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Question 3

①)

Differentiate between GIS
and GPS.

GIS
(Geographic
Information
System)

GPS
(Global Positioning
System)

Definition

A computer-based system used to collect, store, analyze, and visualize geographical data.

A satellite-based navigation system used to determine precise location and time.

Purpose

Analyzing spatial and geographical data for decision-making, mapping, and planning.

Provide accurate location, direction, and navigation.

Data Usage

works with layers of data like demographics, land use, and climate.

Provides real-time location data and coordinates.

Technology

Utilizes databases, remote sensing, and spatial analysis tools.

Relies on a constellation of satellites orbiting Earth.

Application

Urban planning, disaster management, environmental monitoring, and logistics.

Navigation, surveying, tracking, and timing services.

Example

Mapping areas prone to floods by analyzing rain fall and topography.

Determine the location of a vehicle using coordinates.

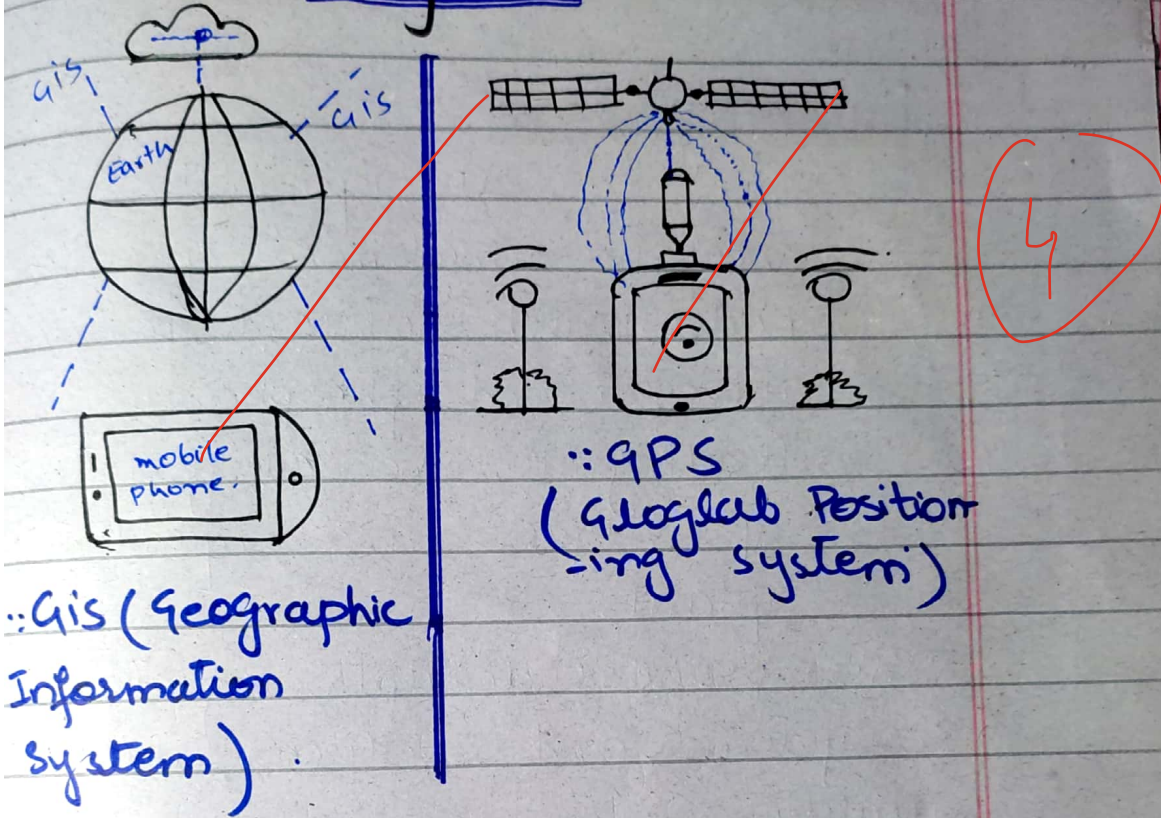
Hardware/Software

Requires specialized software (eg. ArcGIS) and hardware for

Requires GPS receivers or devices with GPS functionality.

spatial analysis

Diagram

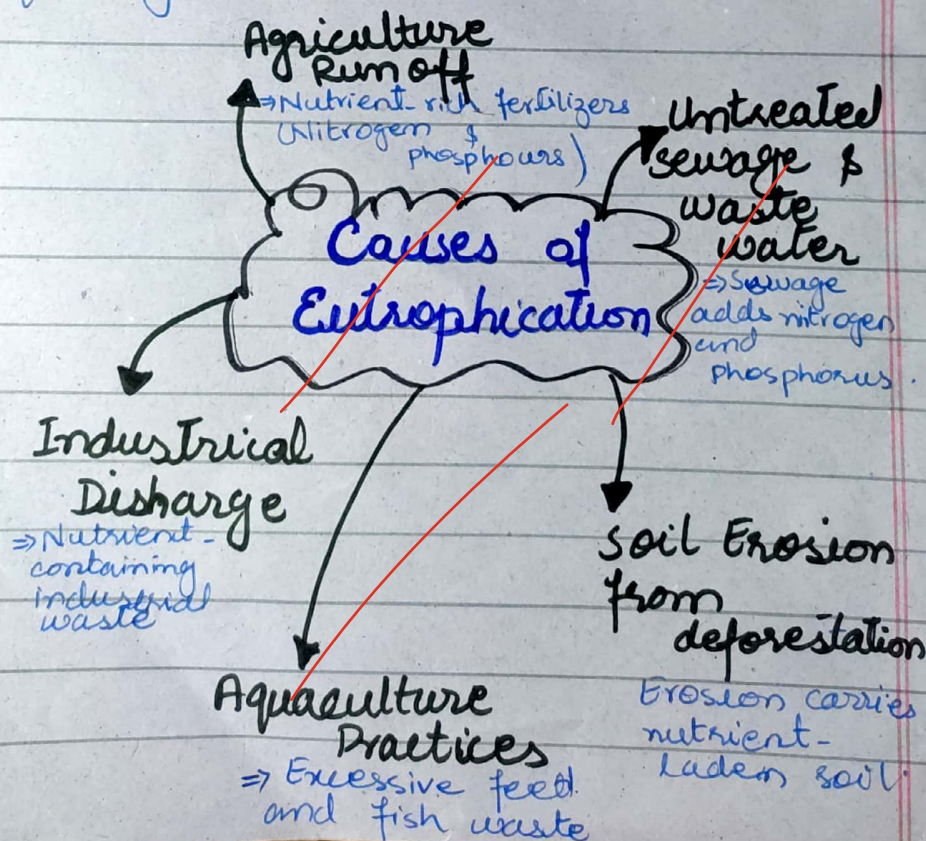


(c) Eutrophication, its Causes and Effects.

Eutrophication:

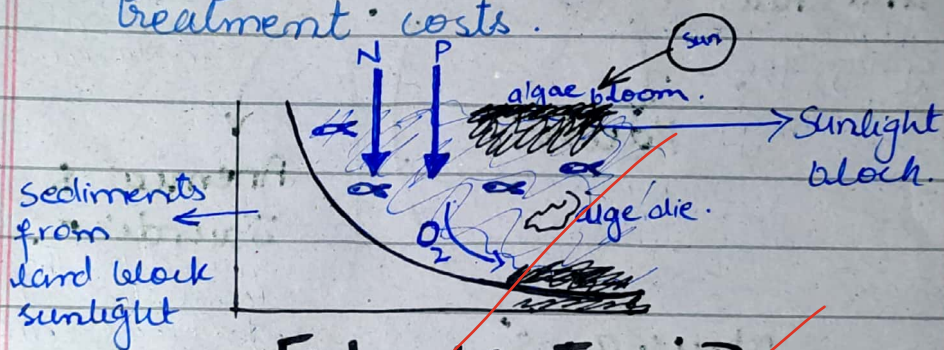
It refers to the excessive enrichment of water bodies with nutrients, particularly nitrogen and phosphorus, leading to the overgrowth of algae and aquatic plants.

This process disrupts aquatic ecosystems and reduces water quality.



Effects of Eutrophication:

- **Algal Bloom:** Rapid algal growth blocks sunlight, reducing photosynthesis.
- **Oxygen Depletion (Hypoxia):** Decomposition of algae consumes O_2 .
- **Biodiversity loss:** Sensitive species decline as water quality deteriorates.
- **Toxicity:** Some algae produce toxins harmful to humans and wildlife.
- **Economic Impact:** Reduced fisheries, tourism, and increased water treatment costs.



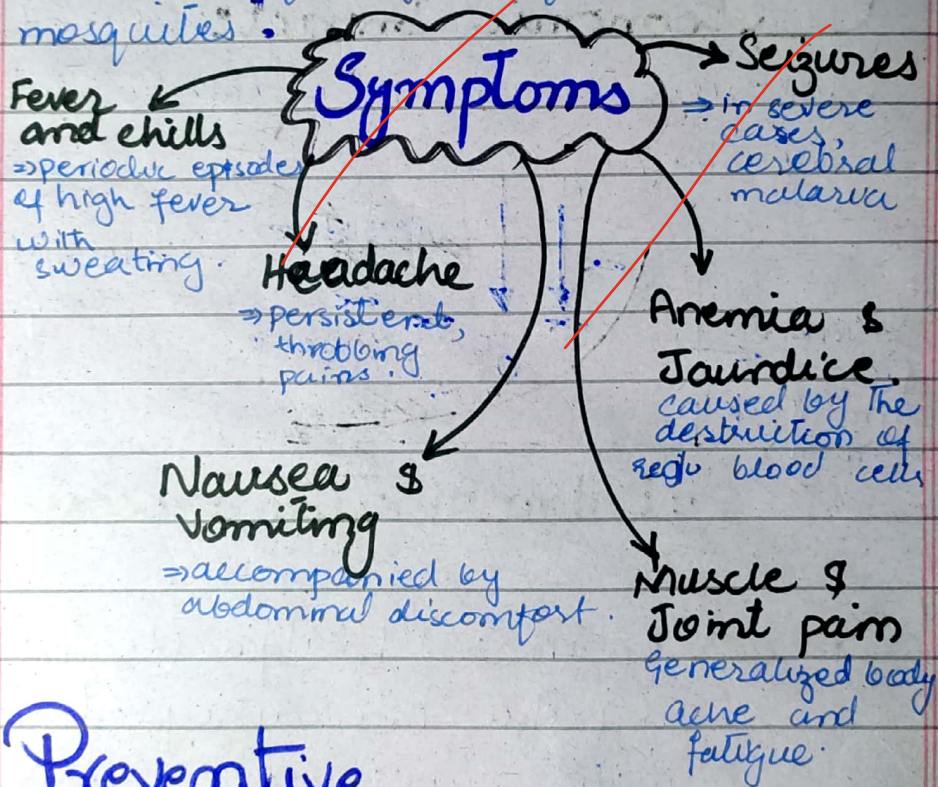
Eutrophication Process

Example: In 2014, algal blooms in Lake Erie disrupted water supplies for Toledo, Ohio.

(B) Malaria, symptoms and Preventive measures:

Malaria?

"It is a life-threatening infectious disease caused by the Plasmodium parasite, transmitted through the bites of infected female Anopheles mosquitoes."



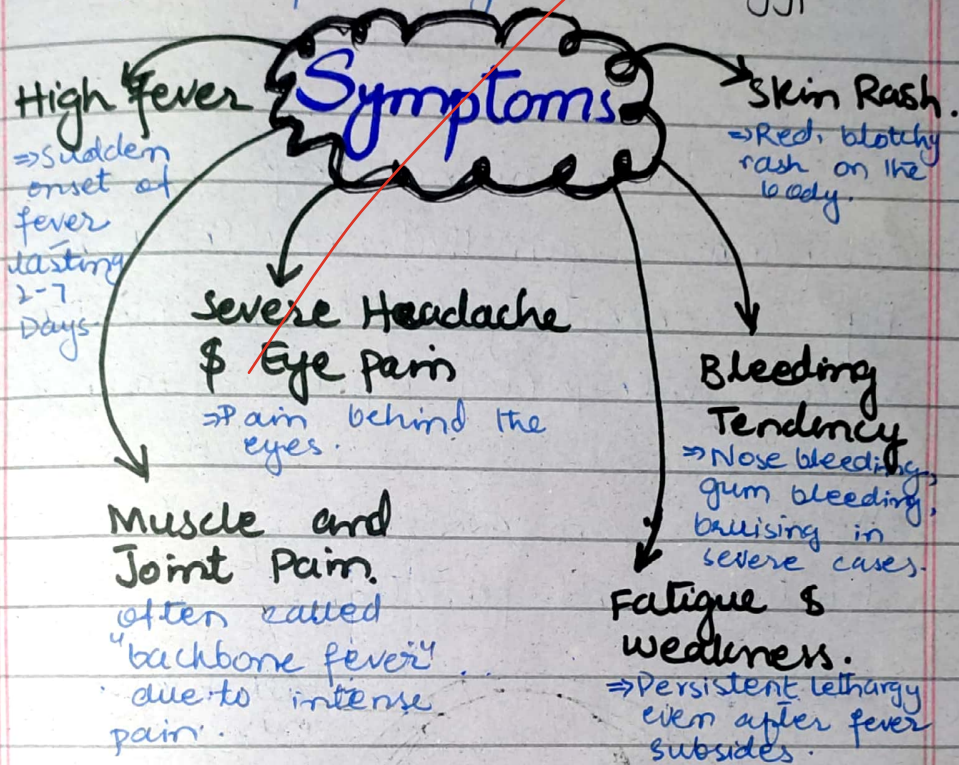
Preventive Measures:

- (i) Protective clothing in mosquito-prone areas.
- (ii) Indoor Protection or use mosquito coils indoors.
- (iii) Eliminate stagnant water sources where mosquitoes breed.
- (iv) Avoid mosquito bites by using insect repellents.

Denque:

Denque is a viral infection transmitted by Aedes mosquitoes, primarily 'Aedes aegypti.'

4.5



Preventive Measures:

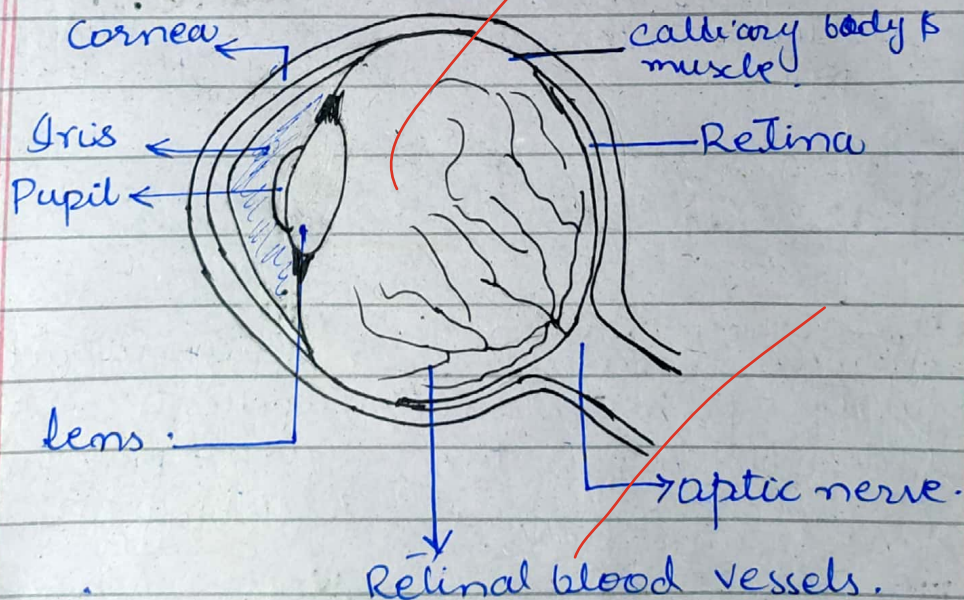
- (i) Remove standing water from containers like flowerpots, tires and water tanks.
- (ii) Apply mosquito repellents and wear protective clothing.
- (iii) Participate in local campaigns for fogging and spraying insecticides.
- (iv) Use air conditioning or screens to prevent mosquitoes from entering.
- (v) Monitoring symptoms like severe abdominal pain, bleeding appear.

(A)

Working of Human Eye:

The human eye is a complex organ that enables vision by converting light into electrical signals interpreted by the brain.

• Here is an overview of its structure and function:



∴ Human Eye

- (i) Light enters the eye through the transparent "Cornea". It bends the light to direct it through the pupil.
- (ii) Pupil: It is a dark circular opening in the center of the "Iris". It regulates the amount of light entering the eye by constricting in bright light and dilating in low light.
- (iii) Lens: The light then passes through the lens, which focuses the light rays onto the "retina" at the back of the eye.
- (iv) Retina: The retina contains millions of light-sensitive cells known as rods and cones. Rods detect light and allow us to see in dim light, while cones detect color and fine detail.
- (v) Optic Nerve: Once the retina detects the light, it converts it into electrical signals, which are sent to the brain through the optic nerve.
- (vi) Brain Processing: The brain processes these signals, creating the visual image.

4

Question 1

①) Solid Waste Management and its weaknesses of Pakistan:

Solid Waste Management: (SWM)

"Solid waste management is the systemic process of collecting, treating, and disposing of solid waste materials generated by human activities."

It also helps to minimize their impacts on health, the environment, and resources. It involves a combination of strategies including waste reduction, recycling, composting, and environmentally safe disposal methods.

Objectives:

- i) It protects human health and
 - ii) the environment.
- It minimizes landfill use and

reduce greenhouse gas emissions.
iii) It promotes resource recovery through recycling and reuse.

2. Weaknesses in the SWM of Pakistan:

(i) Poor Waste Segregation:

In Pakistan, waste segregation at the source is almost non-existent. Recyclable and organic waste is often mixed with non-recyclable materials, making it difficult to process efficiently. It leads to increased landfill waste and lost opportunities for recycling.

(ii) Inefficient Collection System:

The waste collection system in Pakistan is poorly managed and under-resourced. Many areas, especially in rural and suburban regions, do not have regular waste collection services. This results in uncollected waste

littering streets and open spaces.

iii) Lack of Sanitary Landfills:

Pakistan has very few properly designed and maintained sanitary landfills. Most waste is disposed of in open dumps, which cause soil and water pollution. These sites also pose serious health risks to nearby communities.

iv) Insufficient Funding and Policies:

Solid waste management in Pakistan suffers from inadequate funding and weak government policies. Local authorities lack the resources to develop modern waste processing facilities. It prevents the implementation of effective solutions to the waste crisis.

3. Solution for Improving:

- i) Build sanitary landfills.
 - ii) Recycling plants to manage waste properly.
-

(C) Causes & Preventive measures to smog:

1) Introduction:

Smog is a harmful air pollution caused by a mixture of smoke and fog. It is primarily caused by human activities like burning fossil fuels and industrial emissions. Preventive measures are essential to reduce its impacts on health and the environment.

2) Causes of Smog:

i) Vehicle Emissions:

Excessive emissions from vehicles are a major contributor to smog. These emissions release harmful pollutants like nitrogen oxides and hydrocarbons into the air. Increased urban traffic worsens air quality, especially in densely populated areas.

ii) Industrial Pollution:

Industries release large quantities of pollutants into the atmosphere. Factories and power plants burn fossil fuels, emitting harmful gases like sulfur dioxide. These pollutants combine with sunlight to form smog in industrial groups.

(iii) Agriculture Practices:

Open burning of crop residue adds to air pollution, especially in rural areas. It releases fine particles and toxic gases that contribute to smog. Lack of awareness and alternatives make this a recurring problem.

3. Preventive Measures for Smog:

i) Promote Clean Energy:

Switching to renewable energy resources like wind and solar can reduce dependence on fossil fuels. Clean energy

solutions lower greenhouse gas emissions significantly. Government should encourage investment in sustainable energy systems.

ii) Improve Public Transportation:

Developing efficient public transport systems can reduce vehicle emissions. Encouraging carpooling and the use of electric vehicles can also help. These measures decrease traffic congestion and improve air quality.

iii) Enforce Industrial Regulations:

Strict laws should be implemented to limit industrial emissions. Industries must adopt cleaner technologies and install air pollution control systems.

4) Conclusion:

In conclusion, smog can be controlled by reducing emissions from vehicles and industries. With measures like clean energy and air quality can improve the environment.

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(A)

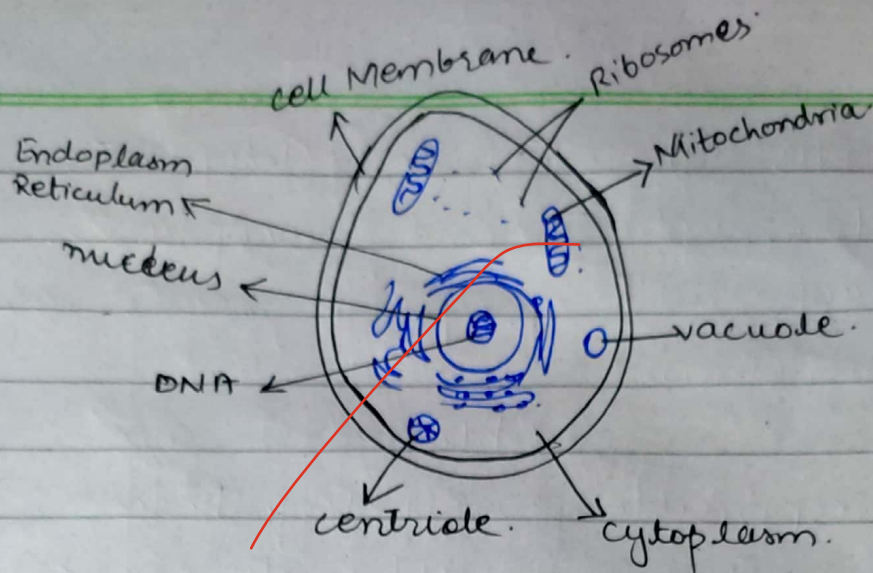
Cell as a basic unit of life and the structure and function of cytoplasm, plastids & nucleus:

1) Cell as a basic unit of life:

The cell is considered the basic unit of life because it is the smallest structure that can carry out all the essential functions of living organisms.

It is responsible for processes such as metabolism, growth, and reproduction.

Cells are made up of various components, including the cytoplasm, nucleus, and organelles. These components perform specific functions. Without a cell, life would not exist, making them fundamental to all living beings.



2) Cytoplasm:

Structure: The cytoplasm is a gel-like substance that fills the cell and surrounds the organelles. It is composed of water, salts, and proteins.

Function: Cytoplasm acts as a medium for the biochemical reactions of the cell. It supports and holds the cell's organelles in place. It also plays a key role in the transport of materials within the cell.

3) Plastids:

Structure: Plastids are membrane-bound organelles found in plants.

cells. They include chloroplasts, chromoplasts, and leucoplasts, each with specific pigments or functions.

Function: Chloroplasts are responsible for photosynthesis, converting sunlight into energy.

- Chromoplasts provide color to flowers and fruits.
- Leucoplasts are involved in the storage of starch, lipids, and proteins.

4) Nucleus

structure: The nucleus is a large, membrane-bound organelle that contains the cell's genetic material in the form of DNA. It is surrounded by a nuclear membrane and has small openings called nuclear pores.

Function: It controls cell activities by regulating gene expression.

- It is responsible for cell division, growth.

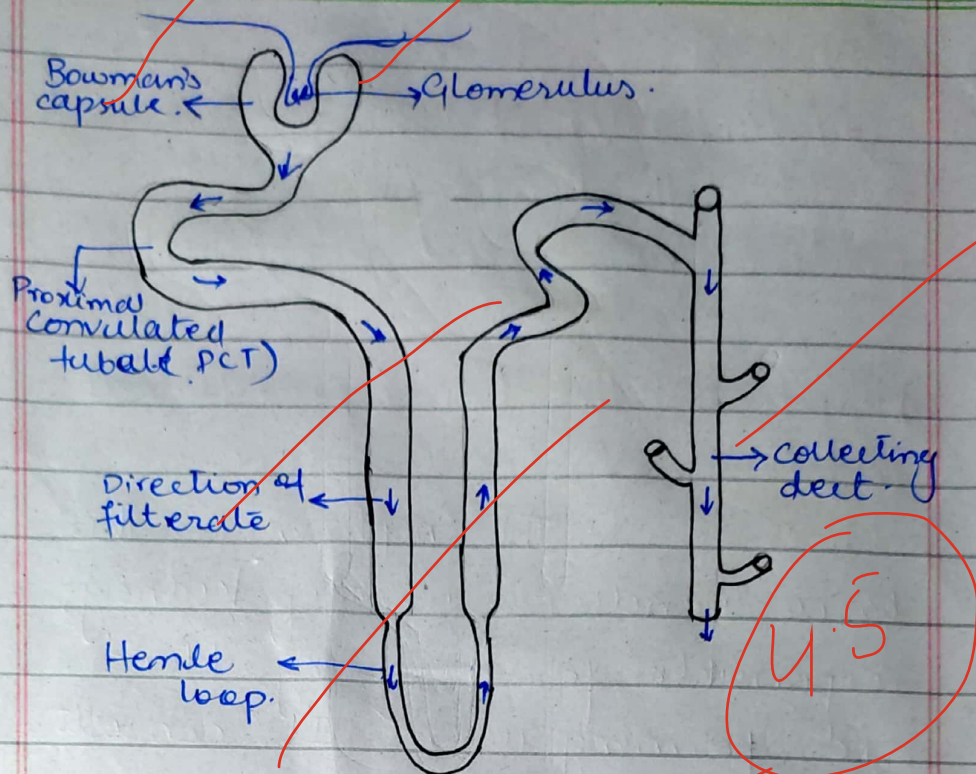
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(B) Nephron, basic functional unit of kidney, its structure and function:

Nephron the basic functional unit of kidney.

The nephron is the basic functional unit of kidney, responsible for filtering blood and forming urine. It consists of several components, including the glomerulus, renal tubules, and associated blood vessels. The nephron plays a crucial role in maintaining the body's fluid and electrolyte balance. Its primary functions include filtration, reabsorption, and secretion. It also helps to regulate waste removal and maintain homeostasis.

2. Structure and function of Nephron:



∴ Nephron.

i) Structure of the Nephron:

Bowman's capsule: It surrounds the glomerulus. It acts as the site where blood filtration begins. It collects the filtrate from the blood.

Glomerulus:

A network of tiny capillaries inside the Bowman's capsule, the glomerulus filters blood under pressure, allowing water and waste to pass into the Bowman's capsule.

Proximal Convoluted Tubule (PCT): The filtrate enters the PCT, where most of water, glucose are reabsorbed into the blood.

Loop of Henle: It is responsible for concentrating urine. It absorbs water and sodium, creating a concentration.

Collecting Duct: The filtrate from several nephrons flows into the collecting duct, where final adjustments in water and salt balance are made. It ultimately leads to the renal pelvis, where urine is formed.

(ii) Function:

Filtration: Blood enters the glomerulus, where large molecules are filtered out, small into Bowman's capsule.

Reabsorption: Filtered water, and glucose are reabsorbed from the renal tubules back into the blood.

Secretion: Waste materials like urea and excess ions are secreted from the blood into the renal tubes.

Excretion: The final product, urine is excreted through the collecting ducts and containing waste materials.