactation periods while local breeds show excellent resistance to diseases. Cross-breeding the two can produce animals with both the desired qualities.

The milk yield and prolongation of lactation period have improved greatly through successful cross-breeding programmes.

2. Fish is a valuable and cheap source of food rich in animal protein. Fish proteins are easily digestible. Fish liver oil is an important source of vitamin A and B.

3. **Marine fish:** Pomphret, tuna, sardine and mackerel.

Fresh-water fish: Rohu, catla, *Mystus* and *Gambusia*

4. Pearl spot and mullet.

5. Rearing and management of aquatic animals such as fish, prawns, molluscs and crabs is called aquaculture.

6. In composite fish culture, several species of fish are reared together in a single fish pond. As a result, fish production is increased within the same cost.

Advantages of composite fish culture: Fish production is increased within the same cost. Fish with different food habits are chosen so that they do not compete for food among themselves, so, all the available food of the pond is effectively utilized.

P. 161 CHECK YOUR PROGRESS 10

1. **Indigenous breeds:** Aseel, Basara, Chittagong, Ghagus, Brahma, Cochin.

Exotic breeds: White Leghorn, Rhode Island Red, Black Minorca, Plymouth, Light Sussex.

2. Improved breeds of poultry birds are the cross breeds of indigenous and foreign breeds of hen.

Variety improvement is done for the following desirable traits to obtain:

(i) Large number and good quality of chicks.

(ii) Dwarf broiler parent for commercial chick production.

(iii) Summer adaptation capacity and tolerance to high temperature.

(iv) Low maintenance requirement.

(v) Small-sized, egg-laying poultry birds which can easily utilize more fibrous cheaper diets formulated by using agricultural by-products.

3. The egg-laying poultry birds are called layers while the one groomed for obtaining meat is called broiler.

A broiler chicken requires vitamin rich supplements especially vitamin A and K. Also, their diet includes protein rich food and enough fat while egg laying birds utilize more fibrous cheaper diets.

4. Following management practices are common in dairy and poultry farming:

(i) Clean and proper shelter facilities.

(ii) Supply of balanced and hygienic food.

(iii) Timely vaccination

(iv) Spraying of disinfectants at regular intervals.

P. 162 CHECK YOUR PROGRESS 11

1. Bee-keeping is the practice of rearing and taking care of honey bees on a large scale to obtain honey from them. It is also known as apiculture.

2. *Apis cerana indica*, *Apis dorsata*, *Apis florea*

3. *Apis mellifera*

4. Pasturage is the flowers available to the honey bees for nectar and pollen collection.

The quality and taste of honey depends upon kind and quantity of pasturage.

P.165 EXERCISES

A. Objective Type Questions

I. Choose the most appropriate answer.

1. d **2.** a **3.** c **4.** d

II. Fill in the blanks.

1. Kharif **2.** Hybridization
3. Macro **4.** Fertilizer
5. Composting **6.** Crop rotation
7. Weeds **8.** Weedicides
9. Fungicides **10.** Fumigants

III. Match the items in column A with those in column B.

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

IV. Assertion-Reasoning type questions. CBQ

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

V. Name the following.

1. Integrated agriculture

2. a. Pusa Ageti, Pusa 84

b. T9, Pant 430

c. PS 16, S8

d. MH2, IC G51

e. Arun, Paras

f. Pusa Gold, Kranti

g. Jaya, Padma

h. Ganga 5, Ganga 101

i. Sonara-64, Sharbati Sonara

3. Hybridization

4. Manures

5. Organic farming

6. *Rhizobium*, *Anabaena*

7. Carbon, oxygen

8. Nitrogen, Phosphorus

9. Animal husbandry

10. Apiculture

VI. Very short answer type questions

1. Nitrogen and phosphorus

2. Nitrogen and carbon

3. The diseases which get transmitted through the soil are called soil-borne diseases.

4. Turmeric and Neem

5. Lindane, Malathion

6. Jersey, Brown Swiss

7. The animal feed contains two types of substances, that are roughage and concentrates.

8. Capturing and management of fishe from natural sources is called capture fisheries.

9. Rohu, catla and *Mystus*

10. *Amaranthus*

11. Plant breeding can be defined as a science of improving genetic make-up of plants in relation to their economic use.

12. Hybridization is the process of crossing two genetically dissimilar plants to obtain a progeny with the desired traits.

13. The manures are classified into farmyard manure (FYM) compost, vermicompost and green manures.

14. It is also known as brown manure. It is the decomposed mixture of cattle excreta (dung) and urine along with the litter (generally straw)

and left over organic matter such as roughage or fodder.

15. Organic farming may be defined as a farming system with no or minimal use of chemicals as fertilizers, herbicides, pesticides, etc., and with maximum use of organic manures, recycled farm wastes (such as straw and livestock excreta), use of bio-agents (such as culture of blue-green algae) in preparation of biofertilizers.
16. Mixed cropping means growing of two or more crops simultaneously on the same piece of land.
17. Intercropping is a process which involves growing two or more crops simultaneously in the same field, in a definite row pattern. For example, multi-tier system of coconut, banana and pineapple.

    Mixed cropping means growing of two or more crops simultaneously on the same piece of land. For example, growing soybean and pigeon pea together.
18. Growing different crops on the same piece of land in a pre-planned succession is known as crop rotation.

    Advantages:

    (i) Rotation of crops improves soil fertility and hence production of food grains.

    (ii) It also fixes atmospheric nitrogen and adds nitrogen fertilizers to the soil at no cost and saves a lot of chemical nitrogen fertilizer.
19. Smut of bajra and tikka of groundnut are soil-borne diseases caused by fungi.
20. The branch of agriculture related with the scientific management of animal livestock is known as animal husbandry.
21. Macronutrients are those elements which are required by plants in relatively large quantities.
22. *Rhizobium*

B. Short Answer Type-I Questions

1. Manures are the major sources of organic matter, which supply nutrients in small quantities but organic matter in large quantities and increase the fertility of soil. The manures are classified into farmyard manure (FYM), compost, vermicompost and green manures.
2. Cow dung, because in villages it is readily available as farmers have farm animals.
3. Chemical fertilizers are nutrient specific and being water soluble, they are readily absorbed by the crops.
4. Fertilizers make the soil fertile. Fertilizers are generally inorganic materials containing nitrogen, phosphorus or potash in the form of soluble chemical compounds. They are used to ensure high vegetative growth (leaves, branches and flowers) in order to produce healthy plants. Fertilizers are a factor in the higher yields of high cost farming.
5. The process of supplying water to the crops by means of canals, reservoirs, ponds, lakes, wells, tube wells, tanks, etc., is known as irrigation.

   Necessity of irrigating the crops:

   (i) Water supplies two essential elements to the crop plants namely, hydrogen and oxygen.

   (ii) Irrigation of crops provides moisture to the soil for the germination of seeds. Seeds do not grow in the dry soil.

   (iii) Irrigation loosens the soil and supports the growth and elongation of the roots.

   (iv) Water at the time of irrigation dissolves the nutrients present in the soil. These nutrients dissolved in water are easily absorbed by the roots and plants.
6. Repeated cultivation of crops on the same land and soil erosion lead to depletion of nutrients in the soil.
7. If a cereal crop is grown in a field then most of the nitrogen present in the soil is absorbed and the soil becomes deficient in nitrogen and this reduces soil fertility. If the next crop grown is a leguminous crop, then it utilizes atmospheric nitrogen to form nitrogen compounds in the soil. As a result, the deficiency of nitrogen containing compounds in the soil is restored. Hence, the soil becomes ready for growing the next crop.
8. Refer to the sol. 17, VSA
9. The chemical pesticides are quick in action and easy to apply.
10. The excessive use of pesticides makes pests resistant to the chemicals and demands a higher dose. Indiscriminate use of pesticide also causes environmental problems.
11. Importance of animal husbandry:

    (i) To increase milk production

    (ii) To increase egg production

    (iii) To increase meat production by rearing high meat-yielding animals

    (iv) To increase production of economically important fish

    (v) To properly utilize animal waste for economic purposes.

C. Short Answer Type–II Questions

1. Factors affecting successful crop production include crop variety improvement, crop production management and crop protection management.

   The crop variety can be improved by plant breeding. The desired characters can be chosen by this process. Crop production management involves use of manures, fertilizers, pesticides and weedicides, etc., to increase the production. After production comes the most important part, that is storage. During storage, the crop has to be protected from pests.

2. Improved breeds of crops are produced by the technique of plant breeding wherein the genetic make up of the plants is improved in relation to their economic use. Varieties can be selected for their useful characteristics such as disease resistance, response to fertilizers, quality of product and high yield.

3. **Micronutrients:** Micronutrients are those elements which are utilized by plants in small quantities. For example, zinc.

   Macronutrients: Macronutrients are required by plants in relatively large quantities, hence these are known as macronutrients. For example, nitrogen.

4. **a.** air, **b.** water, **c.** air, water, **d.** soil, **e.** soil, **f.** soil.

5. The elements essential for plant growth are nitrogen, phosphorus, potassium, magnesium, sulphur, calcium, iron, manganese, boron, zinc, copper, molybdenum and chlorine. These are classified under two classes macronutrients and micronutrients.

6. A chemical fertilizer is a salt or an inorganic compound containing the necessary plant nutrients like nitrogen, phosphorus or potassium. Fertilizers are nutrient specific.

   Excessive use of fertilizer contributes to soil and water pollution. The compounds are recalcitrant and are not degraded in nature.

7. The excessive use of fertilizers is hazardous. These chemicals get washed off into water bodies. Water rich in nitrates becomes unfit for drinking. It also leads to eutrophication in water bodies.

   This can be prevented by implementing organic farming. Organic farming is a farming system in which there is minimal or no use of chemicals as fertilizers, herbicides, pesticides etc. Also, neem leaves or turmeric are used specifically in grain storage as bio-pesticides. It employs healthy cropping systems (mixed cropping, inter-cropping and crop rotation) these cropping systems are beneficial in insect, pest and weed control besides providing nutrients to the soil.

8. Excessive irrigation is harmful to crops. The plant doesn't absorb all the water that is given. The excess water remains in the soil and causes a water logged condition that decreases the amount of oxygen reaching the roots which can kill the roots. It also leads to an increase in the salt content of the soil which can damage the crops.

9. Unwanted wild plants which grow along with the crop plants in the field are called weeds. The weeds can be removed by mechanical methods; i.e by uprooting the weeds by hand or by using a tool; by chemical methods (using weedicides) by cultural methods which involve preparation of proper seed bed and timely sowing of crops and intercropping or biological methods which use insects that selectively feed on the weed.

10. Two examples of weeds that grow in kharif season are nutgrass and wild *Sorghum.* Two weeds that grow in rabi season are wild oat and *Phalaris*.

    A weedicide that can be used to kill these weeds is 2,4-Dichlorophenoxy acetic acid.

11. A pesticide is a chemical used to control pests like mites, rodents, and fungi. We use pesticides because the crops are susceptible to attack by pests. They cause heavy economic loss to the farmer. They affect the health of the crop and reduce the yield.

12. **a. Farmyard manure:** It is the decomposed mixture of cattle excreta and urine along with the litter and left over organic matter. It stimulates plant growth and seed germination.

    b. Compost: Compost is prepared from farm and town refuse like vegetable waste, livestock excreta, animal refuse, sewage waste, eradicated weeds, crop stubble, straw, etc.

    c. Green manure: Some plants like sunn hemp or guar are grown and then mulched by ploughing them into the soil. These green plants thus turn into green manure which

helps in enriching the soil in nitrogen and phosphorus. It is used prior to the sowing of the crop seeds.

d. **Vermicompost:** Vermicompost makes use of earthworms. In this, earthworms are introduced into a pit containing animal and plant refuse. Earthworms hasten the process of decomposition of plant and animal refuse.

e. **River valley system:** River valley system utilizes the run-off and discharge flows of the river during the rainy season for irrigation purpose.

f. **River lift system:** In river lift system, water is directly drawn from the rivers for supplementing irrigation in regions near the river.

g. **Mixed farming:** Mixed cropping is employed to minimize risk and as an insurance against failure of a crop due to abnormal weather conditions. The main criteria for selection of the crops for mixed cropping are:

(i) Duration of crops.

(ii) Growth habit.

(iii) Nutrient demand.

(iv) Root pattern.

(v) Water requirement.

h. **Crop rotation:** Growing different crops on the same field or a piece of land in a pre-planned succession is called crop rotation.

For crop rotation, the selection of crops depends on the:–

(i) Type of soil.

(ii) Nutrient status.

(iii) Availability of water through rain or irrigation.

(iv) Length of rainy season.

(v) Duration of crop – short or long, and

(vi) Availability of inputs like fertilizers, pesticides, manpower etc.

i. **Animal husbandry:** The branch of agriculture related with scientific management of animal livestock is called animal husbandry. It includes breeding, feeding and disease control of domestic animals.

j. **Marine fisheries:** Marine fisheries include capturing fishes from oceans and sea. Mechanical fishing boats and deep sea trawlers are used to capture marine fish.

k. **Composite fish culture:** In composite fish culture, several fish are reared together in a single pond.

l. **Bee keeping:** Bee keeping is the practice of rearing and taking care of honey bees on a large scale to obtain honey from them. It is also called apiculture. We not only get honey on a commercial scale from bee-keeping but also other products like wax, royal jelly and bee venom.

D. Long Answer Type Questions

1. Manures are the major sources of organic matter, which supply nutrients in small quantities but organic matter in large quantities and increase the fertility of soil. Manures contain a mixture of various nutrients recycled from biomass wastes. Since long, the farmers in our country have traditionally used cow dung manures for replenishing soil nutrients.

   The manures affect the soil in the following ways:

   (i) They restore the soil texture for better retention of water and aeration, of specially sandy soil. Hence they improve the physical conditions of the soil.

   (ii) They enrich the soil with the nutrients.

   (iii) They keep up the humus content of the soil.

   (iv) They add large amount of organic matter to the soil, which increases water holding capacity in sandy soil and drainage in clayey soil.

   (v) The organic manures provide food for the soil organism, which help in making nutrients available to the plants.

   (vi) They use biological waste material, which is advantageous as it protects our environment from excessive use of fertilizers. By using biological waste materials, farm waste is also recycled.

2. Compost or composted manure is prepared from farm and town refuse like vegetable waste, livestock excreta (like cow dung) etc., animal refuse, sewage waste, eradicated weeds, crop stubble, straw, etc. This organic matter is decomposed by both aerobic and anaerobic microorganisms in pits. This process is called composting. Compost manure takes about 3 to 6 months in its formation. Compost is rich in organic matter and nutrients.

Preparation of compost:

Dig a pit of suitable size
(4 to 5 m long × 1.5 to 1.8 m broad × 1.0 to 1.8 m deep)
↓
Prepare a layer of well–mixed refuse of plant matter and other organic matter
↓
Moisten the layer of refuse by slurry of cow dung and water
↓
Spread the second layer of the mixed refuse till the heap rises to a height of 45 to 60 cm above the ground level
↓
Cover the top of the heap with a thin layer of soil
↓
Leave for decomposition (3 to 4 months)
↓
Take out mass of the trench and form a conical heap. Moisten, if necessary
↓
Leave for decomposition (1 to 2 months)
↓
Compost is ready for use in the field

Compost is also prepared with the help of earthworms. In this process the earthworms are introduced to the pit containing plant and animal refuse. Earthworms hasten the process of decomposition of plant and animal refuse. This process is known as vermicompost.

3. A fertilizer is a salt or an inorganic compound containing the necessary plant nutrients like nitrogen, phosphorus or potassium. These fertilizers are manufactured commercially from chemicals. They are used to ensure high vegetative growth in order to produce healthy plants. India makes use of NPK fertilizer which contains nitrogen, phosphorus and potassium. Urea is also used as fertilizer. Apart from these chemical fertilizers, biofertilizeros like *Rhizobium*, *Azotobacter* and phosphate solubilising bacteria are also used.

4. **Advantages of a chemical fertilizer:** Fertilizers are nutrient specific that provide nitrogen, phosphorus etc., as per the requirement. Fertilizers are readily soluble in water and are readily absorbed by crops. They also increase the crop yield.

   Disadvantages of chemical fertilizers:

   These chemicals get washed off into the water bodies and enter the food chain. The continuous use of these fertilizers will alter the soil chemistry. The nitrate content in water makes it unfit for drinking and these fertilizers in water bodies cause eutrophication.

5. Different kinds of irrigation systems are adopted to supply water to agricultural lands depending on the kinds of water resources available. These include wells, canals, rivers and tanks.
   (i) **Wells:** This system is based on the availability of ground water. In this, wells are constructed where usable ground is present. They are of two types – dug wells and tube wells. In dug well, water is collected from water bearing strata while tube wells can tap water from the deeper strata. From these wells, water is lifted by pumps for irrigation.
   (ii) **Canals:** Canal-system is usually an elaborate and extensive irrigation system. Canals receive water from one or more reservoirs or from rivers. The main canal is divided into branch canals having further distributaries to irrigate fields.
   (iii) **River lift systems:** In this system, water is directly drawn from the rivers for supplementing irrigation in areas close to rivers. This system is used in areas where canal flow is insufficient or irregular due to inadequate reservoir release.
   (iv) **Tanks:** Tanks are small storage reservoirs, which intercept and store the run-off of smaller catchment areas. Apart from the above mentioned initiatives rainwater harvesting and watershed management is also employed for irrigation purpose. This involves building small check-dams which lead to an increase in ground water levels. These check-dams stop the rainwater from flowing away and also reduce soil erosion.

6. A plant disease is a structural or physiological abnormality that is injurious to plant and reduces the economic value. Plant diseases may be caused by microorganisms like fungi, bacteria, viruses etc. The pathogens may be transmitted through air, water or soil. The plants are protected form these diseases by the help of chemicals which are sprayed from time to time. However, the use of chemicals is not eco-friendly. Hence the environment friendly methods are adopted such as, the use of disease resistant varieties, timely sowing of crop, clean cultivation, ploughing fields in summer to uproot weeds and crop rotation.

7. A good pesticide is one that is specific in its action i.e it must act against the target organism only and doesn't harm other insects. Its mode of action should be such that the pest doesn't

become resistant to it. So it should be used as per the recommended dose.

8. Following preventive measures must be taken before storage of food grains for future use:

Cleaning of the produce before storage: Before storage, the harvested food grains should be checked to see if it contains any foreign matter like seeds, earth particles, sand and stone pieces, straw, etc.,

Drying: The grains have a tendency to absorb moisture from the atmosphere. The moisture content of the grain has to be reduced to certain level for safe storage of the grains. For drying, the food grains or seeds should be spread in thin layer on cemented floor or plastic sheets in the sun. After sun drying, the food materials are dried in the shade to allow them to cool to the temperature before storing them in the containers, gunny bags or grain silos.

Maintenance of hygiene in storage houses: The storage houses like godowns, stores, bins etc., should be properly cleaned before storage of food grains in them. If there are any cracks or holes in the wall, floor or ceiling of the storage house, then they should be properly sealed.

Fumigation: Chemicals which can exist in a gaseous state in sufficient concentration to kill pests are known as fumigants. The use of fumigants to kill or repel pests is called fumigation. Before storage, the storage houses should be fumigated or treated with chemical sprays. Gunny bags should be treated with suitable insecticides before storage of food grains into them.

9. Scientific storage of grains is the storage under hygienic conditions.

There are two different methods of food storage:

Dry storage and cold storage.

The various factors responsible for damage to the stored food materials are:

(i) **Abiotic factors:**

(a) Inappropriate moisture content present in food grains and at the place of storage.

(b) Inappropriate temperature at the place where food material is stored.

(c) Properties of material of container in which food material is stored.

(ii) **Biotic factors:**

(a) Insects, microorganisms (fungi, bacteria) and mites.

(b) Rodents, birds and other animals.

10. Fish forms an important part of our diet. It is a valuable and cheap source of food rich in animal protein. Fish proteins are easily digestible. In addition, fish is useful for us in the following ways:

(i) **Medicinal use:** Fish liver oil (Cod liver oil) is an important source of vitamin A and D.

(ii) **Industrial use:** Body oil of some fish like herrings and sardines are used for the manufacturing of edible oil and margarine.

(iii) **Agricultural use:** They are used as organic manure in the field.

(iv) **Food for farm animals:** Dried fish are used to provide proteins to farm animals.

(v) **Adhesive:** Skins and bones of fish are used to make high quality glues and adhesives.

11. Bee keeping is the practice of rearing and taking care of honeybees on a large scale to obtain honey from them. It is also known as apiculture. Bee keeping not only provides honey on a commercial scale but also other products like bee wax, royal jelly and bee venom. Important species of honey bees in India are as follows:

Apis cerana indica – commonly known as the Indian bee.

Apis dorsata – commonly known as the rock bee.

Apis florea – commonly known as the little bee.

E. Source-based/Case-based/Passage-based/ Integrated assessment questions CBQ

1. **a.** (ii) **b.** (iii) **c.** (iii) **d.** (iii) **e.** (iv)

2. **a.** (iii) **b.** (iv) **c.** (iv) **d.** (ii) **e.** (iv)

P. 168 HIGHER ORDER THINKING SKILLS (HOT) QUESTIONS

A. The indiscriminate use of chemical fertilizers and pesticides in the agricultural field must have washed off the fertilizers to the water in the pond and polluted it. The fertilizers and pesticides are toxic compound and not biodegradable. Hence they persist in the environment for very long period of time and enter the food chain causing biomagnifications.

B. Use of fertilizers is discouraged because the chemicals are recalcitrant compounds and hence persist in the environment for a long time. These chemicals get washed off into the water bodies and enter the food chain. The continuous use of these fertilizers will alter the soil chemistry. The nitrate content in water makes it unfit for drinking and these fertilizers in water bodies cause eutrophication.

C. Yes. Because organic farming is a farming system in which there is minimal or no use of chemicals as fertilizers, herbicides, pesticides etc. There is maximum input of organic manure, recycled farm-wastes, i.e. straw and livestock excreta. Organic farmers control pests and diseases through good plant nutrition and management.

P. 168 VALUE-BASED QUESTIONS (OPTIONAL)

1. The chemical fertilizers, specially nitrogenous fertilizers, get washed away due to excessive irrigation and are thus not fully absorbed by the plants. These fertilizers reach rivers, lakes and other water bodies resulting in the growth of algal bloom. This can increase the biological oxygen demand (BOD) of water which causes harm to aquatic animals like fish and aquatic plants. This phenomenon is known as eutrophication.

Farmers should consider the use of manure instead of fertilizers. This will not cause any damage to the aquatic life.

2. Maximum use of fertilizers is not a good practice. In the long run, the continuous use of chemical fertilizers can cause drastic alterations in soil chemistry and affect the crop yield. Fertilizers also harm the soil microorganisms and thus destroy soil fertility as the organic matter in the soil is not replenished.

Organic farming can be a good alternative for Ranveer to achieve higher yield.

3. In rainwater harvesting, the rainwater that falls on the ground or rooftops of buildings is channeled by canals and recharged into the ground by digging tunnels. It reduces soil erosion and flood hazards by collecting rainwater and reducing the flow of storm-water to prevent urban flooding.

Two advantages associated with water harvesting at community level are: (a) Overexploitation of water resources will be reduced. (b) Helps to recharge the natural wells and provides moisture for vegetation over a wide area.

4. a. Cereal crops utilise nitrogen from the soil. If it is grown year after year, the soil becomes deficient in nitrogen. Sowing a leguminous crop between two cereal crops enriches the soil with nitrogen. Rhizobium bacteria present in the root nodules of leguminous crop fixes atmospheric nitrogen making the soil rich in nitrogen at no cost. The fertility of the soil increases leading to increase in grain production.

b. This agricultural practice is known as crop rotation. Two advantages of crop rotation are: Rotation of Crops Improves Soil Fertility: Hence, it brings about an increase in the production of food grains. Helps in Weed and Pest Control: This is because weeds and pests are very choosy about the host crop plant which they attack. When the crop is changed, the weeds and pests associated with that crop usually disappear.

c. Values shown by Ramesh are awareness, community service and social responsibility.

5. Cropping pattern practiced by Mahmud is intercropping.

Advantages of intercropping are:

It makes optimum utilization of natural resources such as sunlight, land and water.

Intercropping also helps to prevent spread of pests and diseases to all the plants belonging to one crop in the field.