

# "Cell Structure"

## Cell:

"A cell is defined as the smallest, basic unit of life that is responsible for all of life's processes."

- A cell is the structural and Fundamental unit of life. The study of cells from its basic structure to the functions of every cell organelle is called **Cell biology**. Robert Hooke was the first Biologist who discovered cells.

## Cell Structure:

The cell structure comprises individual components with specific functions essential to carry out life's processes. These components include: -

1. Cell wall.
2. Cell membrane.
3. Cytoplasm.
4. Nucleus.
5. Cell organelles.

## Cell Membrane:

- (1) The cell membrane is the outer covering of a cell within which all organelles are enclosed. It is also referred as Plasma membrane.

Date: \_\_\_\_\_

(ii) The major components of cell membrane are carbohydrates, phospholipids, proteins and other lipids such as cholesterol.

(iii) By structure, it is a porous membrane (with pores) which permits the movement of substances in and out of the cell. Besides this, the cell membrane also protects the cell component from damage and leakage.

(iv) In plants, cell wall is present outside the cell membrane.

## Cytoplasm:

The cytoplasm is a thick, clear, jelly-like substance present between the cell membrane and nucleus. All the cell organelles like (iv)

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(taken in tabul)

# Cell organelles

## Endoplasmic Reticulum

The endoplasmic reticulum is involved in the transportation of substances throughout the cell. It plays a primary role in the metabolism of carbohydrates, synthesis of lipids, steroids and protein.

## Ribosomes

Ribosomes are the protein synthesisers of the cell.

## Golgi Bodies

Golgi bodies are called the cell's post office as it involves in the transportation of materials within the cell.

## Mitochondria

The mitochondria is called "the power house of the cell", because it produces ATP - the cell's energy currency.

## Chloroplasts

Chloroplasts are the primary organelles for photosynthesis.

It contains the pigment chlorophyll.

## Vacuoles.

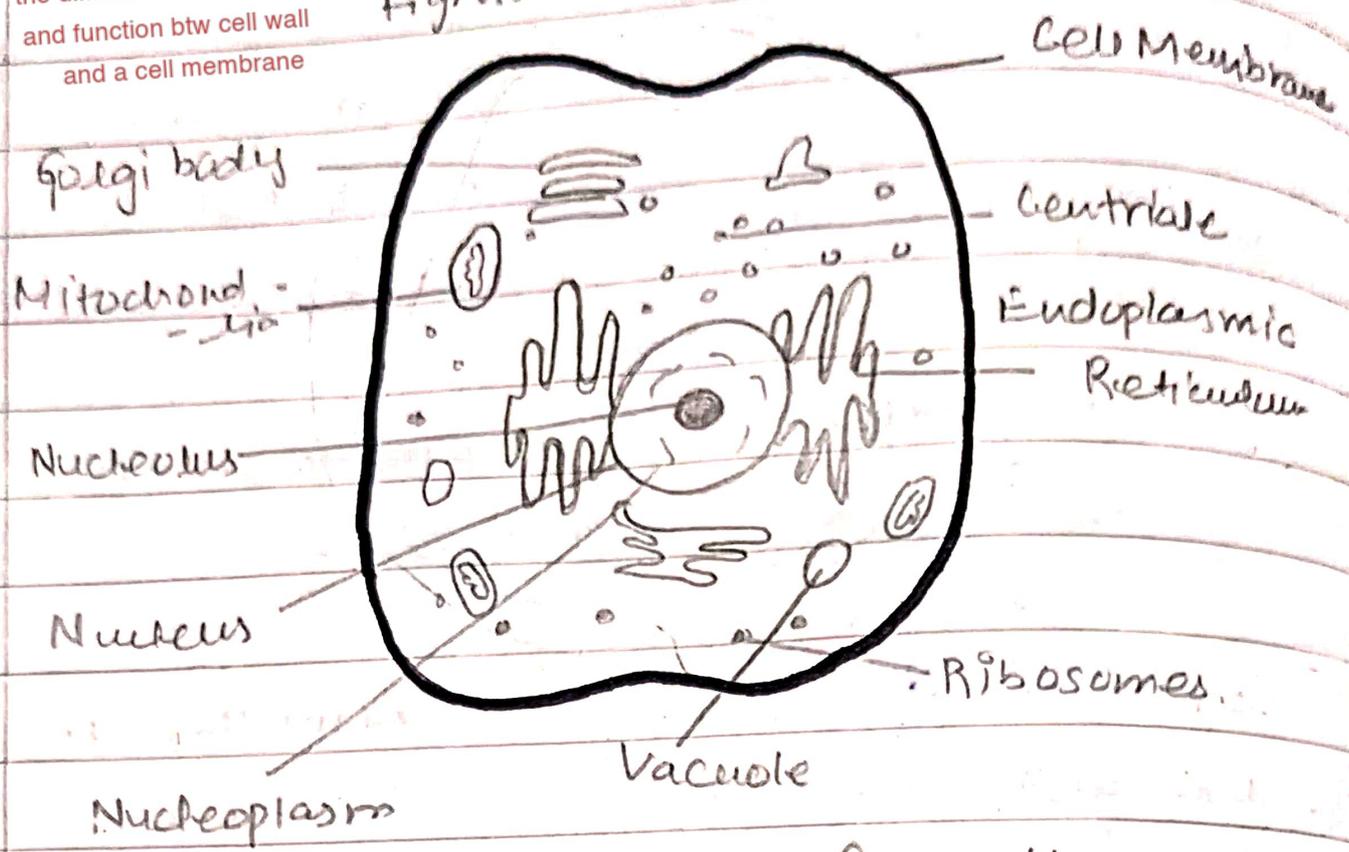
Vacuoles store food, water and other waste materials in the cell.

## Nucleus:

1. The major component of the cell is nucleus, present at the cell of animal cells and at the side of the plant cells.
2. The nucleus of the cell consists of the nuclear membrane, nucleolus, nucleoplasm, and chromosomes that carries the genetic information in DNA.
3. It sends signals to cells to the cell to grow, mature, divide and die.

Draw diagram of Plant and animal cell. Explain the difference in structure and function btw cell wall and a cell membrane

Fig: Animal Cell



Cell membrane Cell wall

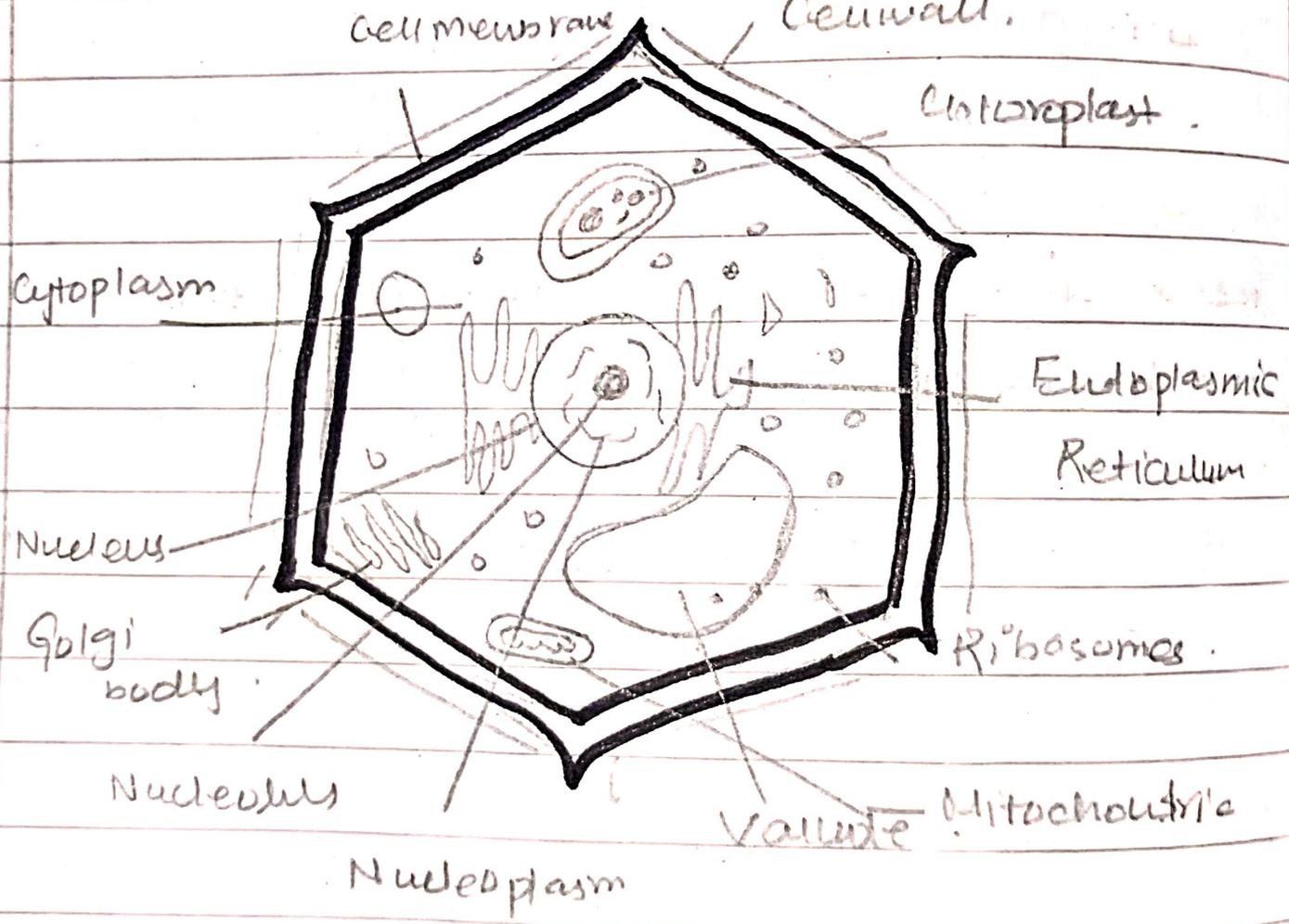


Fig: Plant Cell

## Cell Wall

## Cell Membrane

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### Structure of a Cell Wall

1. The outermost layer of plant cell is called cell wall.
2. It is present only in plant cell.
3. The cell wall has a thick and rigid structure with a fixed shape.
4. Pectin, cellulose and hemicellulose form the cell wall.
5. The cell wall is 0.1  $\mu$ m thick.

### Structure of a Cell Membrane

- The outermost layer of animal cell is cell membrane.
- It is present in all types of <sup>living</sup> cells.
- The cell membrane has a thin and delicate structure with a fixed shape.
- It is made up of 4 types of molecules: proteins, carbohydrates, cholesterol and phospholipids.
- It is 7.5-10nm thick.

## Functions of Cell wall

## Functions of cell Membrane

### 1. Selective Permeability

Cell walls are generally less selective than cell membranes, allowing some molecules like water and ions to pass through smoothly.

### Flexible Gatekeeper

It controls the movement of molecules in and out of the cell, acting as selective gatekeeper -

### 2. Cell wall lacks receptors.

contains receptors facilitating cell to cell communication.

### 3. Cell wall: supports, shape and protect from harsh environment.

cell membrane involves in motility, conduction, cell division, sexual reproduction etc.

# Functions of Human Cell

Elaborate the seven main functions of cell in human beings

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Human cells are the basic structural and functional units of the body. Following are the key functions:

## Metabolism:

Cells perform all metabolic reactions, including the break down of nutrients to produce energy (catabolism) and the synthesis of molecules (anabolism).

**Example:** Cellular respiration in mitochondria produces ATP.

## Reproduction (Cell Division):

Cells reproduce themselves by mitosis (for growth and tissue repair) or meiosis (for gamete formation in reproductive cells).

## Response to Stimuli:

Cells can detect changes in their environment and respond accordingly.

**Example:** Nerve cells transmit signals in response to stimuli.

## Excretion:

Cells produce waste products (e.g. carbon dioxide, urea) that are expelled to maintain cellular health.

## Protein Synthesis:

- Cells use their DNA code to direct the synthesis of proteins in ribosomes.
- Protein serves as enzymes, hormones, structural components and more. ∴

## Growth:

Cells grow by increasing in size and synthesizing new components, which is vital for tissue and organ development.

## Specialized Functions:

Many cell types have unique functions. For

example:

1. Muscle cells contract to enable movement.
2. Red blood cells transport oxygen.
3. Immune cells defend against pathogen.

In summary, human cells perform various functions essential for sustaining life, including energy production, synthesis of molecules, communication, reproduction and maintaining homeostasis.