

**Class: 9**  
**Subject: Biology**  
**Topic: The Fundamental Unit of Life**  
**No. of Questions: 20**

- Q1. Which of the following options is a single membrane bound cell organelle?
- a) Nucleus
  - b) Lysosome
  - c) Mitochondria
  - d) Chloroplast

Sol. b)

- Q2. Plant cell wall is composed of an important substance known as
- a) Cellulose
  - b) Lipids
  - c) Protein
  - d) Chitin

Sol. (a)  
The cell wall of a plant is composed of several compounds among which cellulose is the most important. Cellulose is made up of molecules of glucose. Cellulose molecules are united into fibrils (layers of fibres), which form the structural framework of the wall.

- Q3. Rod shaped structures in nucleus visible at the time of cell division are known as \_\_\_\_\_.

- a) DNA
- b) genes
- c) chromatin
- d) chromosomes

Sol. d)  
Chromosomes are the rod like structures present in the nucleus of a cell and are visible at the time of cell division. These are composed of DNA and proteins.

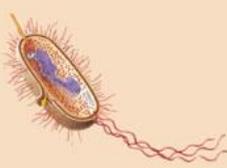
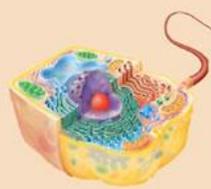
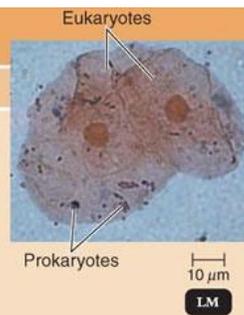
- Q4. Movement of solvent across the plasma membrane from the region of lower concentration of solute to the region of higher concentration of solute is known as
- a) diffusion
  - b) plasmolysis
  - c) osmosis
  - d) active transport

Sol. c)

Osmosis: It is the movement of water from a region of high water concentration or low solute concentration to low water concentration or high solute concentration through a semi-permeable membrane. Thus, osmosis is a special case of diffusion through a semi permeable membrane (membrane, which allows the entry and exit of only water and not solute). So, this is the correct answer.

Q5. What is the difference between prokaryotic and eukaryotic cell?

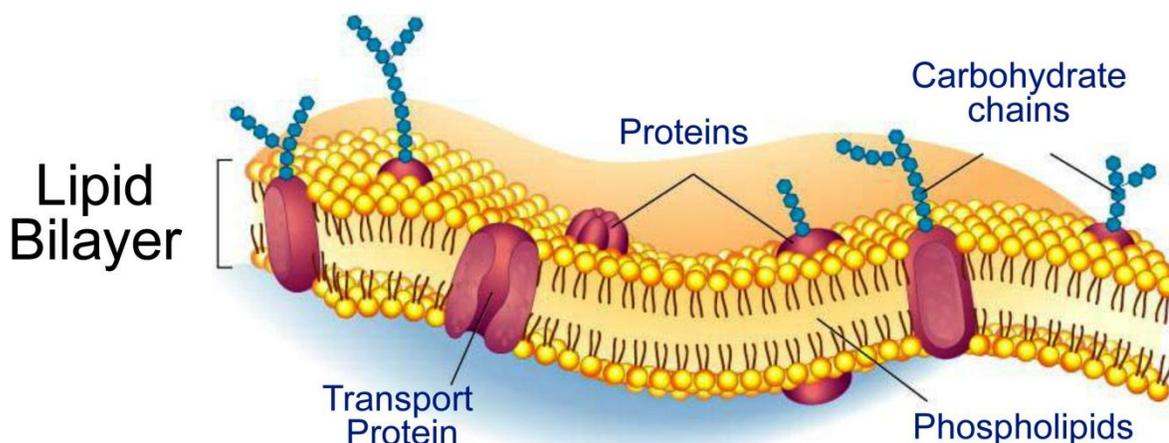
Sol.

Table 4.2 Principal Differences between Prokaryotic and Eukaryotic Cells		
Characteristic	Prokaryotic	Eukaryotic
		
		
<b>Size of Cell</b>	Typically 0.2–2.0 $\mu\text{m}$ in diameter	Typically 10–100 $\mu\text{m}$ in diameter
<b>Nucleus</b>	No nuclear membrane or nucleoli	True nucleus, consisting of nuclear membrane and nucleoli
<b>Membrane-Enclosed Organelles</b>	Absent	Present; examples include lysosomes, Golgi complex, endoplasmic reticulum, mitochondria, and chloroplasts
<b>Flagella</b>	Consist of two protein building blocks	Complex; consist of multiple microtubules
<b>Glycocalyx</b>	Present as a capsule or slime layer	Present in some cells that lack a cell wall
<b>Cell Wall</b>	Usually present; chemically complex (typical bacterial cell wall includes peptidoglycan)	When present, chemically simple (includes cellulose and chitin)
<b>Plasma Membrane</b>	No carbohydrates and generally lacks sterols	Sterols and carbohydrates that serve as receptors
<b>Cytoplasm</b>	No cytoskeleton or cytoplasmic streaming	Cytoskeleton; cytoplasmic streaming
<b>Ribosomes</b>	Smaller size (70S)	Larger size (80S); smaller size (70S) in organelles
<b>Chromosome (DNA)</b>	Usually single circular chromosome; typically lacks histones	Multiple linear chromosomes with histones
<b>Cell Division</b>	Binary fission	Involves mitosis
<b>Sexual Recombination</b>	None; transfer of DNA only	Involves meiosis

Q6. Explain fluid mosaic virus.

Sol. The Fluid Mosaic Model was proposed by Singer and Nicholson. It states that membranes are composed of a Phospholipid Bilayer with various protein molecules floating around within it. The 'Fluid' part represents how some parts of the membrane can move around freely, if they are not attached to other parts of the cell. The 'mosaic' part illustrates the 'patchwork' of proteins that is found in the Phospholipid Bilayer.

Some proteins in the membrane are called 'Intrinsic'. This means that they completely span the Bilayer. Others are called 'Extrinsic' - they are partly embedded in the Bilayer.



Q7. What is the difference between osmosis, diffusion and active transport?

Sol.

### Differences between Diffusion, Osmosis and Active transport

Process	Movement of	Condition	Additional requirements
Diffusion	Molecules/ ions	High conc. to low conc.	Down a conc. gradient
Osmosis	Water molecules	High water potential to low water potential	Across a partially permeable membrane
Active transport	Particles of substances	Low conc. to high conc.	Against a conc. Gradient; Energy required

Q8. What are the functions of cell membrane?

Sol.

- Provide definite shape to cell.
- Mechanical barrier between external and internal environment.
- Regulates the molecular movement across membrane.
- Its helps in endocytosis for engulfing food.

Q9. What is the difference between endosmosis and exosmosis?

Sol.

Endosmosis- movement of water inside the cell  
Exosmosis- the movement of water outside the cell

Q10. What is active transport?

Sol.

Active transport is transport against a concentration gradient that requires chemical energy. Active transport moves ions or molecules in a specific direction through the use of an integral membrane protein.

Q11. Explain cell wall.

Sol.

Cell wall is a tough, rigid layer that surrounds some types of cells. Cell wall is a characteristic feature to cells of plants, bacteria, fungi, algae and some archaea. It is located outside the cell membrane. The major function of the cell wall is to provide rigidity, tensile strength, structural support, protection against mechanical stress and infection. It also aids in diffusion of gases in and out of the cell.

Cell wall composition varies from species to species and also depends on the developing stage of the organism. Protozoans and animals do not have a cell wall.

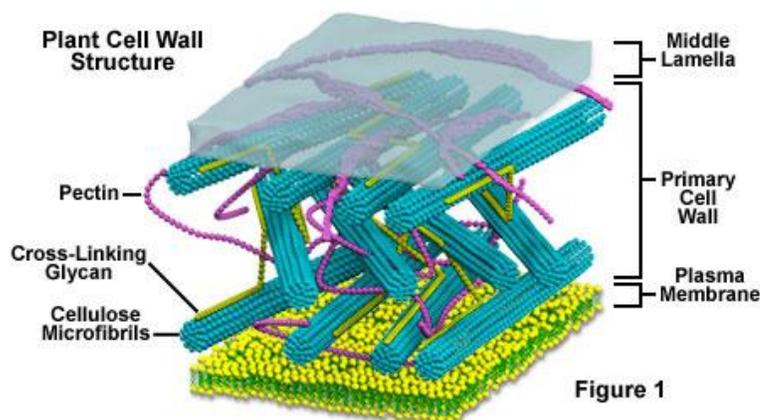
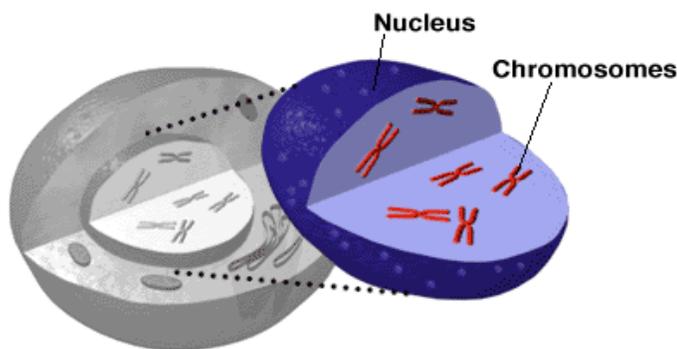


Figure 1

The composition of the cell wall differs from one species to the other. In bacteria the cell wall is made up of peptidoglycans. The Archean cell wall is made of glycoproteins and polysaccharides. In fungi cell walls are made of glucosamine and chitin. In algae it is composed of glycoproteins and polysaccharides. The plant cell wall is mainly composed of cellulose, hemicellulose, glycoproteins, pectins and lignin.

Q12. Explain location of chromosome.

Sol. In nucleus



Q13. Who discovered cells, and how?

Sol. Robert Hooke at first examining a thin slice of dead cork [the bark of a tree] through a self-designed microscope in 1665 and discovered cell.

Q14. What are isotonic solution, hypertonic solution and hypotonic solutions?

Sol. Types of solution on the basis of concentration:

(A) Isotonic solution: When the concentration of the solution outside the equal to the Concentration of cytoplasm of the cell it is called as isotonic solution.

(B) Hypertonic solution: When the f concentration of the solution outside the cell is more than that inside the cell. Due to this cell looses water and becomes plasmolysed.

(C) Hypotonic solution: When the concentration of the solution outside the cell is lesser than that of cytoplasm of cell. Due to this cell swells up and bursts.

Q15. Remove the shell of an egg by dissolving it into dilute hydrochloric acid. Put the egg in pure water and left it for 5 minutes. What do we observe?

Sol. The egg swells because the cell will gain water by osmosis. This happens because the medium surrounding the cell has a higher water concentration than the cell

Q16. How do substances move out of the cell?

Sol. As there is a difference of concentration of  $\text{CO}_2$  inside and outside a cell,  $\text{CO}_2$  moves out of the cell, from a region of high concentration, to a region of low concentration outside the cell by the process of diffusion.

Q17. What is the function of plasma membrane?

Sol. plasma membrane is the outermost covering of the cell present in both plants [below the cell wall] and animal cell.

Singer and Nicholson gave the fluid mosaic model of plasma membrane according to him it consists of a protein layer between two layers of lipids.

(a) It separates the contents of the cell from its external environment.

(b) It allows the entry and exit of some materials in and out of the cell.

Q18. Who gave the cell theory? What does it state? Which organism is an exception of cell theory?

Sol. Two biologists, "Schleiden and Schwann" gave the "Cell theory" which was later on expanded by "Rudolf Virchow". Cell theory states that

(a) All plants and animals are composed of cells. (b) Cell is the basic unit of life. (c) All cells arise from pre-existing cells.

=>Viruses are the exceptions of cell theory.

Q19. First living cell was discovered by -----

Sol. A.V. Leeuwenhoek

Q20. The term protoplasm was coined ----- in 1839.

Sol. by purkinje