



Chapter 8 :- Cell : The Unit of Life
Competency based questions

I. Case based question

Most prokaryotic cells, particularly the bacterial cells, have a chemically complex cell envelope. The cell envelope consists of a tightly bound three layered structures i.e., the outermost glycocalyx followed by the cell wall and then the plasma membrane. Although each layer of the envelope performs distinct function, they act together as a single protective unit. Glycocalyx differs in composition and thickness among different bacteria. It could be a loose sheath called the slime layer in some, while in others it may be thick and tough, called the capsule. The cell wall determines the shape of the cell and provides a strong structural support to prevent the bacterium from bursting or collapsing. The plasma membrane is selectively permeable in nature and interacts with the outside world.

A special membranous structure is the mesosome which is formed by the extensions of plasma membrane into the cell. These extensions are in the form of vesicles, tubules and lamellae. They help in cell wall formation, DNA replication and distribution to daughter cells. They also help in respiration, secretion processes, to increase the surface area of the plasma membrane and enzymatic content. In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments. Bacterial cells may be motile or non-motile. If motile, they have thin filamentous extensions from their cell wall called flagella. Bacteria show a range in the number and arrangement of flagella. Bacterial flagellum is composed of three parts – filament, hook and basal body. The filament is the longest portion and extends from the cell surface to the outside. Besides flagella, Pili and Fimbriae are also surface structures of the bacteria but do not play a role in motility. The pili are elongated tubular structures made of a special protein. The fimbriae are small bristle like fibres sprouting out of the cell. In some bacteria, they are known to help attach the bacteria to rocks in streams and also to the host tissues.

1. Which of the follow structures are not found in bacterial cell?
 - a. Mesosome
 - b. Plasmamembrane
 - c. Nuclear Membrane
 - d. Ribosome
2. Slime layer and capsule in bacteria are modification of the
 - a. Glycocalyx
 - b. Cell wall
 - c. Tonoplast
 - d. Pellicle

3. Assertion: Pili are tubular structures present in bacterial which help in conjugation.

Reason: Formation of pili is controlled by F^+ or fertility factor.

- a. Both A and R are true and R is the correct explanation of A.
- b. Both A and R are true but R is not the correct explanation of A.
- c. A is true but R is false.
- d. Both A and R are false.

4. What are plasmid ?

5. The type of ribosome found in prokaryotic cells

- a. 100 S
- b. 80 S
- c. 60 S
- d. 70 S

II. Multiple choice questions

1. Fluid mosaic model of plasma membrane was proposed by

- a. Singer & Nicholson
- b. Watson & Crick
- c. Robert Hooke
- d. Alfanzo Corti

2. Mitochondria are semi autonomous as they possesses

- a. DNA
- b. DNA +RNA
- c. DNA + RNA + ribosomes
- d. Proteins

3. Consider the following statements

- i. Plant cells have centrioles which are absent in almost all animal cells
- ii. Ribosomes are the site of protein synthesis
- iii. The middle lamella is a layer mainly of calcium carbonate which holds the different neighbouring cells together.
- iv. In animal cells steroidal hormones are synthesized by smooth endoplasmic reticulum.

- a. ii & iv only are correct
- b. i & ii only are correct
- c. iii & iv only are correct
- d. iii & i only are correct

4. Which of the following are true for nucleolus?

- a. Larger nucleoli are present in dividing cells.
- b. It is a membrane bound structure.
- c. It takes part in spindle formation.
- d. It is the site for active ribosomal RNA synthesis.

5. Match the column

	Column I		Column II
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A.	Protein	i	SER
B.	Lipid	ii	Golgi Body
C.	Glycoprotein	iii	Lysosome
D.	Hydrolytic enzyme	iv	RER

- A- i ; B- ii ; C – iii ; D – iv
- A- iv ; B- ii ; C – i ; D – iii
- A- iv ; B- i ; C – ii ; D – iii
- A- i ; B- iii ; C – ii ; D – iv

III. Source based

The cell membrane is mainly composed of lipids and proteins. The major lipids are phospholipids that are arranged in a bilayer. Also, the lipids are arranged within the membrane with the polar head towards the outer sides and the hydrophobic tails towards the inner part. This ensures that the nonpolar tail of saturated hydrocarbons is protected from the aqueous environment . In addition to phospholipids membrane also contains cholesterol. Later, biochemical investigation clearly revealed that the cell membranes also possess protein and carbohydrate. The ratio of protein and lipid varies considerably in different cell types. In human beings, the membrane of the erythrocyte has approximately 52 per cent protein and 40 per cent lipids. Depending on the ease of extraction, membrane proteins can be classified as integral and peripheral. Peripheral proteins lie on the surface of membrane while the integral proteins are partially or totally buried in the membrane. One of the most important functions of the plasma membrane is the transport of the molecules across it. The membrane is selectively permeable to some molecules present on either side of it. Many molecules can move briefly across the membrane without any requirement of energy and this is called the passive transport. Neutral solutes may move across the membrane by the process of simple diffusion along the concentration gradient, i.e., from higher concentration to the lower. Water may also move across this membrane from higher to lower concentration. Movement of water by diffusion is called osmosis. As the polar molecules cannot pass through the nonpolar lipid bilayer, they require a carrier protein of the membrane to facilitate their transport across the membrane. A few ions or molecules are transported across the membrane against their concentration gradient, i.e., from lower to the higher concentration.

- Mention the structure of phospholipid bilayer.
- A few ions or molecules are transported across the membrane against their concentration gradient. How does this process occur?
- Give an example for the above-mentioned question b.
- Neutral solutes and water move across the membrane by _____
- State one difference between osmosis and diffusion.