CHAPTER – 1

CELL – THE STRUCTURAL AND FUNCTIONAL UNIT OF LIFE

P. 11 Check Your Progress 1

A. Name the following.

1. Fungi, algae
2. Germ cell
3. Cell wall
4. Robert Hooke
5. Nerve cells
6. Leucocytes

B. Name the part of the cell which:

1. Cell wall
2. Plasma membrane
3. Cytoplasm
4. Cell wall

C. Answer these questions.

1. All living organisms are composed of cells. All cells are basically alike in chemical composition and metabolic processes. The function of an organism as a whole is the outcome of the combined activities and interactions of the constituent cells. Hence, cell is considered as structural and functional unit of all living beings.
2. Plasma membrane allows only selective substances to pass in and out of the cell. Hence it is known as selectively permeable.

P. 17 Check Your Progress 2

A. Fill in the blanks.

1. structural, functional
2. plant cells
3. proteins
4. animal
5. Protoplasm, nucleus

B. Match the following.

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

C. Answer these questions.

1. Proteins are synthesized in ribosomes of the cell.
2. Lysosomes are membranous sacs budded-off from Golgi bodies. The enzymes released by the rupture of lysosomes help in intracellular digestion by destroying and digesting foreign substances around them. Hence, they are called suicide bags of the cell.
3. Mitochondria and chloroplast.

P. 20 Exercises

I. Multiple-Choice Questions

A. Choose the most appropriate answer.

1. a **2.** b **3.** a **4.** c **5.** c
6. a **7.** d **8.** d **9.** a **10.** c

II. Assertion–Reason Type Questions

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

III. Very Short Answer Type Questions

A. Name the following.

1. Plasma membrane
2. Cytoplasm
3. Nuclear membrane
4. Chromatin network
5. Nucleolus
6. Endoplasmic reticulum
7. Ribosomes
8. Mitochondria
9. Vacuoles
10. Anthocyanins

B. Fill in the blanks.

1. cell wall
2. cellulose, lipid bilayer
3. tonoplast
4. DNA and proteins
5. Lysosomes
6. Genes
7. Leucoplast
8. Plasma membrane

C. Match the items in Column A with those in Column B and write down the matching pairs.

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

D. Arrange the following processes in the correct sequence.

1. b → d → a → c
2. c → b → a → d

E. State the relationship between the following and fill in the blanks.

1. Centrosome
2. Chloroplast
3. Chromoplasts

F. Give one word for each of the following.

1. Nucleus
2. Lysosomes
3. Golgi apparatus

G. Answer these questions.

1. Prokaryotic cells are cells having primitive nucleus. The nuclear material in these cells is not enclosed by a nuclear membrane and the genetic material is equivalent to a single molecule of DNA. Bacteria are examples of prokaryotic cells.
2. Eukaryotic cells are cells having a well-defined nuclear membrane. In these cells, the genetic material is composed of DNA and protein molecules, which form chromatin fibres and the nuclear material is enclosed in a nuclear membrane. Eukaryotic cells occur in plants.
3. Mitochondria is responsible for the release of energy in the form of ATP.
4. Nucleus is the control centre of the cell. It controls cell metabolism and other activities of the cell. It also regulates and coordinates various life processes of the cell. If the nucleus is removed, the cell will die.
5. 23 pairs

IV. Short Answer Type Questions

A. Differentiate between the following (one key difference only).

1. **Cytoplasm and protoplasm**

   Cytoplasm is the living content between the plasma membrane and the nucleus whereas protoplasm is the living content, including cytoplasm and nucleus of a cell.

2. **Nucleus and nucleolus**

   Nucleus is the organelle present mostly at the centre of a cell containing genetic material (DNA) and controls all the activities of the cell including heredity.

   Nucleolus is the structure present inside the nucleus. It is rich in protein and RNA molecules.

3. **Centriole and centrosome**

   Centrosome is a small, naked, protoplasmic structure present near the nucleus of an animal cell.

   Centrosome consists of two small granules called centrioles, which lie at right angles to each other.

4. **Cell wall and cell membrane**

   Cell wall is present only in plant cells whereas cell membrane is present in both plant and animal cells.

5. **Lysosomes and Golgi bodies**

   Lysosomes are concerned with intracellular digestion whereas Golgi bodies are concerned with storage, modification and secretion of substances.

6. **Ribosomes and mitochondria**

   Ribosomes are involved in protein synthesis whereas mitochondria are responsible for energy production by cellular respiration.

7. **Leucoplasts and chloroplasts**

   Leucoplasts help in storage of food whereas chloroplasts help in synthesis of food.

8. **Prokaryotes and eukaryotes**

   Prokaryotes are organisms having cells with primitive nucleus, i.e. the nuclear material in these cells is not enclosed by a nuclear membrane.

   Eukaryotes are organisms having cells with a well-defined nuclear membrane, i.e these cells have their genetic material enclosed in a nuclear membrane.

B. State the major functions of the following parts in a cell.

1. **Cell membrane:** It is a selectively permeable membrane that allows only selected substances to pass through it. It protects the cell from injury and provides an outer boundary to the cell.
2. **Nucleus:** Controls and coordinates all the metabolic activities of a cell.
3. **Endoplasmic reticulum:** It helps in protein synthesis and intracellular transport of the cell.
4. **Ribosome:** It is the site of protein synthesis.
5. **Mitochondria:** In mitochondria, glucose is oxidized to produce energy.
6. **Golgi body:** Storage, modification and packaging of substances.
7. **Plastids:** Provide pigmentation or colour to the plant cell, help in photosynthesis.
8. **Lysosomes:** Help in intracellular digestion by secreting digestive enzymes.
9. **Chromosomes:** They are the carriers of heredity.
10. **Cell wall:** It provides rigidity and a definite shape to the cell.

C. Answer these questions.

1. Cell membrane or plasma membrane bounds the semi-fluid contents of the cell. It protects the cell from injury and provides an outer boundary to the cell. Plasma membrane is selectively permeable as it allows only selective substances to pass in and out of the cell.
2. Mitochondria are the sites where oxidation of food leads to the production of energy in the form of ATP. Hence, these are called powerhouses of the cell.
3. A small cell size means larger surface area. The large surface area ensures greater diffusion of nutrients and respiratory gases into the cell, and the metabolic waste and carbon dioxide out of the cell.
4. Like every organism, cells also need food. The cells require energy to survive and carry out all metabolic processes. This energy is obtained in the form of food by the cell.

V. Long Answer Type Questions

A. Answer these questions.

1. Cell theory was proposed by two German biologists M.J. Schleiden and T. Schwann. According to them the key points of cell theory are:
   i. All living organisms are composed of one or more cells.
   ii. Cells are the basic unit of structure in all living organisms.
   iii. All new cells arise from pre-existing cells.
2. Plastids are organelles containing coloured pigments found in the plants. These are the different types of plastids:
   - **Leucoplast:** White in colour/colourless
   - **Chloroplast:** Green in colour
   - **Chromoplast:** Different colours like red, yellow, orange

   Functions:
   - Leucoplasts store food.
   - Chloroplasts perform photosynthesis.
   - Chromoplasts contain colour pigments which give colour to fruits and leaves.
3. The statement is false. Plant cells have both mitochondria and chloroplasts, since plants are living organisms and they require energy to continue their vital activities.
4. Each cell contains cell organelles which perform specific functions 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 functions will be affected resulting in death of the cell.

VI. Structured / Application / Skill Type Questions

A. 1. Chloroplast
2. Plant cell
3. Centrosome
4. Plant cell
5. Provides shape and rigidity to the cell
6. Plasma membrane
7. Both plant and animal cells
8. Both plant and animal cells
9. Producing and assembling the cell's ribosomes

B.

Characteristic features	Prokaryotic cell	Eukaryotic cell
Size	Generally small (1–10 μm)	Generally large (5–100 μm)
Nuclear region	Not enclosed by nuclear membrane	Well-defined surrounded by nuclear membrane
Chromosome	Single circular chromosome	More than one chromosome
Membrane-bound cell organelles	Absent	Present and named as, mitochondria, chloroplast, lysosomes, etc.
Occurrence (examples)	Bacteria, blue-green algae	Plants, animals, protozoa, fungi

C.

Drawing number	Name of the organelle	Primary function
1	Endoplasmic reticulum	Helps in protein synthesis and intracellular transport
2	Nucleus	Controls and coordinates all the metabolic activities
3	Mitochondrion	Produces energy by oxidation of glucose in the form of ATP

D. 1. It is an animal cell.

2. a. Nucleus; **b.** Smooth endoplasmic reticulum; **c.** Mitochondrion; **d.** Ribosomes on rough endoplasmic reticulum; **e.** Golgi apparatus.

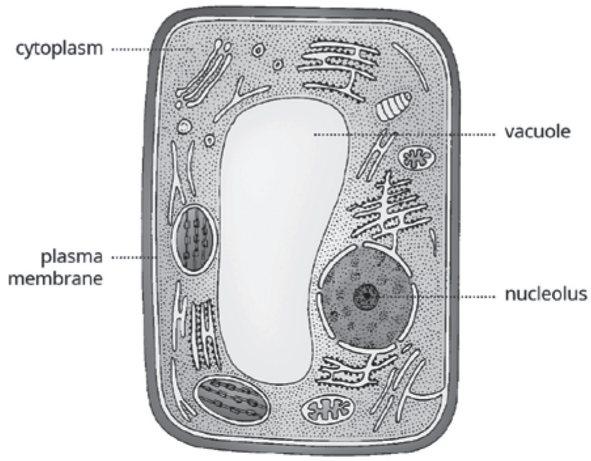
3. Ribosomes (d)

4. Mitochondrion (c) is known as 'powerhouse of the cell' since oxidation of glucose occurs here and it produces energy in the form of ATP.

5. Controls all the metabolic activities of the cell.

E. 1. It is a plant cell

2.



Plant cell

3. Chloroplast and large central vacuole

4. Cell membrane/plasma membrane