7. Name two cell-organelles that are double membrane bound. What are the characteristics of these two organelles? State their functions and draw labelled diagrams of both?
Solution: Mitochondria and chloroplast are double membrane bound organelles. Mitochondria: Mitochondria are cylindrical or sausage shaped cell organelles and contains two membranes, outer and inner. The inner compartment is called the matrix containing DNA, RNA, ribosomes, enzymes of Krebs cycle etc and outer membrane forms the continuous limiting boundary of the organelle. Inner membrane forms number of infoldings called the cristae which increases the surface area. Oxysomes are present on inner mitochondrial membrane. Mitochondria are semiautonomous organelles, i.e., have their own DNA and ribosomes.

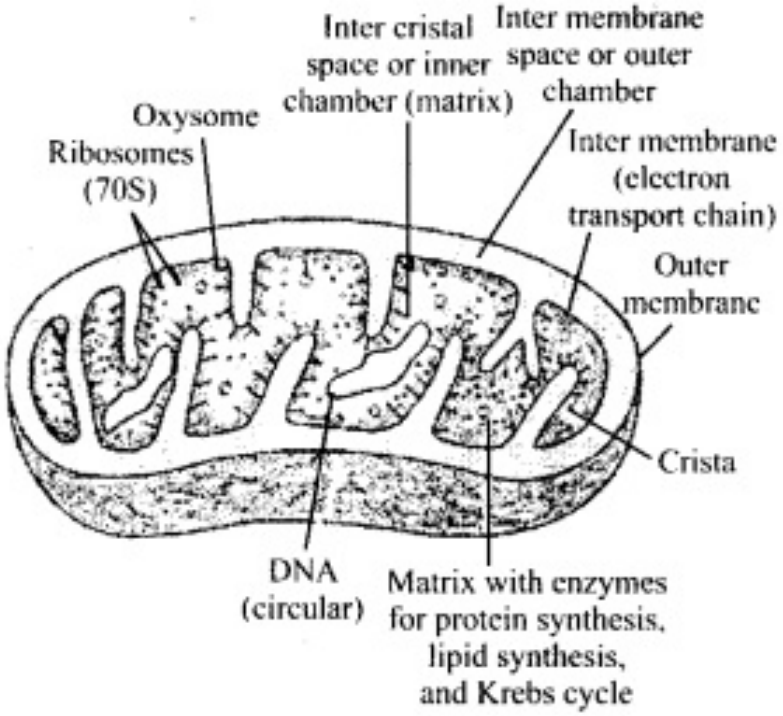

Fig.: A mitochondrion in section.

Functions of mitochondria:

- Mitochondria are essential for aerobic respiration.
- Mitochondria provide intermediates for synthesis of important biomolecules such as chlorophyll, cytochrome, steroids etc.
- Mitochondria regulate the calcium ion concentration in the cell.
- Mitochondrial matrix contains enzymes for the synthesis of fatty acids.
- Synthesis of many amino acids takes place here

Chloroplast: They are green coloured plastids which are disc shaped. The space limited by inner membrane of chloroplast is called as stroma. Stroma has organised flattened membranous sacs called the thylakoids. Thylakoids are arranged in stacks called grana. Matrix of a chloroplast contains DNA, RNA, ribosomes and enzymes. Chloroplast is also a semiautonomous organelle.

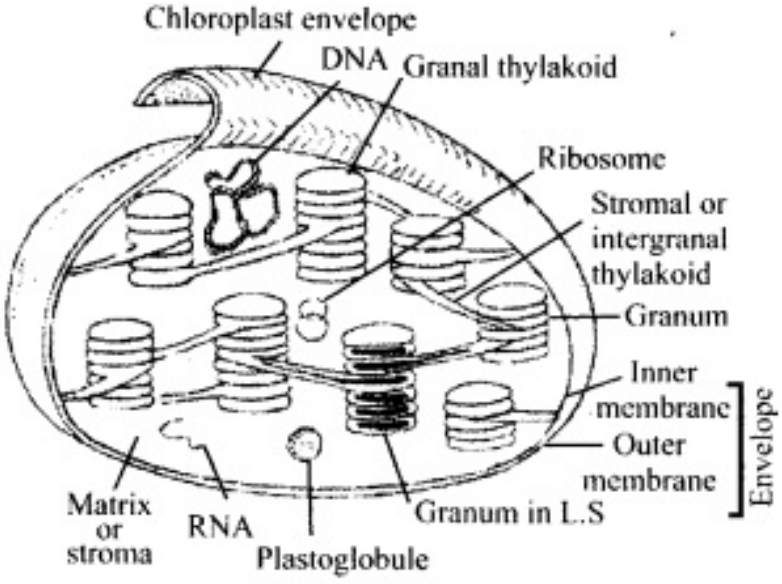

Fig.: 3-dimensional structure of a chloroplast.

Functions of chloroplast:

1. Photosynthesis is performed by chloroplast.
2. Chloroplast stores starch grains.
3. Maintains balance of CO_2 concentration in the air.
4. Keeps oxygen balance constant in atmosphere by liberating O_2 into the atmosphere, used during respiration and combustion.

8. What are the characteristics of prokaryotic cells?
Solution: Characteristics of prokaryotic cells are as follows:

- The prokaryotic cell is essentially a single - envelope system.
- Prokaryotes lack membrane bound cell organelles.
- Prokaryotes have 70S ribosomes.
- DNA is naked and lies coiled in cytoplasm. It is not covered by nuclear membrane and is termed as nucleoid.
- Nuclear components, like, nuclear envelope, nucleolus, nucleoplasm are absent.
- Cell wall is present in bacteria and cyanobacteria, but absent in mycoplasma.
- Multiplies by asexual reproduction.
- Transcription and translation takes place in cytoplasm.

9. Multicellular organisms have division of labour. Explain.
Solution: Division of labour is differentiation of certain components or parts to perform different functions for increased efficiency and higher survival. Multicellular organisms often possess millions of cells. Various cells are grouped together to form specific tissue, organ or organ system, with each specialised to perform particular function. Every cell of a multicellular organism cannot obtain food from outside. The organism requires a system for obtaining food, its digestion and distribution. Therefore, a digestive system and system of transport are also required. Certain cells of the body take over the function of reproduction. Others take part in repair and replacement of worn out or injured portions. For optimum functioning of cells, a multicellular organism also requires an internal favourable environment. Therefore, multicellular organisms come to have division of labour.

10. Cell is the basic unit of life. Discuss in brief.
Solution: Cell is fundamental, structural and functional unit of life, as no living organism can have life without being cellular. All life begins as a single cell. An organism is either made of single cell (unicellular) or many cells (multicellular). In unicellular organism, single cell is capable of independent existence and perform all

essential functions of life, while in multicellular organism, each group of cells is specialised for specific function. Life passes from one generation to the next in form of cells, and new cell always arise from division of pre-existing cells. Cells are totipotent, i.e., single cell has ability to form whole organism. The activities of an organism are sum total of activities of its cells, therefore, cell is the basic unit of life.

11. What are nuclear pores? State their function.
Solution: Nuclear envelope bounds the nucleus from outside and separates it from cytoplasm. It consists of two membranes, with outer membrane continuous with endoplasmic reticulum. The nuclear envelope is interrupted by minute nuclear pores, at a number of places, which are produced by the fusion of its two membranes. These nuclear pores are the passages through which movement of RNA and protein molecules takes place in both directions between the nucleus and the cytoplasm.

12. Both lysosomes and vacuoles are endomem-brane 'structures, yet they differ in terms of their functions. Comment.
Solution: Organelles of endomembrane system such as lysosome and vacuoles function in close coordination with one another but are specialised to perform different functions. Lysosomes breakdown the ageing and dead cells, they help in digestion of food as they contain hydrolytic digestive enzymes. They are involved in cell division also. Vacuoles on other hand, help in excretion and osmoregulation in Amoeba (contractile vacuole) or provides buoyancy, mechanical strength in prokaryotes (air vacuoles).

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