

Q NO 1:

A)

## CELL:

Cell is the smallest unit of all living organisms. Cell is discovered by Robert Hooke in 1665.

"Cell is the basic structural and functional unit of life."

Cell is a membrane bound organelle that contains the fundamental molecules of life. The cell is capable of metabolizing its own nutrients, synthesizing many type of molecules, replicating on its own and providing its own energy for the proper functioning of cell.

A cell is often a complete organism on its own, such as bacterium and yeast.

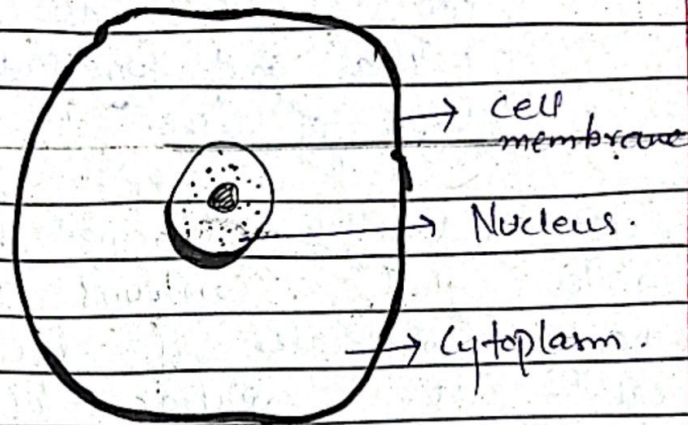
Cell is an enclosed membrane bounded organelle containing different organelles in its cytoplasm.



# STRUCTURE OF CELL:

A cell consists of ~~three~~ main parts :

- a) Cell membrane
- b) Cytoplasm (organelles).
- c) Nucleus



## CYTOPLASM:

Cytoplasm is a gel-like structure ~~is~~ in the cell that exists outside the nucleus membrane and inside the cell membrane.

Composition:

It is composed of water, salts, and other important organelles.

In cytoplasm materials move by physical process of diffusion.



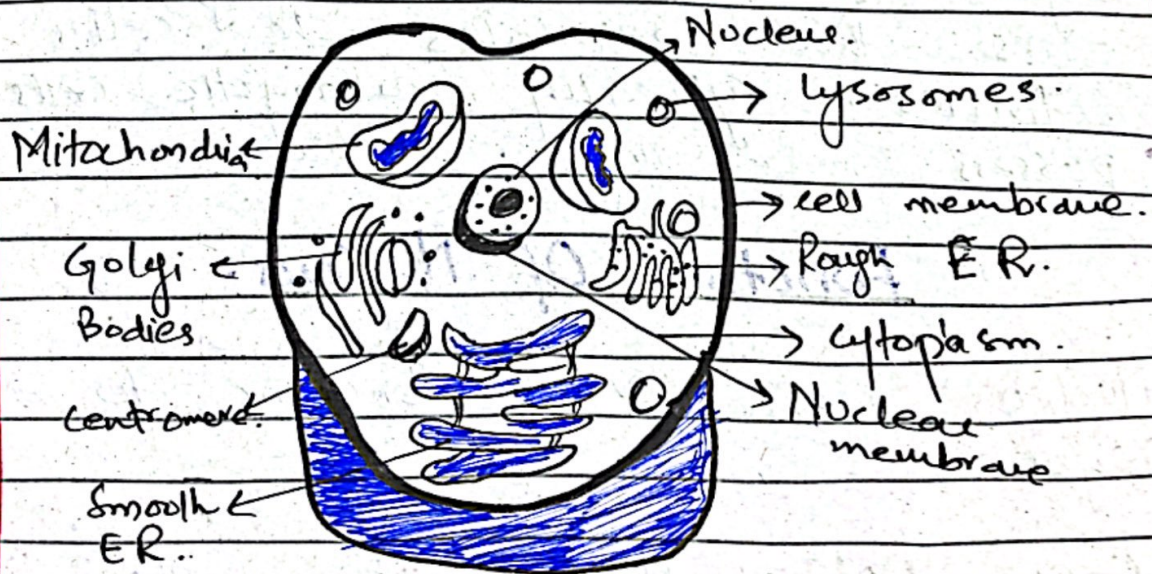
## Structure of Cytoplasm:

The structure of cytoplasm is made up of gel-like substance called cytosol, organelles and a network of protein fibers called cytoskeleton.

**Cytosol:** A semi-fluid, water based solution that contains ions, small molecules and macromolecules. The cytosol is mostly water but protein suspended in it give it gel-like consistency.

## Cytoplasmic Organelles:

Cytoplasmic organelles are suspended in cytosol and include the mitochondria, ribosomes, endoplasmic reticulum, golgi apparatus etc.





# Function Of Cytoplasm:

Cytoplasm performs many functions like:

- a) It is a medium for chemical reactions.
- b) Provides a platform where other organelles operate within the cell.
- c) Functions like cell expansion, growth and replication are carried out in cytoplasm.

# NUCLEUS:

Presence of cell nucleus was reported in 1831 by Robert Brown.

Nucleus is membrane bound organelles found in eukaryotic cells that regulates the cell's activities. Typically, eukaryotic cells possess a single nucleus.

## Function Of Nucleus:

Nucleus has several functions to perform:

**Storing DNA:** Nucleus stores the cell's DNA, which is cell's hereditary material.



**DNA replication:** The nucleus is where DNA replication occurs, which is process of duplicating DNA for cell division.

**Coordinating cellular activities:** The nucleus coordinates many important cellular activities, such as protein synthesis, cell division and growth.

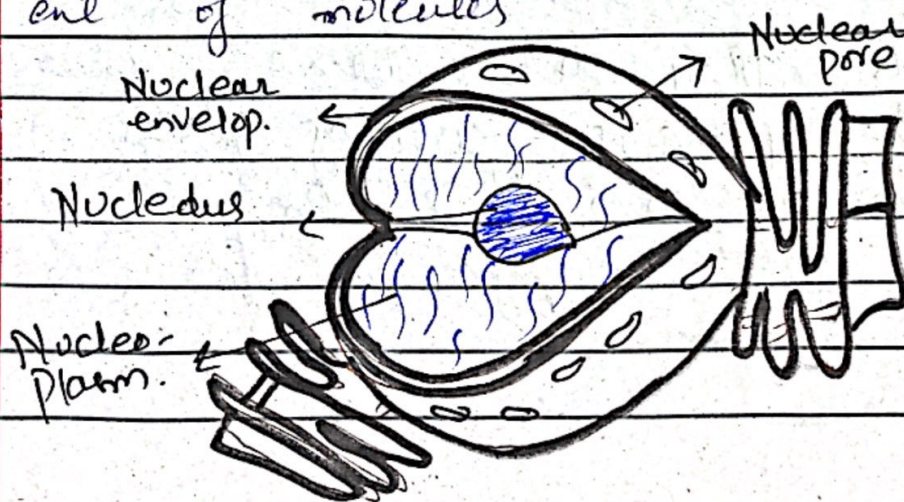
## Structure of Nucleus:

Nucleus consists of nuclear membrane, nucleoli, nucleoplasm and chromosome.

**Nuclear membrane:** It is a double membrane that encloses genetic material.

**Nucleolus:** A dense structure of RNA and DNA in the nucleus is known as nucleolus.

**Nuclear pore:** It is a tiny hole within nuclear membrane that allow movement of molecules.





# Plastid:

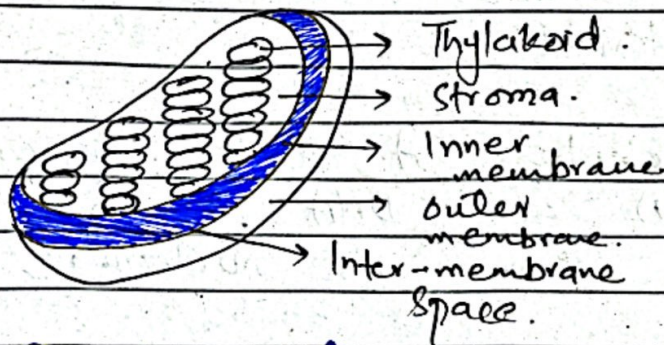
Plastid is an organelle found in plant cell and algae. They are membrane-bound and contain their own DNA and ribosome.

## Structure Of Plastid:

The structure of plastids include:

Outer membrane, inner membrane, intermembrane space, stroma. (The aqueous fluid within plastid.)

Thylakoid membrane (Internal folded membrane containing closed disks called thylakoids.)



## Function of Plastid:

Plastids play a crucial role in photosynthesis, enabling plants to convert sunlight,  $\text{CO}_2$  & water into energy.



B)

## NEPHRON:

Nephron is the structural and functional unit of kidney. It is responsible for filtering blood and producing urine.

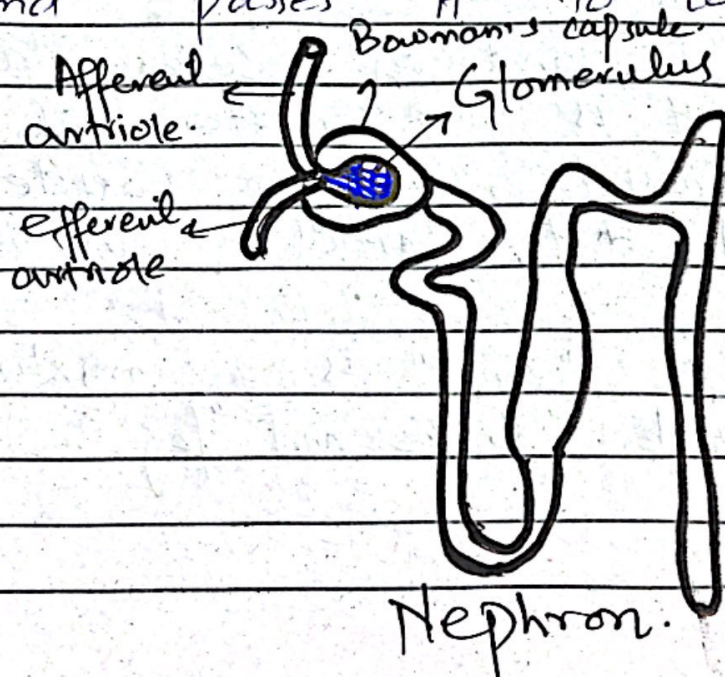
### Structure of Nephron:

The nephron is made up of following parts:

**Renal Corpuscle:** It consists of glomerulus, a tuft of capillaries, and the Bowman's capsule, a cup-like structure.

**Renal Tubule:** It extends from the Bowman's capsule and is made up of epithelial cells within a lumen.

**Collecting duct:** It collects urine and passes it to uterus.





## Functions of Nephron:

The nephron performs following functions:

**Filters blood:** Blood is filtered as it passes through the glomerulus.

**Reabsorption of Nutrients:** The renal tubules reabsorb essential nutrients back into the blood.

**Secretes hormone:** The nephron secretes hormones such as erythropoietin.

**Regulates blood pressure:** The nephron also helps in regulating blood pressure and volume.

c)

## SMOG:

Smog is a kind of severe air pollution. It is a mixture of sulphur dioxide, nitrogen oxide, smoke and dust particles in the air.

The word "smog" is a mixture of the word "smoke" and "fog".



## Causes of smog:

The main cause of smog formation is the burning of fuel for industrial and transportation purposes. When the fuel in the form of coal and oil is burnt, they release large amount of smoke particles which contribute to air pollution.

## Preventive measures for smog formation:

The preventive measures for smog formation are:

Reduce vehicle emissions: Using high quality fuel for the vehicle, and use of public transportation and bicycle can reduce smog formation.

Using less fossil fuel: By using renewable energy sources like wind, nuclear or hydroelectric power and using electric appliance instead of fossil-fuel-powered ones can help in the reduction of smog formation.



## D) SOLID WASTE MANAGEMENT:

SWM stands for solid waste management. It is the process of collecting, handling and disposing of waste. It is an important part of environmental management systems. It is based on the principle of reuse, reduce and recycle.

### Weaknesses in SWM Of Pakistan:

In Pakistan SWM faces several challenges due to urbanization, population growth and inadequate infrastructure.

#### a) Insufficient Infrastructure:

Insufficient infrastructure is a big hurdle in SWM. There is lack of waste collection system in Pakistan. Only 50-70% of wastes in urban areas is collected, while rural areas lack any formal collection systems.

#### b) Poor Waste Seg



## b) Poor waste segregation and Recycling Practices

The household and businesses do not separate organic, recyclable and hazardous waste. It is also accompanied by low recycling rate as informal sector has no large-scale recycling infrastructures.

## c) Financial Constraints:

The municipal budgets are insufficient to cover the costs of collection, transportation and disposal. etc.

## Q NO 2:

# BRAIN:

Brain is the central and leading part of central nervous system.

Brain is the basic processing unit of nervous system.

Its function is to control center for processing and sending information throughout the body.



# Structure Of Brain:

The brain is divided into three main parts:

- a) The Forebrain
- b) The Mid-brain
- c) The Hind brain

## a) Functions associated with Fore-Brain:

The fore-brain is the largest and most complex part of brain. It is responsible for higher executive functioning such as:

Decision making, planning, language, processing, emotion regulation, Cerebrum is responsible for intelligence and memory. The executive motor functioning of voluntary movement etc are carried out by fore-brain.

## b) functions associated with Hind-Brain:

The hind-brain is located at the back of brain. It consists of pons, cerebellum

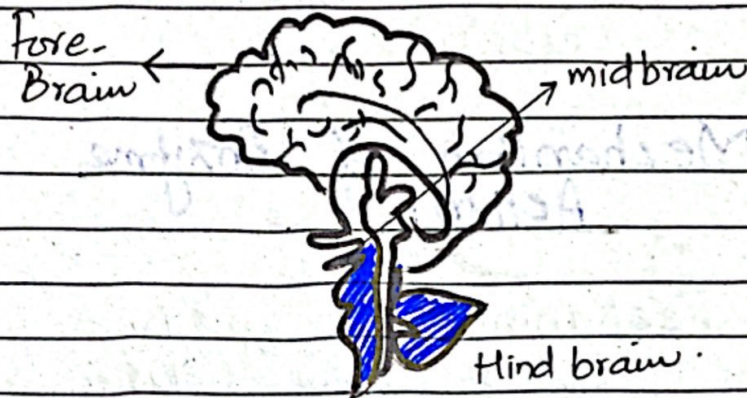


and medulla oblongata.

The cerebellum coordinates eye-movement and maintains balance.

Medulla controls automatic functions like breathing and heart-beat.

Pons controls the sleep and wakefulness.



B)

## ENZYMES:

Enzymes are the biological catalysts. They tend to speed up the reaction (chemical) by lowering the activation energy without getting completely utilized. After the completion of the action, enzymes leave the chemical reactions.

Enzymes are Protein in nature, increases the reaction rate and remains unchanged at the end.



## Characteristics of Enzyme:

Enzymes speeds up the chemical reaction by lowering the activation of energy, required for molecules to act.

Enzymes are highly specific in their actions because each enzyme has different shaped active site that fits with specific substrates.

## Mechanism of Enzyme Action:

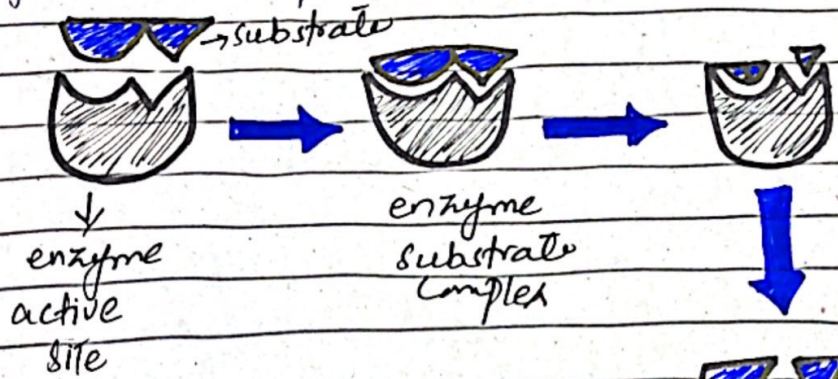
The mechanism of enzyme action involves few steps:

**Binding:** Enzymes has a specific region called the active site where the substrate binds. The specific type of substrate combines with the active site of the enzyme.

**Catalyzing:** The enzyme catalyzes the chemical reaction that forms product. When substrate binds with the enzyme an enzyme-substrate complex is formed that catalyze the chemical reaction.



Dissociating: The products separate from the enzyme surface after completing the reaction.



Mechanism of action of enzyme.

product leaving the active site of enzyme.