

## Question # 1

## 1(a)

Cell is considered as a 'basic unit of life'. Explain the structure and function of cytoplasm, plastids and nucleus.

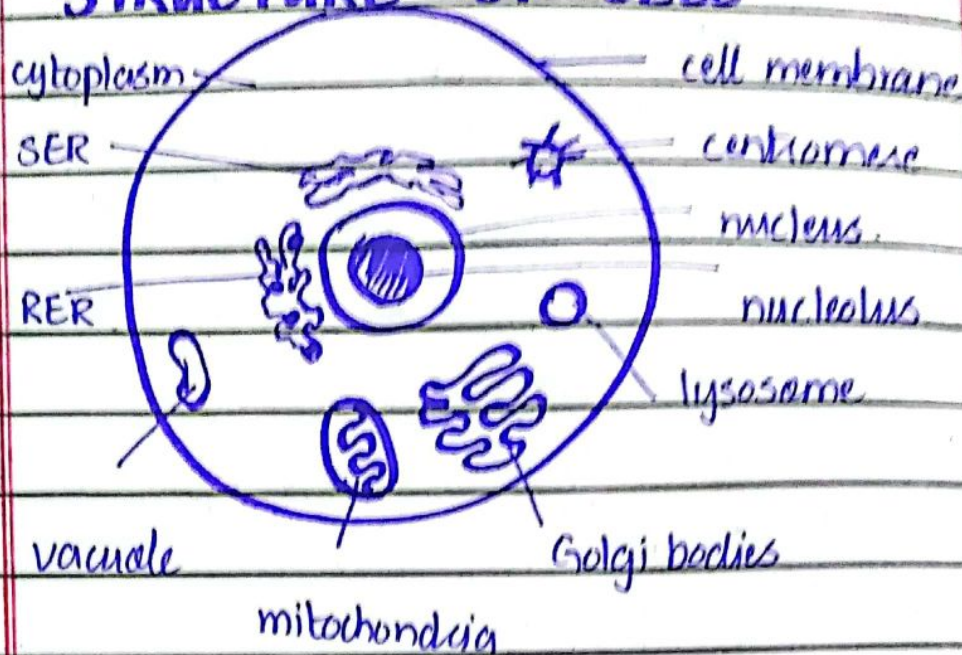
Cells are considered the basic unit of life because all the living organisms are made up of cells and all the functions taking place inside the body of an organism are performed by cells. They perform all the physiological activities inside our bodies.

A cell consists of 3 <sup>major</sup> parts: the cell membrane, nucleus and cytoplasm.

The cytoplasm contains distinct structures called organelles.



# STRUCTURE OF CELL

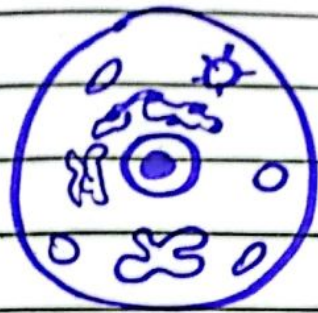


## CYTOPLASM STRUCTURE AND FUNCTION

Cytoplasm refers to the fluid that fills up the cell. Cytoplasm fluid has a gel like consistency that helps the cell maintain its shape and form. It fills up the cell and enables the organelles to remain in their place enclosed within the cell membrane. Without the cytoplasm the cell would become deflated and substance would not be able permeate easily from one



organelle to the other.



Normal cell with cytoplasm.



Damaged cell with ruptured membrane and cytoplasm drained.

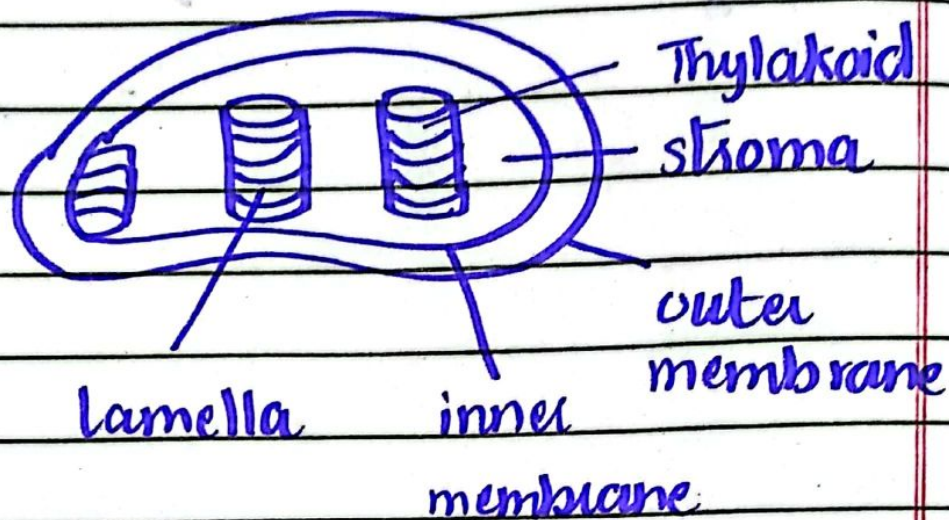
Apart from maintaining the shape of the cell, cytoplasm is home to many molecular and enzymatic activities of the cell. It assists in metabolic activities occurring within cells.

## PLASTIDS STRUCTURE AND FUNCTIONS

Plastids are a type of organelle that are found in plant cells. They are double membrane bound organelles that are responsible for manufacturing and storing food. They also contain



pigments that help in the process of photosynthesis.



The plastids have 2 membranes. The outer membrane is the primary covering of the organelle. Inner membrane is the secondary covering. The area between the inner and outer membrane is called stroma intermembrane space. Stroma is the aqueous fluid present within the plastid. Lamella are stacked in several piles in the plastids to form Thylakoid.

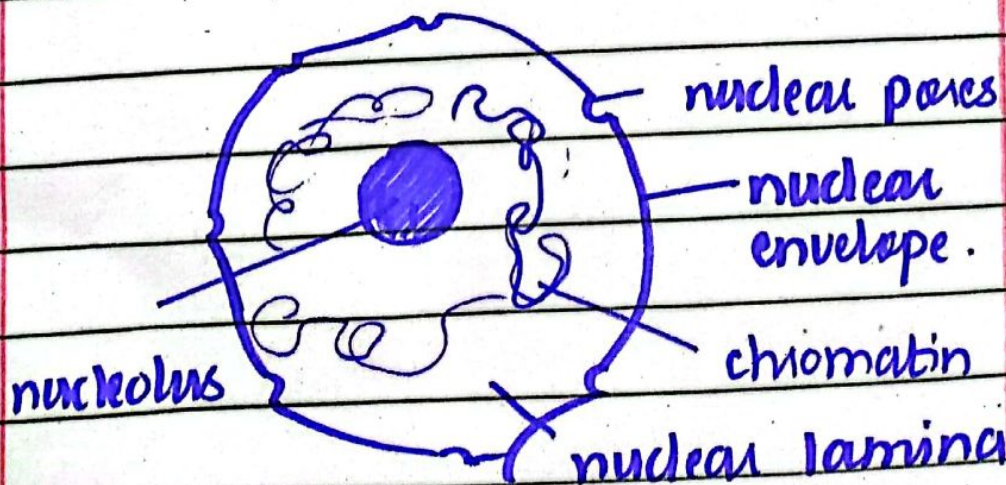


Plastids can be classified as chloroplast, chromoplast and leucoplast. Each of these has separate functions.

Chlorophyll helps in photosynthesis hence plastids are required for food synthesis. Chromoplast contains pigment and provides colour to plant cells. They also act as a contributor to pollination. Leucoplasts act as storage agents.

## NUCLEUS STRUCTURE AND FUNCTION

Nucleus is made up of several elements. It has a nuclear envelope, nuclear lamina, nucleolus and nuclear pores.





All the components work to make the nucleus accomplish its functions. Nucleus controls the genetic information of the cell and thus the heredity characteristics of an organism. Control of the protein and enzyme synthesis, it also stores DNA, RNA and ribosomes. It is also responsible for the production of ribosomes. It appears as a dark organelle at the center of the cell.



## Question # 2. (b)

# NEPHRON

Nephron is the basic functional unit of kidney, it is responsible for removing waste from the body. Each kidney is composed of more than a million nephrons that are present in the renal cortex.

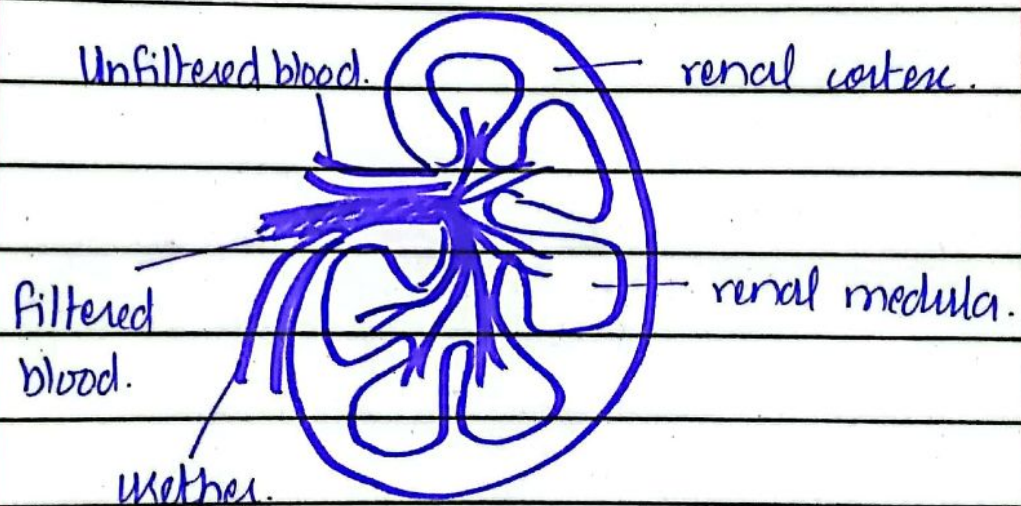


Figure: Structure of kidney

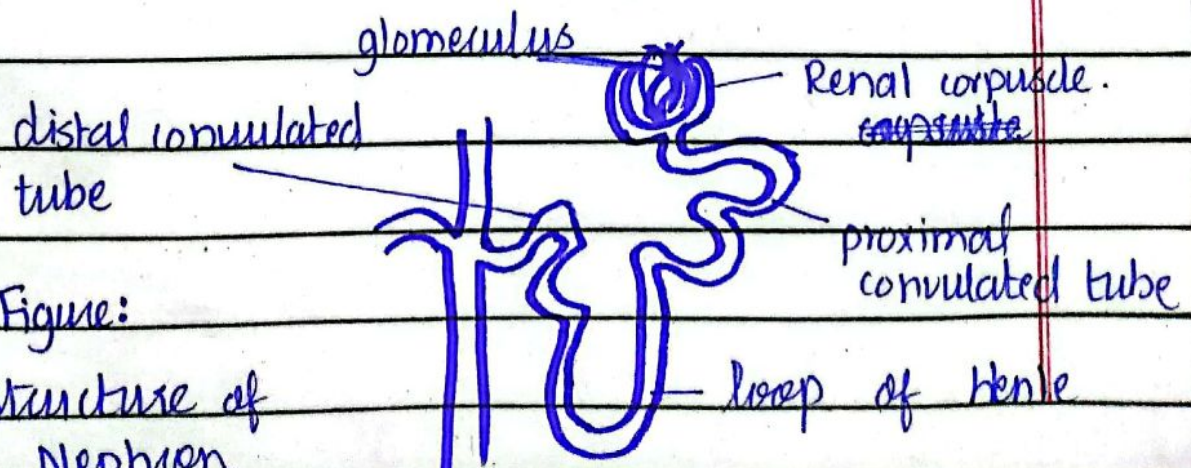


Figure:  
structure of  
Nephron.



## STRUCTURE

The nephron consists of a renal capsule that encloses the glomerulus, a proximal convoluted tube, a loop of Henle also called as nephron loop, a distal convoluted tube and a collecting duct. The collecting duct is located in the pyramids of the kidney's medulla.

## FUNCTION

The main function of nephron is to filter the blood to convert it into urine. It uses four mechanisms to convert blood into urine, filtration, reabsorption, secretion and excretion. The glomerulus filters the blood when the blood flows into the nephron. The tubule returns the required substances to your blood and removes the wastes. The blood vessel that runs along the tubule reabsorbs almost all the water, along with minerals. The excess toxins and



the remaining fluid is what forms urine.

## Question # 1(c)

### SMOG

Smog is a type of air pollution that has gripped the world.

It is a mixture of smoke, fog and various pollutants mainly as a result of human activities.

### CAUSES OF SMOG

There are several causes of smog

The main causes include, industrial emissions, vehicle emissions, burning of fossil fuels, agricultural activities, wildfires etc

**INDUSTRIAL**: Factories, power plants and refineries release large amounts of pollutants such as sulfur dioxide, nitrogen dioxide, and particulates



matter into the atmosphere. These chemicals can combine with other atmospheric elements to form smog.

**VEHICLES:** The smoke and carbon emission from the vehicles release nitrogen oxides, carbon monoxides etc. These pollutants are large contributors of smog due to heavy traffic.

**AGRICULTURE:** Fertilizers, pesticides, and methane emissions from livestock can also contribute to formation of smog.

**WILDFIRES:** Smoke from forest fires and wildfires releases a mix of carbon monoxide, heavy smoke and several other pollutants into the air that lead to smog formation.

## PREVENTIVE MEASURES FOR SMOG

Proposing preventive measures for smog involves reducing pollutant emissions



and improving the air quality. Some of these preventive measures include Reducing vehicle emissions, improved industrial regulation, carbon taxation, policy review, improving green spaces, controlling agricultural emissions.

### **REDUCING VEHICLE EMISSION:**

Promoting the use of public transportation systems, encouraging carpooling can reduce the number of vehicles on the road thus reducing emission.

Use of car exhaust filters can help trap dangerous particles, soot etc to prevent them from entering environment.

### **IMPROVED INDUSTRIAL REGULATION:**

Implementing strict emission standards for industries and power plants can help reduce smog.

### **CARBON TAXATION POLICY**

A carbon tax aimed at reducing carbon emissions can also help control this issue. It has been a potential area of development and by integrating a carbon tax at national level for



energy and transport & agriculture sector can improve the climate in Pakistan.

**GREEN SPACES:** Planting more trees and improving the green spaces and urban forests can help absorb pollutants like CO<sub>2</sub> and improve air quality.

**CONTROLLING AGRICULTURAL EMISSIONS:** Implementing sustainable agricultural practices such as reducing the use of chemical fertilizers and pesticides, can help reduce the pollutants that contribute to smog.



## Question # 1 (d)

### SMW

SMW refers to solid waste management. It includes collection, transportation, processing, recycling and disposal of solid waste management materials in a way that makes our environment thrive and minimizes the negative impacts of waste. It typically involves components such as

**Waste collection:** Gathering solid waste from households, industries etc.

**Waste transportation:** Moving waste to transfer station, treatment facilities or landfills.

**Waste treatment:** Processing waste through recycling, composting, or incineration.

**Waste disposal:** Final disposal of waste that cannot be used, to landfills.

### WEAKNESS IN SMW OF PAKISTAN



Despite being an essential aspect of environmental management, Pakistan's SMW faces several challenges, such as:

1. Inefficient waste collection systems.
2. Lack of Proper segregation of waste
3. Inadequate Recycling facilities
4. Limited waste-to-Energy programs
5. Uncontrolled dumping and landfills
6. Lack of Public awareness and participation
7. Limited government & institutional capacity
8. Overdependence on landfills
9. Ineffective policies
10. Inadequate Financing for Waste management.



The solid waste management systems in Pakistan faces numerous challenges. The absence of comprehensive and coordinated policies combined with limited resources and institutional capacity has lead to this issue becoming a huge today. Improvement in Pakistan's SMW will require concerted efforts from the government, private sector and public. Key steps towards improvement could include investing in waste segregation and recycling infrastructure, promoting public awareness campaigns, enforcing environmental regulations and improved land filling.