



CHAPTER 5: THE FUNDAMENTAL UNIT OF LIFE

ANSWER THE FOLLOWING

1. Who discovered cell and how?

Robert Hooke discovered cells for the first time in a cork slice with the help of a primitive microscope.

2. Why is the cell called the structural and functional unit of life?

Cells are called the structural and functional unit of life because all the living organisms are made up of cells and also all the functions taking place inside the body of organisms are performed by cells.

3. What are the functions of plasma membrane?

- It maintains the shape of the cell.
- It separates the cellular contents from the external environment.
- It helps in absorption of mechanical shocks and protects the cell from injury.
- It allows the movement of some substances into and out of the cell.
- Movement of substances through this semi-permeable membrane can be by the process of diffusion, osmosis etc.
- It forms the membrane for various cell organelles.
- It keeps the adjacent cells in contact.
- It helps in absorption of materials.

4. How do substances like CO₂ and water move in and out of the cell? Discuss.

The substances like CO₂ and water move in and out of a cell by diffusion from the region of high concentration to low concentration. When the concentration of CO₂ and water is higher in external environment than that inside the cell, CO₂ and water moves inside the cell. When the concentration outside the cell becomes low and it is high inside the cell, they move out.

5. Why is the plasma membrane called a selectively permeable membrane?

Plasma membrane is called a selectively permeable membrane because it regulates the movement of substances in and out of the cell. This means that the plasma membrane allows the entry of only some substances and prevents the movement of some other materials.

6. If the organisation of a cell is destroyed due to some physical or chemical influence, what will happen?

If the organisation of a cell is destroyed due to some physical or chemical influence then cell will not be able to perform the basic functions like respiration, nutrition, excretion etc. This may stop all the life activities and may result in its death.

7. Write the importance of Osmosis.

1. Entry of water from soil into roots of plant occurs through osmosis.
2. Helps in seed germination.
3. Cell to cell movement of water occurs through osmosis.
4. The stomata open and close by osmosis.

5. Living cells remain turgid by osmosis.

8. Write the differences between diffusion and osmosis.

DIFFUSION	OSMOSIS
It is the process by which molecules move from a region of higher concentration to a region of lower concentration.	It is a process by which solvent molecules move from a region of higher concentration to the region of lower concentration through a semipermeable membrane.
Diffusion occurs in all the mediums (solid, liquid or gas.)	Osmosis takes place only in liquid medium.
Semipermeable membrane may not be present.	Presence of semipermeable membrane separating the two liquids is necessary.
It is a rapid process in gases and slow process in liquids	It is a slow process.

9. Distinguish between hypotonic, isotonic and hypertonic solution.

Hypotonic solution	Isotonic solution	Hypertonic solution
If the medium surrounding the cell has a high water concentration than the cell, i.e; if the solution is very dilute, the cell will gain water by osmosis. Such a dilute solution is called hypotonic solution.	If the medium surrounding the cell has exactly the same water concentrations as the cell, there will be no net movement of water across the cell membrane. Such a solution is called isotonic solution.	If the medium surrounding the cell has a high water concentration than the cell, i.e., if it is very concentrated solution, the cell will lose water by osmosis. Such a solution is called hypertonic solution.

10. Where are chromosomes located? What are they composed of? What is chromatin material and how does it change just before the cell division?

Chromosomes are located in the nucleus of plants and animal cells. They are composed of DNA and protein. Chromatin material are entangled mass of thread like structures. The chromatin material gets organized into chromosomes just before the cell divides.

11. What are the functions of nucleus?

- Nucleus controls all the cellular activities of the cell.
- Nucleolus is involved in synthesis of ribosomes.
- Nucleus contains hereditary information of cell.

- It is responsible for cell division (reproduction) and transmission of genetic information from parents to offspring.

12. What is the difference between plasma membrane and cell wall?

Cell wall	Plasma membrane
i) It is present in plant cells only ii) It is the outermost covering of the plant cells. iii) It is present outside the plasma membrane. iv) Cell wall is rigid and comparatively thick. v) It is nonliving and permeable. vi) It is made up of cellulose	i) It is present in both animal cell and plant cell. ii) It is the outermost covering of animal cells. iv) Plasma membrane is flexible and comparatively thin. v) It is living and selectively permeable. vi) It is made up of lipids and proteins.

13. Write the functions of cytoplasm.

1. Cytoplasm helps in exchange of materials between cell organelles.
2. It acts as a store of vital chemicals such as amino acids, glucose, vitamins etc.
3. It is the site of certain metabolic pathways.

14. What are the functions of Endoplasmic Reticulum (ER)?

The functions of Endoplasmic reticulum are

1. Helps in transporting materials from one part to the other inside the cell or between various regions of the cytoplasm and the nucleus.
2. Acts as skeletal framework and provides mechanical strength to cytoplasmic matrix.
3. Provides larger surface area for synthesis of various metabolic activities.
4. The membranes of ER contain a number of enzymes for various metabolic activities.
5. In liver cells of vertebrates, SER is also involved in the process of detoxification of drugs and poison.

15. What would happen if the plasma membrane ruptures or breaks down?

Plasma membrane is a selectively permeable membrane i.e. it allows movement of certain materials in and out to the cell. In case plasma membrane ruptures (like in hypertonic solution), the cell will shrink and eventually die. At this time, lysosomes of the cell will come into action. Lysosomes will release digestive enzymes and eat up worn out cell organelles and foreign material.

16. Why are lysosomes known as suicide bags?

Lysosomes are organelles that contain digestive enzymes. They digest excess or worn out organelles, food particles, and engulfed viruses or bacteria. Sometimes, when the cell gets damaged, lysosomes may burst and the enzymes digest their own cell. Therefore, lysosomes are also called suicidal bags.

17. Why is mitochondria called 'Power house of the cell'? Give three similarities and one difference between mitochondria and plastid.

Mitochondria create energy for the cell, and this process of creating energy for the cell is known as cellular respiration. Most chemical reactions involved in cellular respiration occur in mitochondria. The energy required for various chemical activities needed for life is released by the mitochondria in the form of ATP molecules. Thus, mitochondria is also called 'Power house of the cell'.

The similarities between mitochondria and plastids are

1. Both mitochondria and plastids have their own genetic material and ribosomes.
2. External structure of mitochondria and plastids are same.

- Both mitochondria and plastids have more than one membrane layer.

One difference between mitochondria and plastids is that mitochondria are present in both plant and animal cell whereas plastids are present only in plant cell.

18. Differentiate between RER and SER. How is Endoplasmic Reticulum important for membrane biogenesis?

Rough Endoplasmic reticulum(RER)	Smooth Endoplasmic Reticulum(SER)
i) Ribosomes are attached to the surface ii) Situated near to nucleus iii) Helps in protein synthesis	i) Ribosomes are not attached to its surface ii) Situated near plasma membrane iii) Helps in lipid synthesis

SER helps in manufacture of fat and lipids which along with proteins synthesized by RER help in building the cell membrane. Thus ER takes part in membrane biogenesis.

19. What are the functions of plastids?

- Leucoplasts store materials such as starch, oils and protein granules.
- Chromoplast give colour to flowers and fruits, so they help in pollination and fruit dispersal.
- Chloroplasts trap solar energy to manufacture food through photosynthesis.

20. What are the functions of vacuole?

- Vacuoles provide turgidity and rigidity to the plant cells as it is filled with cell sap.
- They store certain materials like amino acids, sugars, various organic acids and some proteins
- In Amoeba, the food vacuole contains the food items that it has consumed.
- They play important role in expelling excess water and some wastes from the cell in some unicellular organisms.

21. What are lysosomes, peroxisomes and centrosomes? Write their functions. (CBSE, 2010)

Lysosomes	Peroxisomes	Centrosome
They are single membrane small vesicular structure found in the cytoplasm of all the eukaryotic cells except mammalian RBC's. They contain enzymes and are formed by Golgi apparatus.	They are found in photosynthetic cells of plants, liver cells of vertebrates and contain two types of oxidative enzymes bounded by a unit membrane.	A centrosome is a light microscopic organelle formed of two darkly coloured granules called centrioles surrounded by a transparent cytoplasmic area called centrosphere. It lies near the nucleus.
Functions: They are involved in intracellular digestion of foreign food or microbes and are involved in self-digestion of cells after their death.	Functions: These are involved in removal of toxic substances by oxidative reactions. In plant cells, these also help on photorespiration.	Functions: It helps in cell division in animal cells. They also help in the formation of cilia and flagella of the cells.

22. Make a comparison and write down ways in which plant cells are different from animal cells.

Animal cell	Plant cell
The do not have cell wall.	They have cell wall made up of cellulose.
They do not have chloroplast.	They contain chloroplast.
They have centrosome.	They do not have centrosome.
Vacuoles are smaller in size.	Vacuoles are larger in size.
Lysosomes are larger in number.	Lysosomes are absent or very few in number
Prominent Golgi bodies are present.	Subunits of Golgi bodies known as dictyosomes are present.

23. What would happen to the life of a cell if there was no Golgi apparatus?

If there was no Golgi apparatus in the cell, lysosomes would not be formed. There would not be any excretion, as such foreign materials might accumulate in the cell. Complexing of molecules will also not take place.

24. What are the consequences of the following conditions?

(a) A cell containing higher water concentration than the surrounding medium

(b) A cell having lower water concentration than the surrounding medium

(c) A cell having equal water concentration to its surrounding medium

(a) A cell containing higher water concentration than the surrounding medium will undergo exosmosis and thus lose water.

(b) A cell having lower water concentration than the surrounding medium will undergo endosmosis and thus absorb water from outside.

(c) A cell having equal water concentration to its surrounding medium will neither gain nor lose water to the external medium.

25. Why does the skin of your finger shrink when you wash clothes for a long time?

Soap solution is very concentrated (hypertonic), so water moves out of our finger cells by exosmosis. Because of this, the skin of our finger shrinks when you wash clothes for a long time