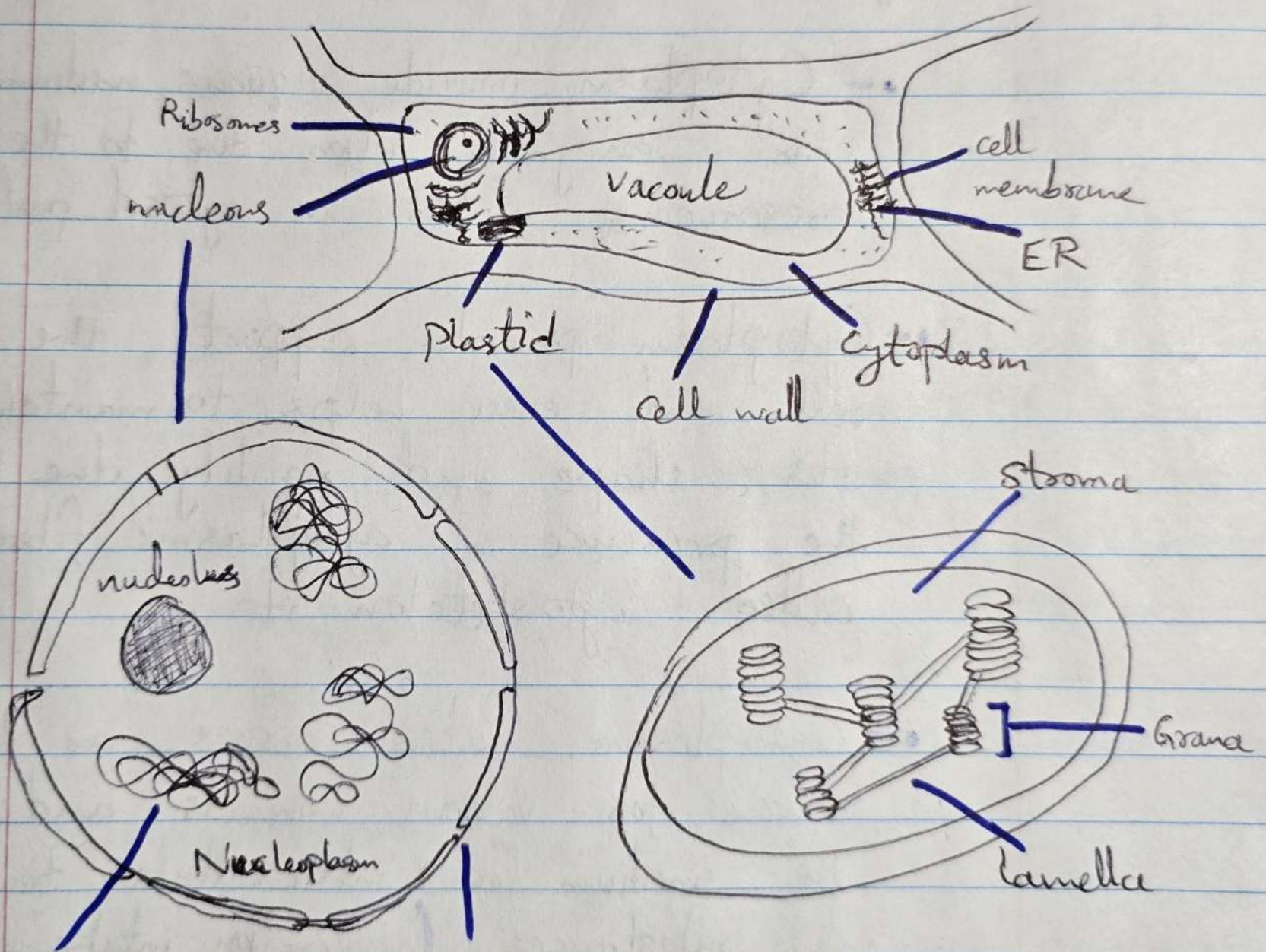


Q1. A) - Cell is the basic unit of life and consists of several sub-cellular organelles. An animal or plant cell has different types of organelles in it. Following is the structure of a plant cell:



Chromosomes
Genetic material

Nuclear
pores

These are 3 types of Plastid and the one given here is Chloroplast.

Cytoplasm:

Cytoplasm is the aqueous solution present in cell in which all organelles are present. It contains water and minerals that support important functions of various organelles.

- Cytoplasm provide aqueous medium for enzymatic action due to the presence of water in cytosol part.

- Cytoplasm provide support the cell and even helps to maintain its shape and rigidity due to the presence of cytoplasmic fibres called cytoskeleton it.

- Cytoplasm also serves as the source for various minerals and as the medium for intra-cellular transport of substances (excretion, intake, etc.)

Nucleus:

Nucleus is the brain of cell. In animal cell, it is present

at the center but in plant cells it is pushed to the side due to a larger vacuole. Nucleus contain hereditary material, also called the genetic material. The structure and function of various nucleus components are:

- - Nuclear pores helps to transport ribosomes out and other molecules needed in to the cell.
- - Nuclear envelope to give shape the nucleus and keep the nucleoplasm from dispersing.
- - Nucleolus, the factory of ribosomes that form ribosomes that are then transported out of the nucleus.
- - Nucleoplasm, the fluid within nuclear membrane that contain DNA, RNA and other hereditary material.

Plastid:

Plastids are sub-cellular organelles that have 3 types based on their functions:

- Chloroplast
 - Chromoplast
 - Leucoplast
- (photosynthesis)
(pigmentation)
(food storage)

Plastids, especially chloroplast are mainly found in plants cells and their components are

- A double membrane
- lamella, the inner fluid that facilitate transportation within
- Granum structure made up of stacked pile of structures enveloped by thalokoid membrane.
- Thalokoid membrane connects the grana structures with each other and contain the main pigment that carry out photosynthesis.

C). Smog:

Smog is the condition of yellowish-brown haze caused due to presence of deleterious pollutants in the lower troposphere that can impair or affect visibility.

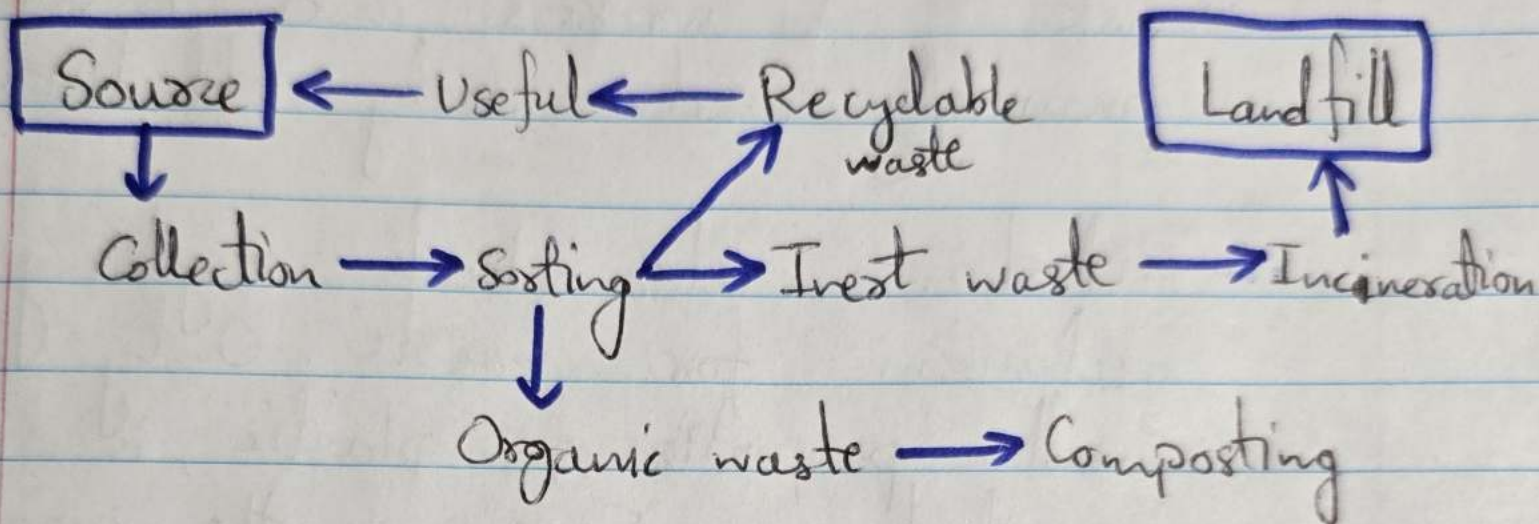
Causes: Smog is caused by various factors, including:

- Reaction of various primary pollutants, released from sources like fossil fuel burning and catalytic converters. (industry)
e.g- SO_x & NO_x .
- The reaction is sometimes facilitated by sunlight and is called as photochemical smog.
- Constituents of smog like O_3 , SO_2 are also released directly into air from various sources like volcanic eruption, photocopy machine etc.

Prevention:

- - Industries should use the scrubber system to filter the air released into air.
- - Vehicles should be tuned in timely and fines should be imposed to vehicles emitting black smoke.
- - Stubble burning should be banned.
- - Although trees are also affected by smog and can not absorb the smog constituents, ~~to~~ but these can help to filter out these pollutants.
- - Artificial rain can be the last resort that can help to settle down the pollutants of smog.
- - Public awareness

D). SWM: Solid waste management is the process of managing the waste from the source of its production to its last fate.



Weakness in Pakistan:

Solid waste management process is not that much developed in Pakistan as

- - Pakistan does not have a proper centralized collection mechanism to ensure the collection and dumping of waste at the same point. People and even waste collectors usually dump it after collection in open ~~at~~ spaces.

• - Pakistan also lack sorting mechanisms and machinery, which is often sorted by hand and poses several health risks to workers and is not financially and timely effective.

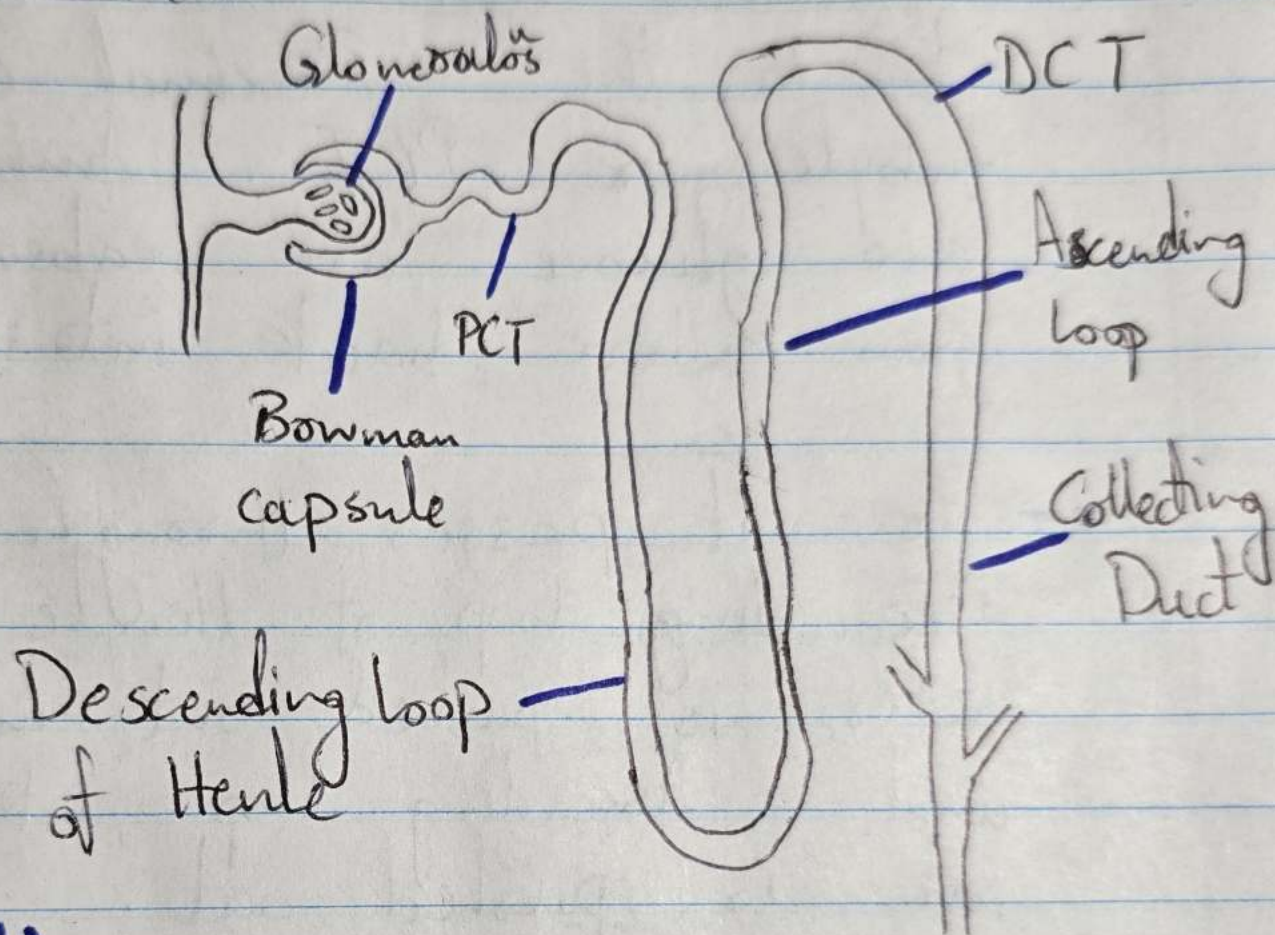
• - Pakistan also lack recycling mechanism for waste. Only small proportion of plastic is recycled. Same is the case with organic waste.

• - Pakistan also lack the political and public will to manage waste and modify the existing waste management system.

• - Incinerated waste and inert waste like dry ash can sometime be very harmful and is disposed directly onto soil which leads to soil contamination.

• - lack of public awareness & education

B). Nephron : The basic structural and functional unit of kidney is Nephron. Each kidney has about a million nephrons in it.



Functions :

Nephron helps to filter blood of excessive salts, minerals, water and other compounds like glucose. Larger particles like the protein etc. remain in blood.

Structure :

- - Glomerulus is a bunch of blood vessels that have high

pressure in it and pushes out the waste molecules into Bowman's capsule.

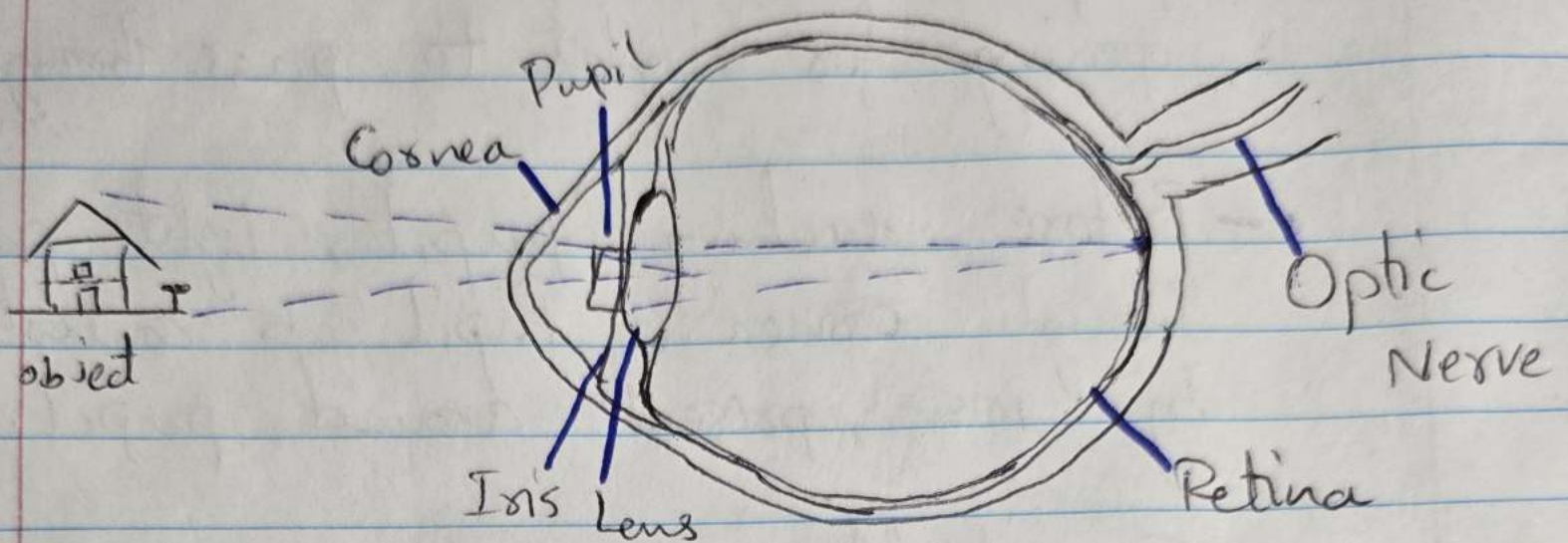
- - Bowman Capsule then transfers it to the Proximal convolute tubule or PCT. Amino acids and glucose are reabsorbed from here back into blood.

- - Then it passes through the Descending loop of Henle, where water is pushed out into blood and Ascending loop, where sodium ion is pushed out.

- - Then it passes through DCT or distal convoluted tubule where reabsorption of Na^+ & K^+ ions take place.

- - Then it opens into collecting tube that also has waste from several thousand other Nephrons.

Q3. A) - Working of Human Eye:



Human eye is the most vital organ for visionary sense. It helps to view the surroundings by using the light reflected from these surroundings.

For instance, an object is present in front of the eye. Its image is formed in brain by -

- - light reflected from the object goes into the eye by passing through the cornea that is there to protect the eye from any particle from outside.

- - Then, ~~#~~ it passes through pupil which is a small opening for light to pass through.
- - Before reaching pupil, light passes through cornea. Pupil is controlled by iris, present around pupil.
- - The light then passes through the lens ~~p~~ behind pupil and is focused onto retina.
- - There, the visionary light signals are converted into ~~to~~ electric signals and passed onto the optic nerves.
- - The optic nerves then carry these signals to visual cortex (part of brain that interpret these signals and process to form image of that object).
- - All this takes place in milliseconds.

C) - Eutrophication:

When water bodies are contaminated with excessive amount of phosphorous and other nutrients. Phosphorous specifically is an important nutrient that speeds up the algal growth in that water body. Hence, such water body with huge algal build up is then faced with oxygen deprivation and this process is called eutrophication.

Causes:

- - Agricultural run offs bring in fertilizers containing phosphorous in it that promotes the growth of algae.
- - Domestic sewage waste water containing detergents also have various organic compounds made up of phosphorous that promote the algal growth.

- - Erosion of nearby soil also lead to the mobilization of organic compounds of soil into nearby water bodies that may cause eutrophication.

Effects:

- - The huge algal buildup on surface leads to the blockage of sunlight that seizes the photosynthesis activity in that water body, leading to the deprivation of oxygen in water.
- - Deprived of oxygen, fishes and other water organisms start to die.
- - Death of marine organisms and their decomposition by microorganisms further reduce the oxygen level.
- - The water is not compatible for drinking purpose.

D) - GIS

- - GIS or Geographic Information system is a digital method of remote sensing.
- - It is used to collect data, map images, digitalize maps, modify and to plan using map.
- - Runs on specific systems like ArcGIS and QGIS.
- - It is used by collecting coordinates of various landmarks and then uploading these in softwares to process.
- - Used for mapping and data acquisition.

GPS

- - GPS or Global positioning system is the digital mean of navigation and search.
- - It is used to locate something on the Global map.
- - Requires complicated processing but is easily available on phones and hand held devices.
- - The satellites emit signals that reaches the desired object or device and then collected back by satellite, telling it's location.

B)- Malaria: Symptoms of ~~Malaria~~ Malaria includes:

- Fever with chills
- Head ache and muscle ache
- Nausea and vomiting
- Difficulty breathing (severe)
- Organ failure (severe)
- Severe anemia (severe)

Following preventive measures can be taken to avoid Malaria -

- Use of mosquito repellents
- Use of mosquito nets
- Wear full sleeves clothings
- Eliminate standing water.
- Use of mosquito sprays indoor.
- Get vaccinated
- Promote awareness about the disease, vector and its breeding sites.

Dengue: Just like Malaria, Dengue is also a vector.

- bore disease and spread through mosquitos. It's symptoms are-

- High fever
- Severe head ache
- Pain behind eyes.
- Joints and muscle pain
- Persistent vomiting severe
- Internal bleeding severe
- Organ failure severe

It can be prevented by-

- Using mosquito nets
- Using mosquito repellents
- Wearing full sleeves clothing
- Eliminating water / breeding sites.
- Eliminating by sprays and fogging
- Covers water containers
- Raise awareness about it's breeding sites and early symptoms.

