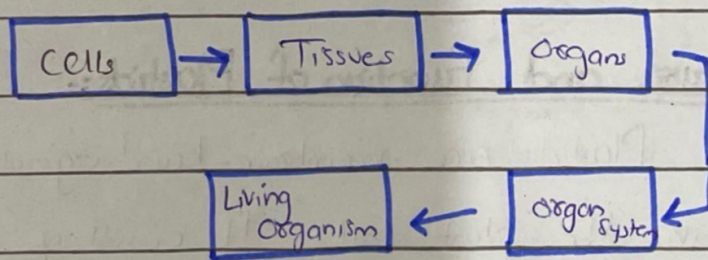


Question # 1:-

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

I. Cell - Basic Unit of Life:-

Cell is the basic structural and functional unit of living organisms. It was discovered by Robert Hook in 1665. Cells are mainly defined as prokaryotic cells or Eukaryotic cells. Cells combine to form tissue, which further combine to form organs and organs further form organ system and hence a living organism is formed.



Cells are used in reproduction, immunity and in overall working of body.



## II. Structure and Function of Cytoplasm:-

Cytoplasm is a semi-viscous and semi-transparent material found between the nucleus and cell membrane. In Cytoplasm, there is 90% water while 10% micro-nutrients, macro-nutrients etc. Cytoplasm is responsible to provide site and production to living organisms. It is also called store house of water, nutrients and vitamins.

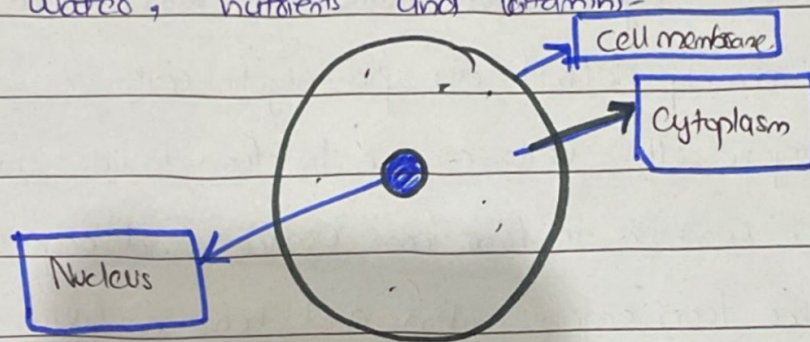


Figure: Structure of Cytoplasm

## III. Structure and Function of Plastids:-

Plastids are membrane-bound organelles found in the plant cell. It consist of three types: chloroplast, chromoplast and leucoplast.

### (A) Chloroplasts:-

Chloroplasts are double-membrane organelles



Which consists of sacs <sup>call</sup> granum - Chloroplast is responsible for the green pigments in plants - It contains chlorophyll for this -

(B) Chromoplasts:

Chromoplasts are responsible for giving color and pigments to the flowers petals and fruits -

(C) Leucoplasts:

Leucoplasts are colorless and store only starch, proteins and carbohydrates -

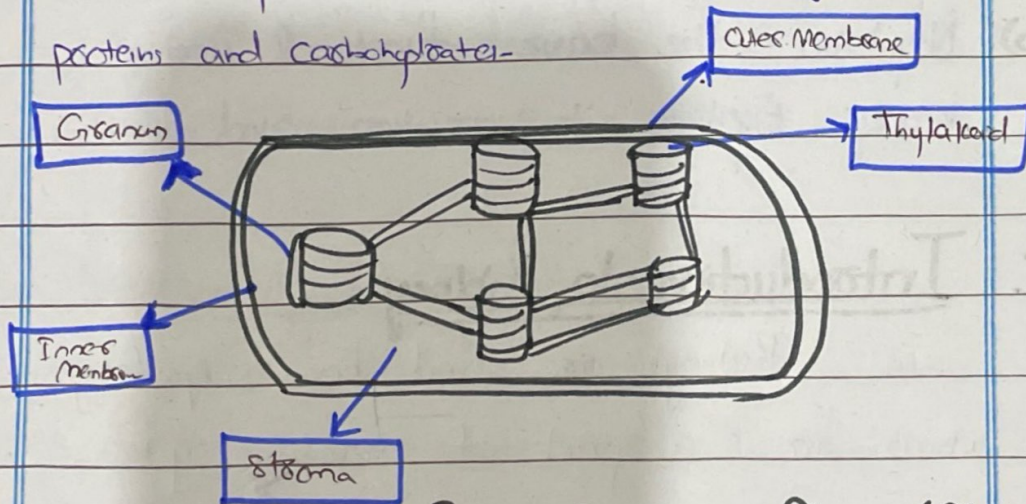


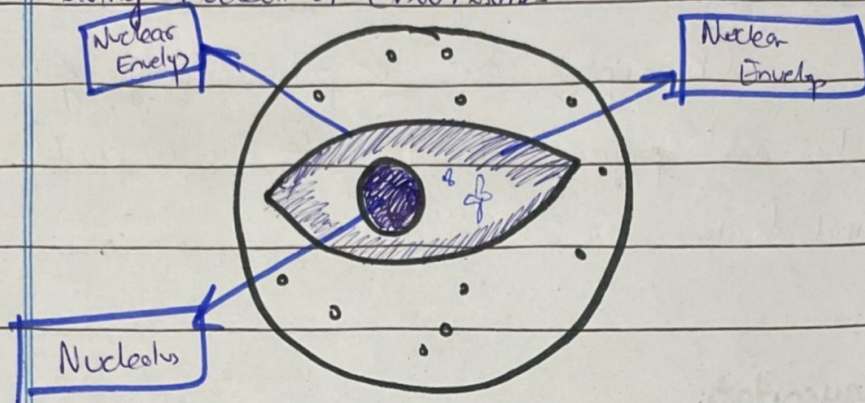
Figure: Structure of Plastids (Plant Cells)

IV. Structure and Function of Nucleus:-

Nucleus is present prominently in eukaryotic cell - However, in animal cell, it is



pushed to side - Nucleus is bounded by double membrane called nuclear envelop - It consists of small pores which act as semi-permeable membranes - A nucleoplasm is present inside nuclear envelop having nucleoli or chromosome.



(b) Nephron is the basic functional unit of kidney - Explain its structure and function.

### I. Introduction to Kidney:-

Kidneys are red bean shaped organ which are a part of excretory system.

The excretory system is responsible for the transfer of waste from the body.

### II. Nephrons - Basic Functional Unit of Kidneys:-

Nephrons are a part of kidney.



These are numerous microscopic tubules in the kidney which are responsible for the removal of waste and sorting of the useful products in the body.

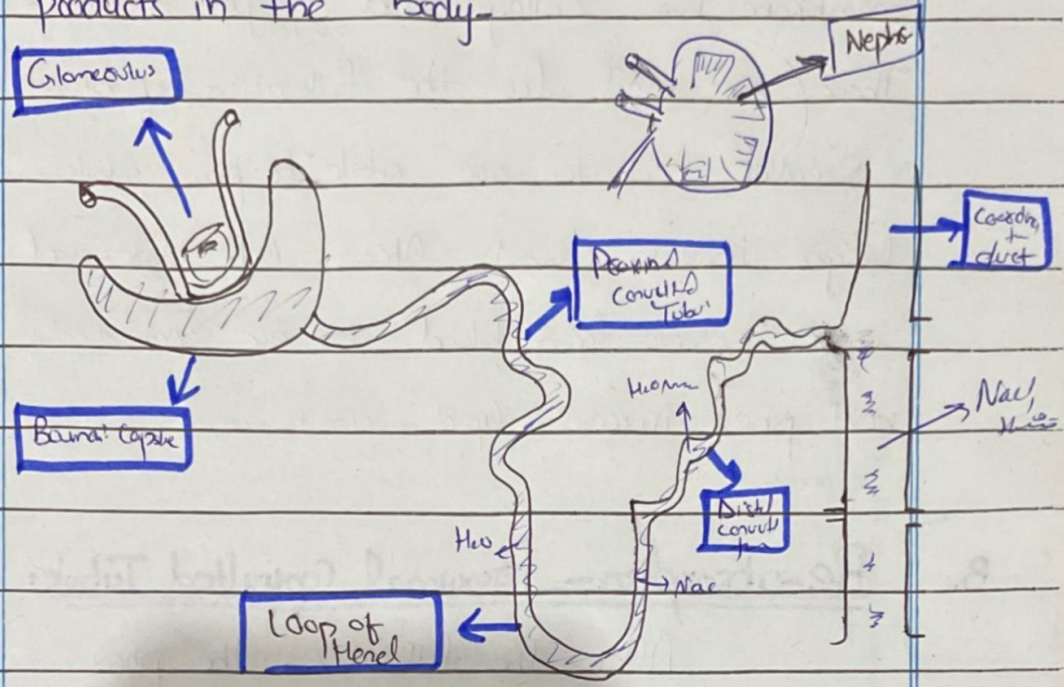
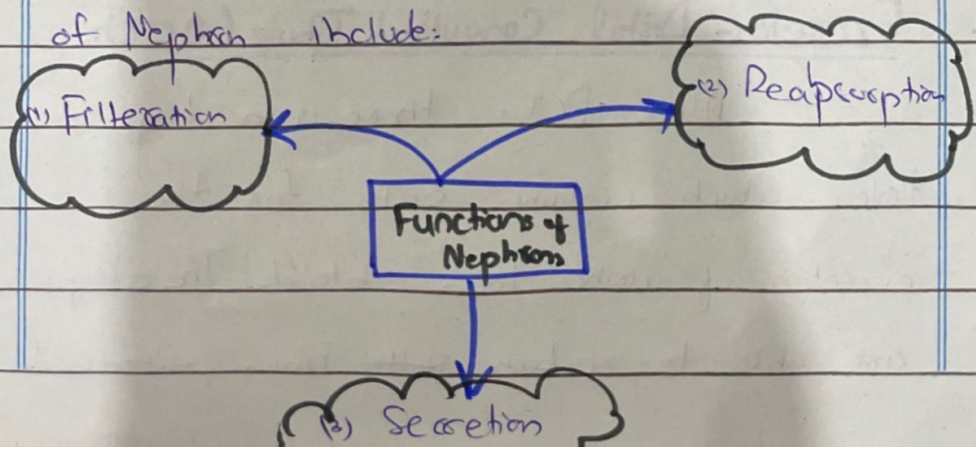


Figure: Structure of Nephron.

### III. Function of Nephron's components:

Nephron consist of tube closed at one end and open at the other end. The function of Nephron include:





:ع ٥

## A- Filteration - Glomerulus:-

Glomerulus consists of two cell layers and a basement membrane. The basement membrane has collagen and glycoprotein fibres. These are used for the filtration of blood.

Smaller molecules are able to pass while larger molecules cannot. Almost 70% solutes and water remove from blood but are reabsorbed in next phase. Moreover, lipids, amino-acids are also removed.

## B- Re-absorption - Proximal Convoluted Tubule:

After the filtration, the phenomenon of reabsorption takes place at Proximal Convoluted Tubule (PCT). Essential elements like <sup>and glucose</sup> Ions, Amino Acids, Vitamins are again reabsorbed in the blood.

## C- Excretion - Distal Convoluted Tubule (DCT):

After PCT, there is a loop of Henle which contains salts for the excretion of urine from blood. These loops are able to reabsorb ~~setts~~ Ions, water and

: 5

solvent which are reabsorbed through collecting duct. The water is pushed to descending order and enters the DCT. Then, from here the fluid moves to collecting duct for another filtration and then sent to urinary bladder.

#### IV Conclusion:-

Nephrons are indeed the functional unit of kidney since they take the blood from kidney and filter <sup>out</sup> the necessary and un-necessary things / substances from it and at the end excrete them to the urinary bladder.

(c) Discuss the causes and preventive measures to smog.

#### I. Understanding the term "Smog":

Smog is a thick, hazy air pollution which is a combination of smoke and fog. It is a mix of pollutants and gases caused by human activities.



## II. Causes of Smog:

The <sup>main</sup> factors responsible for the formation of smog are:-

### A- Combustion of fossil fuel:-

In today's world, the ~~so~~ non-renewable energy sources including coal, diesel, oil and natural gas are the major cause of ~~gas~~ smog. Since when these fossil fuel burn there is an emission of  $\text{CO}_2$ ,  $\text{SO}_2$  and  $\text{CO}$ , which pollute the environment. As per the report of **IPCC (Intergovernmental Panel on Climate Change)**,

"The energy sector is responsible to contribute 35%, agricultural sector as 25%, Industrial sector as 21% and Transport sector as 15% to air pollution."

### B- Massive Deforestation:

Plants are considered as carbon sinks. When a large number of trees are cut for housing purpose, industrial development, commercial markets or to fulfill



the energy or basic need, the rate of deforestation increases which contribute to the level of smog.

According to **Global Forest Watch (GFW)**

"A total of 10 million + hectares have been deforested in the world in the past 4 years."

### III. Rapid Urbanization:

The increasing number of people within the cities also contribute to the smog formation. Since more population means increase in the demand, more production, more fuel emission. As per the **UN report 2015:**

"54% population in the world was living in urban cities"

However, there are not the only cause. Other cause also include over population, pathetic solid waste management, and contribution of warfare tactics.



### III. Measure to Prevent the Smog:-

Some measure to prevent the smog are:

- (1) Reducing the level of greenhouse gases by using
- (2) renewable energy resources-
- (3) Promoting afforestation and reforestation of the world-
- (4) Reducing the use of private vehicles-
- (5) Introducing bi-cycle usage for short or few km distance-
- (6) Enhancing the concept of Smart cities i.e.
- (7) Vertical building rather horizontal-
- (8) Promoting sustainable industry and solid waste management

### IV. Smog Conclusion:

Smog is very hazardous for human health and other habitants. It has been caused by various effects. However, by following the above stated measure the level of smog can be decreased especially in Lahore which is severely affected this year.



(c) What is SWM? Highlight the weaknesses in the SWM of Pakistan:

## I. Introduction to Solid Waste Management:- <sup>(SWM)</sup>

Solid Waste Management is the effective system of effectively managing the waste products in a systematic way by generation, collection, transfer, treatment, recycling, recovery and disposal of waste. Solid Waste Management depends on the origin, content and hazard potential of the waste. The waste may be a municipal waste, biomedical waste, electronic waste, domestic waste or an industrial waste.

## II. Weaknesses in the SWM of Pakistan:-

Pakistan is the country where increase in population is a continuous phenomena. As the population increase, so does the factors associated with it especially the waste produced. The report by World Bank says, global waste is 1.3 billion/yr.

"Total waste generation in Pakistan is about 20-24 Million tons a year"

~ Pak Ministry of Environment Study



The major weaknesses associated with the Solid waste management in Pakistan are:

- (1) Absence of proper solid waste management system for collection and disposal of waste in any city.
- (2) Inappropriate landfills or open sites of dumping.
- (3) Landfillings are mostly unengineered.
- (4) The unusual methods of disposing.
- (5) Waste collected limited to only influential areas.
- (6) Treatment of hazardous waste and hospital waste in ordinary ways.
- (7) Loss of valuable recyclable material during dumping.

**III. Conclusion:**

Pakistan faces a number of challenges with its Solid Waste management system due to the above mentioned reasons. However, various measures including proper handling of waste etc. can be used to reduce the problem.



## Question #2:-

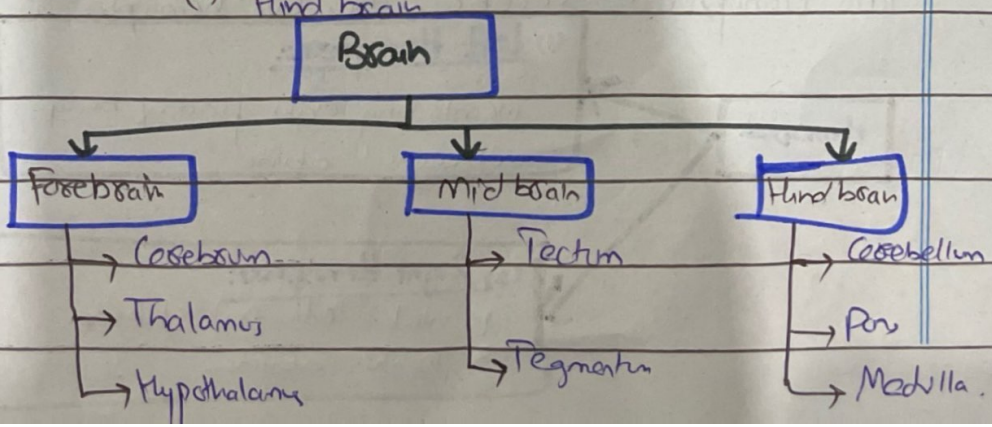
Brain is the leading part of CNS.  
Barely <sup>describe</sup> explain the function of Forebrain and Hind Brain.

### I. Introduction:-

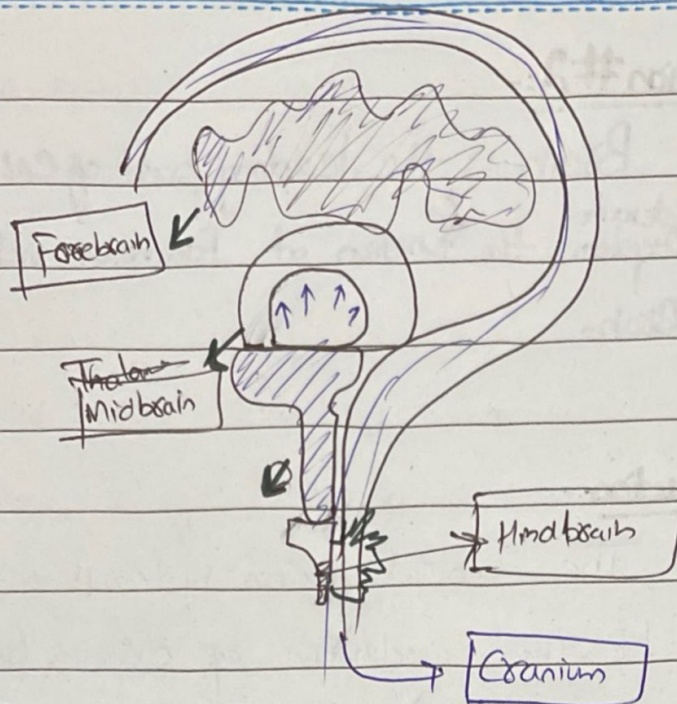
The central nervous system is responsible for the coordination of external body organs with the brain. Brain is the leading part of central nervous system. It helps in coordination, movement, perception, thinking and various functions. Brain is protected by a layer here called cranium. The fluid inside the cranium called CSF helps it from cushioning.

The three parts of brain are:

- (1) Fore brain
- (2) Mid brain
- (3) Hind brain







## II. Function of Forebrain:

Forebrain mainly consists of these parts-

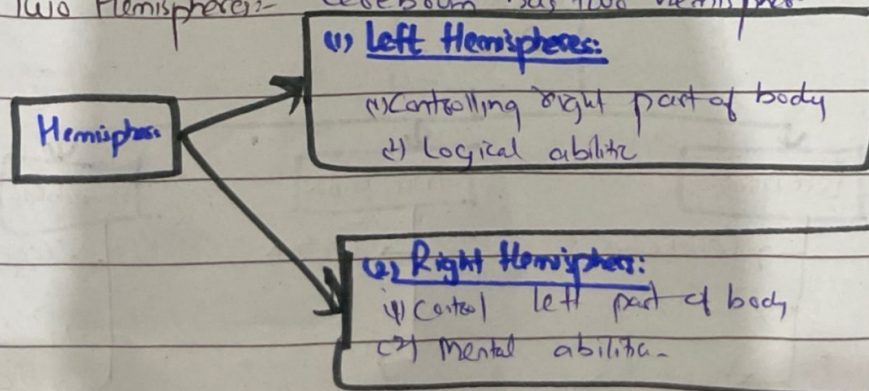
### A. Cerebrum:

Cerebrum is responsible for sensitive information.

It has 4 lobes:

- (1) Frontal: Thinking, Emotion, Perception
- (2) Parietal: Recognition, movement, orientation
- (3) Occipital: Perception of auditory visual processing
- (4) Temporal: Auditory processing.

Two Hemispheres:- Cerebrum has two hemispheres-





: 25

### (B) Thalamus:

It is responsible for receiving message from the five sensory organs and sending it to the central nervous system.

### (C) Hypothalamus:

It is responsible for controlling sleep-wake cycle, appetite and thirst of the body. It is also responsible for hormonal balance.

## III. Functions of Hindbrain:

Hindbrain is responsible for brain stem. These are responsible for basic or vital life things i.e. breathing and blood pressure.

### A. Cerebellum:

It is also called little brain. It is used for coordination of movement, posture and balance of body.

### B. Pons:

These are responsible for controlling the



breathing of body.

(c) Medulla:

Medulla is responsible for controlling the breathing and blood pressure of the body.

(b) Define enzymes- Explain its mechanism of action and give their characteristics.

I. Understanding enzymes:

Enzyme is a specialized organ responsible for acting as a catalysts to regulate the speed of chemical reactions involved in the metabolism of living organisms. The metabolic processes include digestion and breathing, blood clotting, healing etc.

II. Mechanism of Enzymes:

Enzymes are highly selective in nature. They mainly consists of a part where only certain kind of substrate are allowed called "active site". The molecules that react



and bind to enzyme as "substrate"

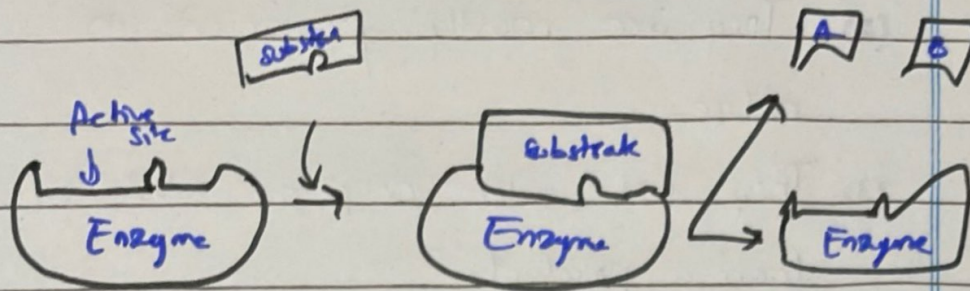


Figure: Enzyme Substrate Model

Enzyme has a protein part and also a non-protein. The protein part is called "apoenzyme".

### III. Mechanism of Enzyme Action:

Enzymes perform a variety of functions in living organisms -

(1) **Lipase Enzyme:** Used for the production of <sup>sugar</sup> food from starch.

(2) **Catalase Enzyme:** Used for breakdown of starch into sugar.

(3) **Protease Enzyme:** Helps in lowering protein level.

(4) **Tyrosinase Enzyme:** Used in pre-digestion.

### IV. Characteristics of Enzymes:

(1) Enzymes increase the rate of a



Reaction

- (2) They are mostly proteinous in nature-
- (3) They act with only one substrate to form a product.
- (4) They work like a key and lock-Therefore known as lock-key model.
- (5) They are highly sensitive to PH and temperature changes-

### Conclusion:

Enzymes are powerful organic substances that are responsible for various functions like digestion, control on hormones etc. They are highly efficient for us.

- (c) Transition in the energy system is pivotal to manage env. problems:- How renewable energy resources can help in reducing env. costs



## Understanding the Concept of Renewable Energy:

The renewable energy refers to the process of attaining energy through natural processes. These natural processes refer to the wind, water, biological material (biofuel), and Sun.

## Importance of Renewable Energy:

The renewable energy plays a very vital role in attaining it and also preventing environment from further hazards of Greenhouse gases.

### I. Prevention From Economic Crisis:

The production of renewable energy helps us (Pakistan) to increase the GDP (Gross Domestic Production) - Since the raw material is



: 5

already at home - So, only the money will be spent on the processing technology. Moreover, the oil prices in the world are very high due to crisis.

## II. Reduced Dependence on Foreign Reserves:

Pakistan depends on foreign countries for production of electricity, gas and oil. The use of renewable sources would reduce the dependence on foreign countries and would make the country self-sufficient and independent.

## III. Reduction in the Inflation:

The production of energy at home would <sup>have</sup> decrease the value due to absence of extra tariffs or taxes. So, ultimately the buying capacity of country will be increased which would lead to the decrease in inflation.

## IV. Reduction in the Greenhouse gases:

The presence of non-renewable energy sources are polluting the environment. Introducing renewable energy sources would reduce the



further enhancement of emission of  $\text{CO}_2$  leading to a clear and non-polluted environment

## IV Reduced Impacts of Climate Changes:

The presence of non-renewable energy sources would reduce the impacts of hazardous gases which are polluting the environment - So, the risk of climate change would also be reduced.

