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QNO1

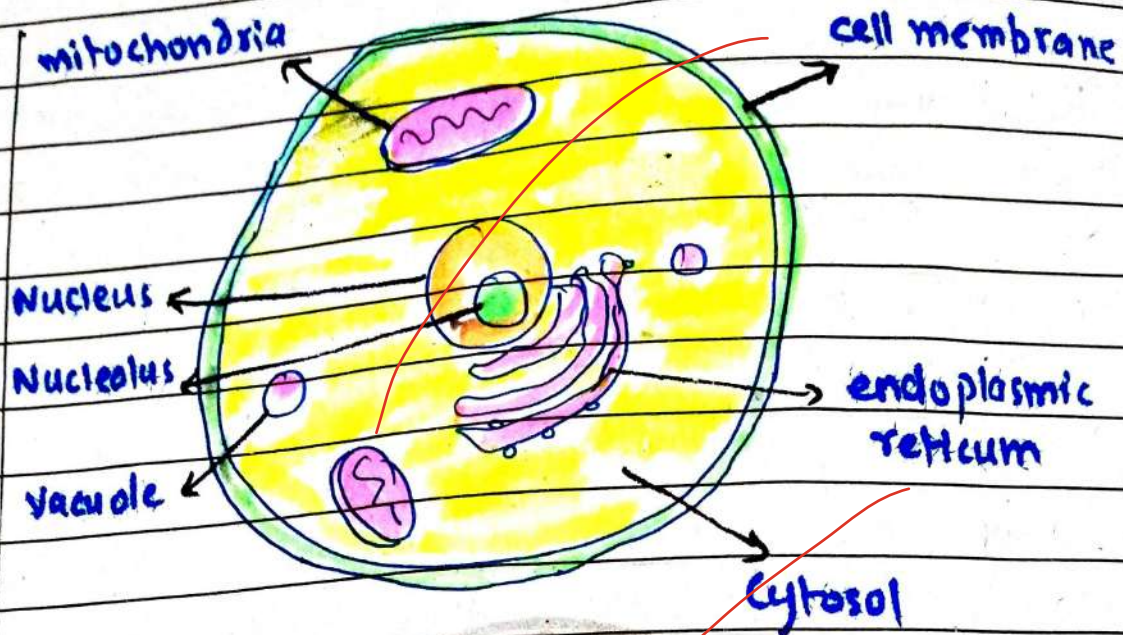
A. Cell is considered as a "basic unit of life". Explain the structure and function of cytoplasm, plastids and nucleus.

Cell: Basic Unit of life

Cell is the basic structural and functional unit of life that controls all the activities at micro-level. Cell is the smallest structure that consists of various organelles and nucleus. It is present in both animals and plants. The structure of cell varies in them. Some organisms consists of only one cell called unicellular organisms, such as bacteria or unicellular fungus, other organisms consist of millions of cells called multi-cellular organisms such as animals, plants, human beings.

Structure Of Cytoplasm

It is fluid like <sup>semi-</sup>transparent material present in cell. It contains 70-90% water, soluble substance called cytosol and various organelles such as mitochondria, chloroplast, ribosomes, endoplasmic reticulum.



### Structure of cell

The structure of cytoplasm is present between cell membrane and nuclear membrane.

### Function of Cytoplasm

- ① It works as a centre where all the activities and metabolic functions of cell occur.
- ② Cytoplasm consists of cytoskeleton that gives and maintain shape and size of cell.
- ③ The major processes such as protein synthesis, respiration, energy production occur in cytoplasm.
- ④ It contains vacuoles that eliminate wastes from the cell.
- ⑤ The matrix portion of cytoplasm act as a buffer that gives protection to the cell.

# Plastids

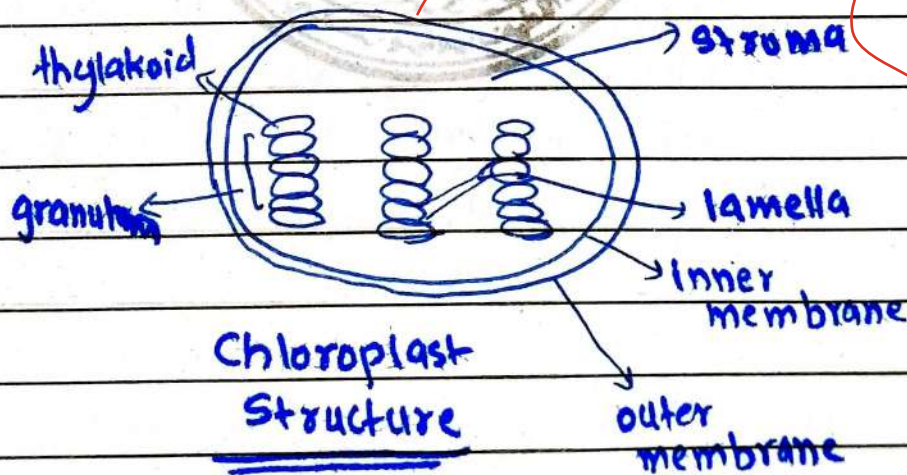
Plastids are present only in plant cells.

They consist of:

- ① Chloroplast
- ② Chromoplast
- ③ Leucoplast

## ① Chloroplast

It is the part of cell where photosynthesis takes place. It consists of stroma (the fluid portion), grana (the stacks of lamella) and chlorophyll where photosynthesis occurs. It gives green colour hence, present <sup>abundantly</sup> in all green parts of plants such as leaves.



## ② Chromoplast

It contains colourful pigment.

It is present abundantly in coloured parts of plants.

Function

They attract insects towards colourful parts, hence play a great role in pollination.

③ Leucoplast

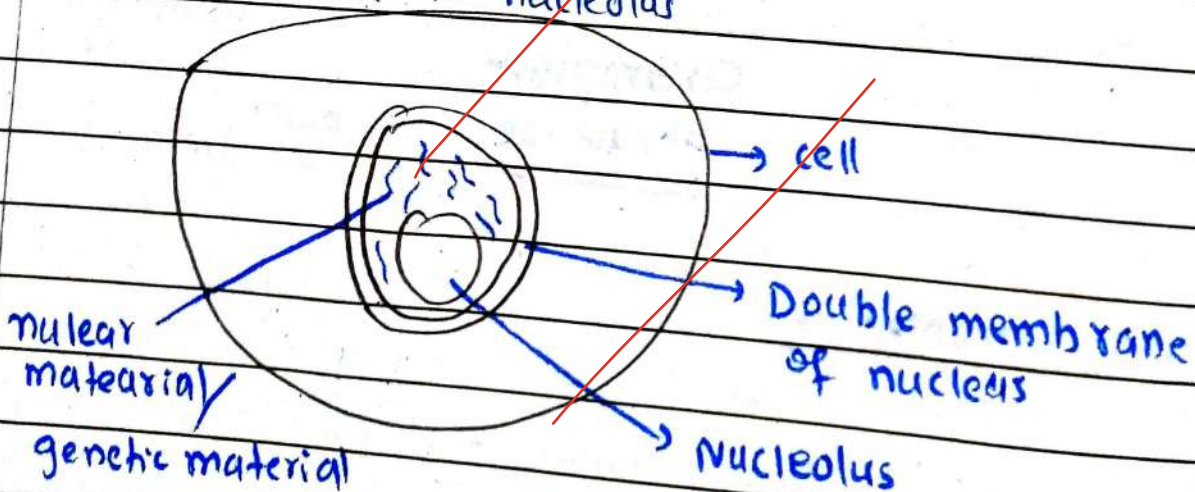
They are present in colourless parts of plant, mostly underground parts.

Function

They store food.

NucleusStructure

Nucleus is the important structure present inside cytoplasm. It is present at the centre in animal cells and present near cell membrane in animal cells. Nucleus contains a double membrane and a nucleolus.

Nucleus

Nuclear membrane is porous that allows material to move in and out of nucleus.

### Function

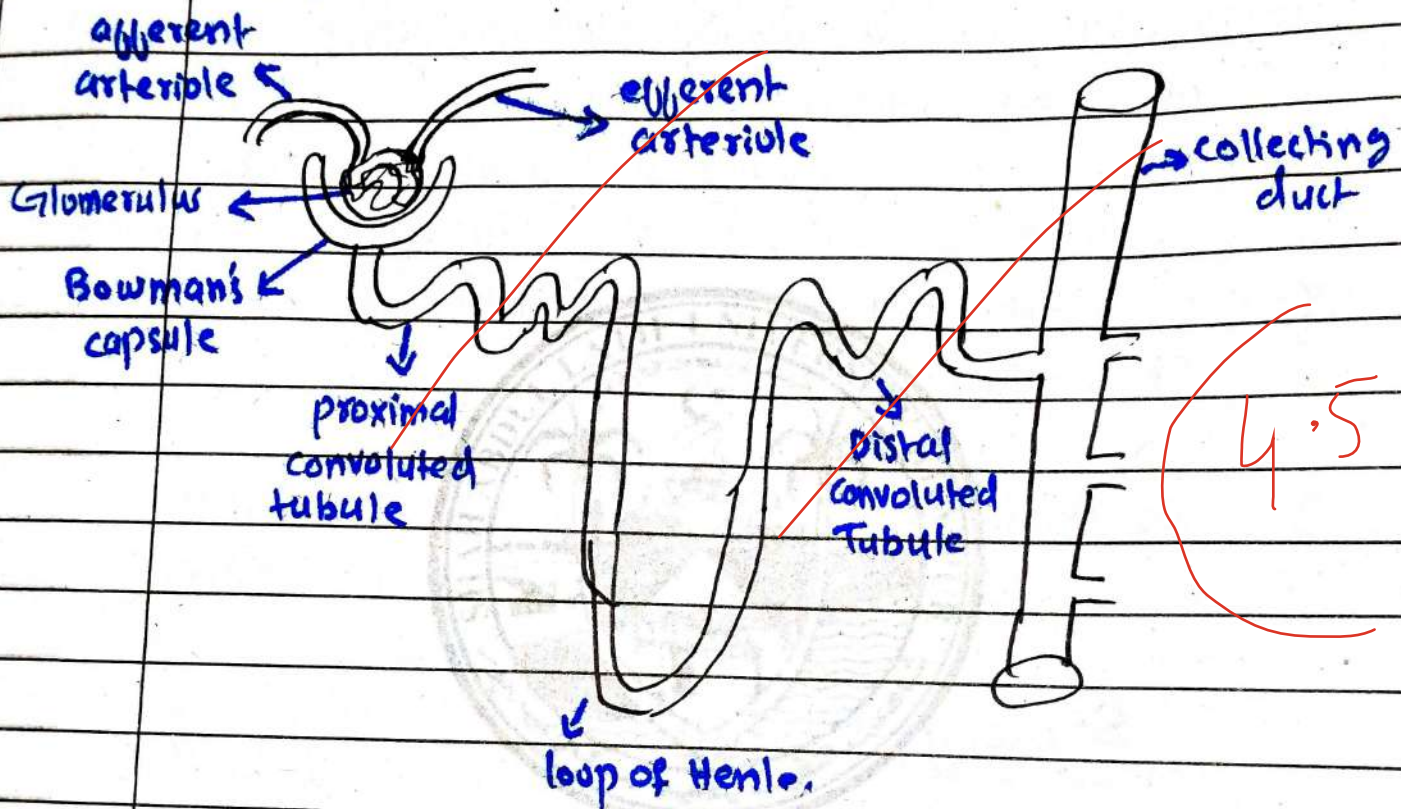
- ① Nucleus contains genetic material that has all the information of body.
- ② Nucleus is the control centre of cell like that of brain of a body. It control all functions of cell.
- ③ It contains nucleolus that synthesize ribosomal RNA (rRNA).

B. Nephron. is the basic functional unit of kidney. Explain its structure and function.

### Structure Of Nephron

Nephron is the functional unit of kidney. Each kidney contains almost 2 million nephrons. The structure of nephron consist of afferent arteriole that forms a tuft of capillaries called glomerulus. The glomerulus is present in a bowl-like structure called Bowman's capsule. Afterwards, the efferent arteriole arise that form capillary like network around tubules. Initially there is proximal convoluted tubule, then

U-shaped loops of henle and distal convoluted tubule. These tubules finally enter into collecting duct, which collect all the material and through pelvic area it transfer all nitrogenous waste into ureter.



## Structure Of Nephron

### Function Of Nephron

- ① **Excretion;** It excretes all the unwanted waste such as urea, uric acid, minerals, salts and excessive water from the body.

(ii) Reabsorption; It reabsorbs all the useful substance from excreted wastes and balance the environment of ~~map~~ kidney, such as water and salts are absorbed back.

(iii) Secretion; The inner membrane of nephron secretes nitrogenous waste into the tubules of nephron.

C. Discuss the causes and Preventive measures of smog.

### Causes of Smog

Smog is a kind of air pollution cause by both natural sources and human activities, that release harmful pollutants into the environment.

#### (i) Industrial Emissions

The industries emit nitrogen oxide ( $\text{NO}_x$ ), sulphur-dioxide ( $\text{SO}_2$ ) and particulate matter that contribute to both photochemical and industrial smog.

#### (ii) Vehicular emissions

Vehicle emit pollutants in large amount such as nitrogen oxide, volatile organic

compounds and carbon-monoxide. They react with sunlight and contribute to photochemical smog.

### (iii) Burning of fossil fuels

The fossil fuels combustion such as oil, gas, diesel, petroleum release greenhouse gases (GHGs) into the environment, intensifying the smog.

### (iv) Agricultural factor

Farmers burn agricultural crop residues in large amount openly into the environment that exacerbate the condition. It is evident from recent air quality index of Lahore that topped in the list due to agricultural activities of farmers.

### (v) Deforestation

Loss of forest lands and cutting of plants at high frequency reduce the natural filtration of pollutants and contribute to the smog.

## Preventive measures

### (i) Reduction of vehicular emission;

Promote the use of public transport.



and encourage use of non-motored vehicles and electric vehicles (EVs) - these can reduce smog formation.

### (ii) Regulating industrial pollution

Industries should use filters and reduce dumping of large amount of waste into seas and oceans. Also, promote the use of renewable energy resources, such as solar plants, hydal and wind energy.

### (iii) Sustainable agricultural practices

There should be ban on open-field burning and farmers should use modern techniques for residue management to reduce smog formation.

### (iv) Transit to the use of Renewable resources

There should be transition from use of fossil fuels to renewable resources of energy production such as solar energy, geothermal and wind energy. It would conserve the environmental resources and provide sustainability with reduction of smog formation.

### (v) Other measures

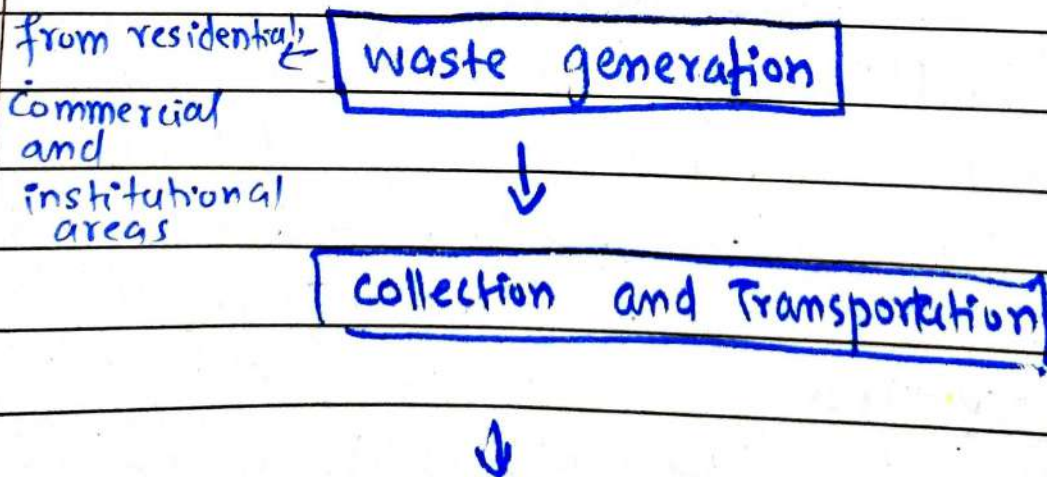
Other measures to reduce smog

formation include stringent policy measures, increased awareness and education in public on adverse effects of smog so that collective measures are taken to prevent smog formation.

D. What is SWM? Highlight the weaknesses in SWM in Pakistan?

## Solid Waste Management (SWM)

It is a management process to collect, transport, process, recycle and dump solid waste with in an efficient, environment friendly and sustainable manner. The aim of SWM is to minimize environmental impacts while maximizing resource recovery such as energy generation and recycling. It consists of multiple stages:



Segregation of waste and recovery

→ occur at different transfer stations

↓  
Processing

↓  
Recycling

↓  
Disposal

→ through different methods such as open dumping, land fill, Incineration.

## Weaknesses In SWM In Pakistan

### (i) Institutional weakness

Pakistan lacks infrastructure for collection and storage of waste. Almost half of the waste is left in urban areas uncollected due to weak workforce and lack of resources such as vehicles.

### (ii) Weak governance

Solid waste management is controlled by various entities, often leading to coordination problems. Poor governance and lack of accountability lead to inefficient management in Pakistan.

### (ii) Absence of proper disposal mechanism

A significant portion of solid waste is dumped through open dumping method. Wastes on open areas produce serious environmental and health hazards.

### (iv) Low recycling rates

Pakistan has limited mechanisms of ~~low~~ recycling methods. Hence, only a small fraction of waste is recycled.

### (v) High waste generation rates

Pakistan is one the most populous countries. It has high rate of population growth and rapid urbanization. Therefore, large amount of waste is produced in already struggling system.

### Recommendation

Pakistan should strengthen its institutions, create comprehensive policies and build adequate infrastructure. It should also focus on recycling methods to manage the waste efficiently.

Q No. 2

A. Brain is the leading part of C.N.S, briefly describe the function associated with Fore-Brain and Hind-Brain.

### § Function of Forebrain

Forebrain consists mainly three parts.

#### ① Cerebrum

It contains cerebral cortex that controls thinking process, intellectual ability, judgement, critical thinking, analysis capability and processing of thoughts.

#### ② Thalamus;

This part of forebrain acts ~~as~~ to control and transfer sensory information, especially the auditory and visual information.

#### ③ Limbic system;

It contains following:

##### ④ Hypothalamus

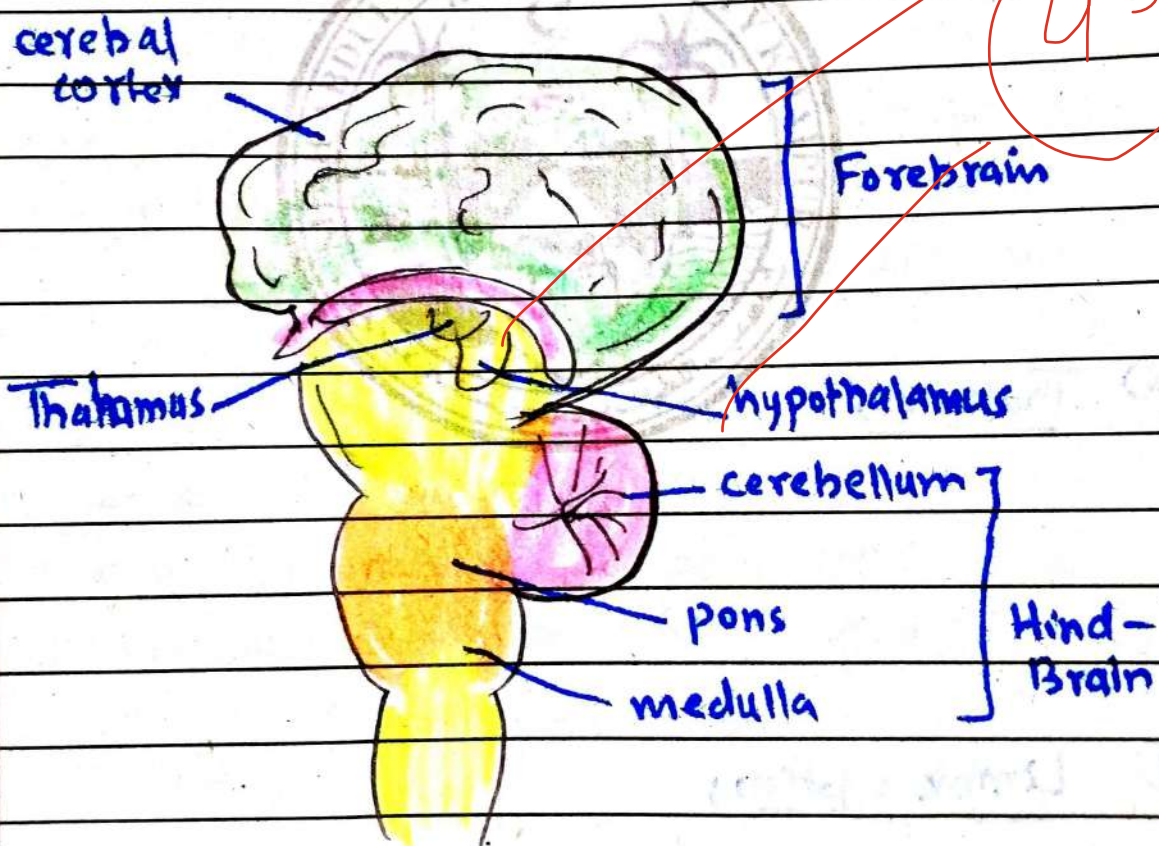
It controls automatic functions such as hunger, thirst, menstrual cycle, water balance etc.

## (b) Hippocampus

Hippocampus is mainly concerned with short-term memory of a person.

## (c) Amygdala

It is the emotion centre of body that controls anger, happiness, sadness, and sexual arousal.



## Functions Of Hind-Brain

The Hind-Brain consist of medulla oblongata, cerebellum and pons. The functions of various parts of hind-brain are given below.

(i) Cerebellum

It controls mainly balance and ~~coord~~ coordination of a body.

(ii) Pons

Pons is a part of hind-brain concerned with sleep-wake cycle. It functions in awakening of ~~the~~ process of body.

(iii) Medulla Oblongata

The function of medulla oblongata is to control the involuntary functions of body, such as respiration, breathing, swallowing, heart beat etc.

B. Define enzymes, explain their mechanism of action and give their characteristics.

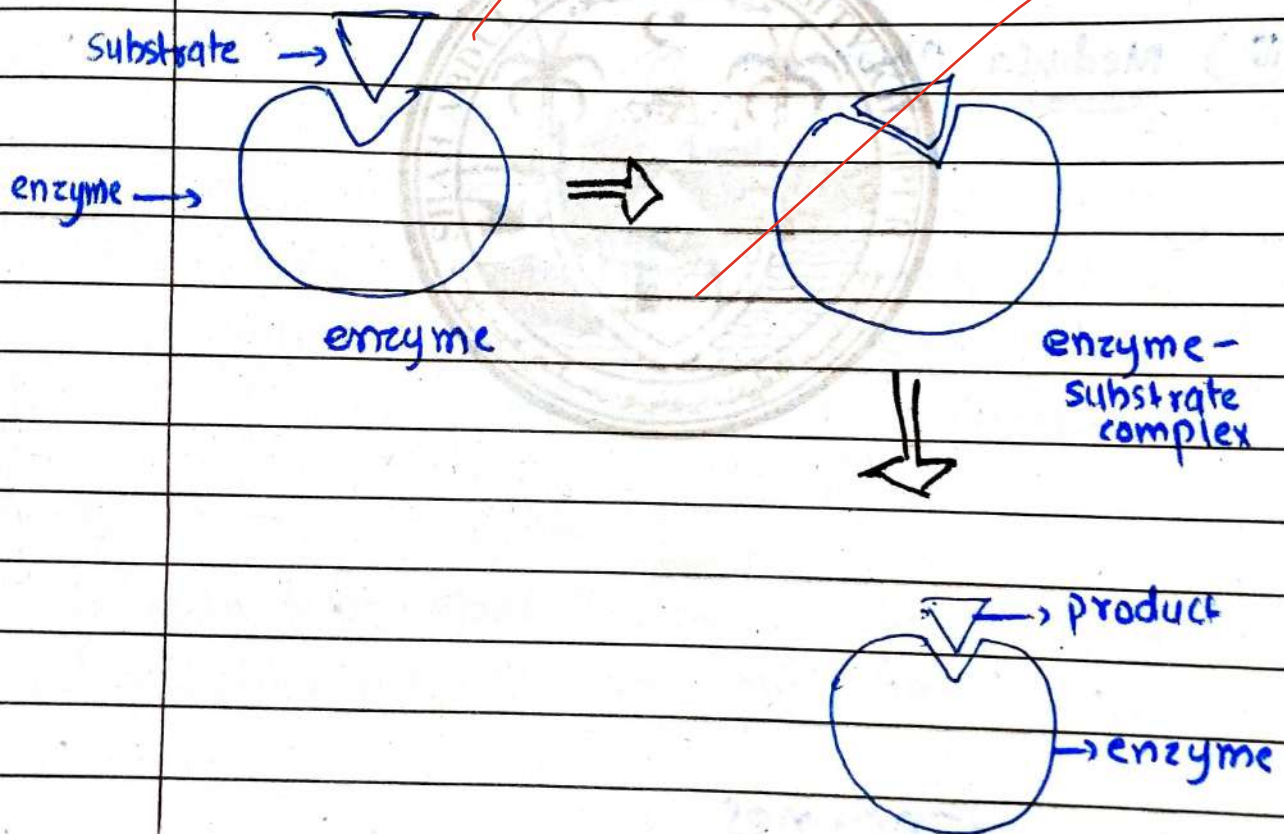
Enzymes

Defination;

Enzymes are the biological catalyst made of proteins that increase the rate of reaction without being used and without being effecting the final product.

## Mechanism of Action

Enzymes work on substance called substrate. The enzyme combine on the site of a substrate called active site. They increase the rate of reaction of a reaction. After the product formation, the enzyme is released unchanged.



Enzyme  $\rightarrow$  Enzyme-substrate complex  $\rightarrow$  enzyme + product.



## Characteristics of Enzyme

- ① Enzymes are protein in nature that may contain non-proteinous component called co-factor.
  - ② They are effected by minor changes in substrate concentration, temperature and pH changes.
  - ③ Enzyme increase the rate of reaction without being used and they are released at the end unchanges.
  - ④ Enzymes don't effect the end-product, they only alter rate of reaction.
  - ⑤ Enzymes lower the activation energy of a reaction.
- 3

c. Transition in the energy system is pivotal to manage the environmental problems. How renewable energy resources can help in reducing environmental cost?

## Renewable energy resources: Reduce the environmental cost

The renewable energy resources include solar energy, geothermal energy, hydro energy, wind energy. The transition from fossil fuels such as coal, gas, petroleum to renewable resources reduce environmental costs significantly.

### ① Reduce greenhouse gas emissions (GHG)

The use of renewable sources don't emit greenhouse gases into the environment. They generate energy without emitting GHGs, significantly lowering carbon emission.

### ② Prevent depletion of natural resources

The use of renewable

sources ~~also~~ contribute to conservation of non-renewable resources. The reliance on renewable resources are beneficial because they don't deplete and damage the ecosystem.

### ③ Prevent Habitat destruction

The fossil fuels combustion produces toxic chemicals that effect biodiversity, pollute water. Renewable resources produce greater energy with minimal impact on ecosystems.

### ④ Mitigation of water pollution

Fossil fuels usage produce harmful pollutants whereas renewable sources produce little or no toxins hence, it mitigate the water pollution.

### ⑤ Reduction in waste production

Coal, gas, petroleum generate large amount of chemical gases such as sulphur di-oxide ( $SO_2$ ), carbon-monoxide (CO), nitrous oxide ( $NO_x$ ) but transition to renewable sources results in reduction ~~of~~ in waste production and generate clean energy.

### ⑥ Lowers the climate change impacts

As the major driver

of climate change is green-house gases, through renewable resources the global rising of temperature can be controlled.

### Conclusion

Renewable energy resources transition produce environmental friendly impacts. It reduces the environmental cost, mitigate impacts of climate change, preserve global reserves of fossil fuels and generate efficient system of energy production with low cost.

D. Define remote sensing, give its principles and environmental applications.

### Remote sensing

Remote sensing is a science in which information about the earth's surface can be acquired without being in direct contact with it. This is achieved with the use of analysis of reflected or emitted energy from various structures on earth and generating their image for data