

QSA - TEST 02

QUESTION 1 "PART A"

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

ANSWER

CELL - BASIC UNIT OF LIFE

Cells are the fundamental units of life which provide structural and functional organisation to the living organisms. Cytoplasm, plastids and nucleus are also three essential components which play major role in cellular functioning.

CYTOPLASM

Cytoplasm - a jelly-like substance - which is enclosed in the cell membrane. Cytoplasm consists of water, salts, organic molecules and organelles. Cytoplasm is divided into a fluid portion called cytosol and cytoplasmic inclusions which consists of nutrients and pigments.

FUNCTION:

Cytoplasm acts as a medium for the reactions within the cells and facilitates the transports of materials within the cell and

out of it. Cytoplasm also provides mechanical support to the cell which ensure proper positioning of the organelles in the cell and also acts as the host to metabolic processes.

PLASTIDS

Plastids are the organelles which are present in the cytoplasm of plant and algae cells - not in animal cells. Plastids are of 3 types, i.e. Chloroplast, Chromoplast and Leucoplast.

STRUCTURE OF PLASTIDS:

Plastids are double membrane organelles which contain their own DNA and Ribosomes.

① Chloroplast: Chloroplasts are present in green parts of the cell which contain chlorophyll.

② Chromoplast:

Chromoplasts are present in flowers which contain pigments in them.

③ Leucoplast:

Leucoplasts are colourless plastids which store starch, lipids, and proteins in them.

These 3 main components of plastids are responsible for different functions and have different structures.

FUNCTIONS OF PLASTID:

Plastids are responsible for the nutrition of the plant mainly, with different kinds of plastids responsible for different functions, such as:

① Chloroplast:

Responsible for photosynthesis in plants. They convert the energy trapped from the sun into chemical energy.

② Chromoplast:

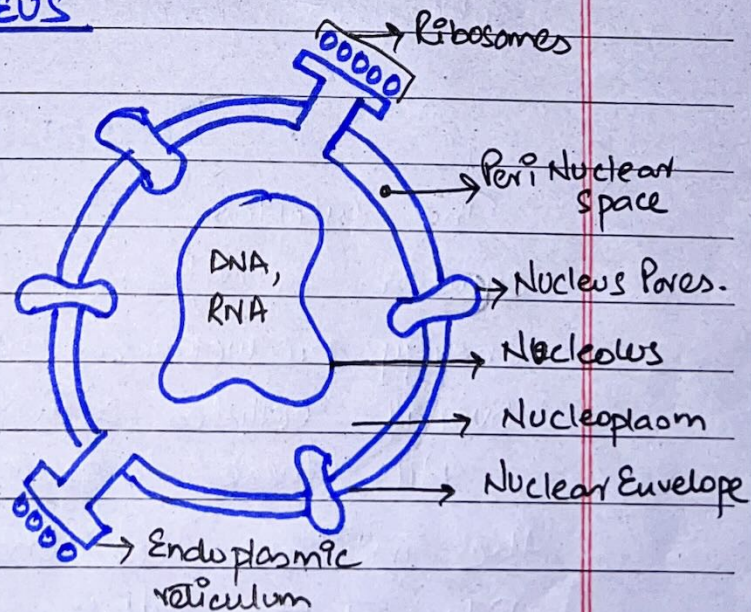
Chromoplasts give the color to the plants. They synthesize and store pigments in the plant cell other than chlorophyll.

③ Leucoplast:

Leucoplasts are responsible for the storage of food in the plant cells.

NUCLEUS

Nucleus is a double membranous organelle in the cell which contains the chromosomes.



STRUCTURE OF NUCLEUS:

The nucleus is made up of several components which are, as follows:

① Nuclear Envelope: It separates the nucleus

from the rest of the cell.

② Nucleolus: Network of fibrous intermediate filaments.

③ Nucleoplasm: Semi-fluid, gel-like matrix where chromatin is suspended.

FUNCTIONS OF NUCLEUS:

Nucleus is also called the brain of the cell which is also responsible to regulate cellular activities. It serves as the control center of the cell, which regulates the gene expression, cell division and the synthesis of ribosomes in the nucleolus. Nucleus ensures the transmission of genetic information to subsequent generations.

CONCLUSION

The cytoplasm provides the medium for cellular activities, plastids - vital for energy production. Nucleus controls the overall cellular activities of the cell.

All these organelles together, exemplify the intricate coordination required for life at the cellular level.



"PART B"

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

ANSWER NEPHRON

Nephron is the basic functional unit of kidneys, which is mainly responsible for filtering blood and producing urine.

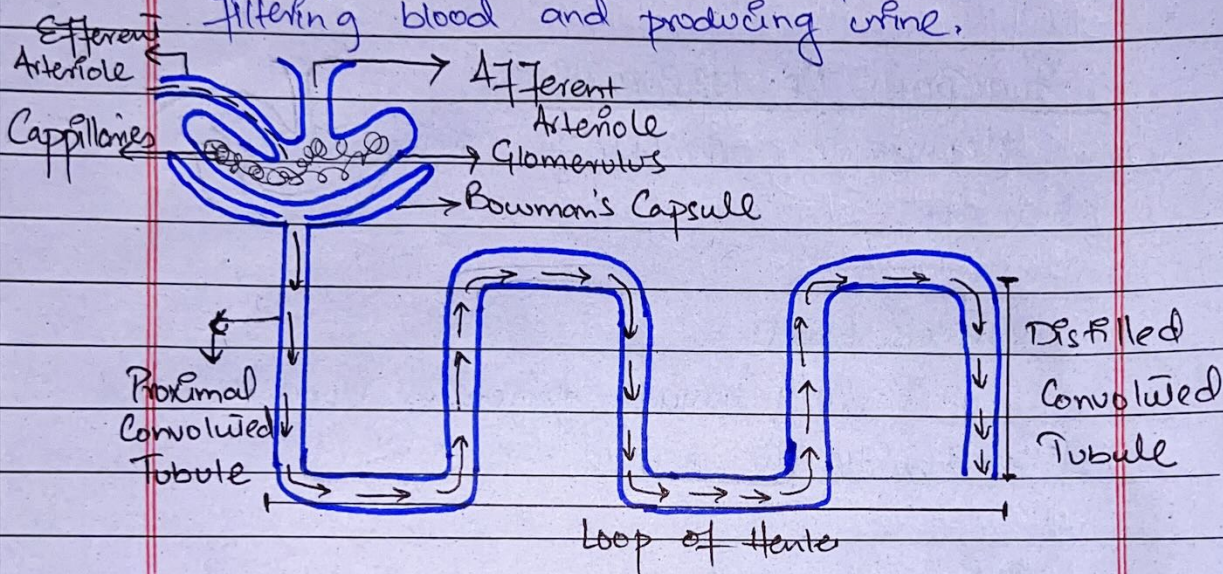


FIGURE: Close look at a Nephron.

STRUCTURE OF NEPHRON:

A nephron consists of the following major parts:

① Renal Corpuscle:

It consists of the glomerulus, capillaries and the Bowman's capsule as shown in the diagram above.

② RENAL TUBULE:

Renal tubule extends from the Bowman's Capsule and consists of proximal convoluted tubule (PCT), ~~and~~ distal convoluted tubule (DCT), and loop of Henle.

③ Collecting Duct:

The collecting duct collects the urine and passes it to ureters.

FUNCTIONS OF NEPHRONS:

Nephron is responsible for various functions such as;

① Filters blood:

Passing through glomerulus, blood is filtered, with the help of the capillaries.

② Reabsorbs nutrients:

Nutrients are reabsorbed ~~by~~ ~~the~~ into the blood by the renal tubules.

③ Hormone Secretion:

• Hormones like erythropoietin are secreted by nephrons.

④ Regulation of Blood Pressure:

Nephrons are also responsible for the regulation of blood pressure.

CONCLUSION

Nephron is a highly specialized structure which filters blood, reabsorbs essential substances, and eliminates the waste products from the body. It is also responsible for maintaining the internal environment of the body.



"PART-C"

Discuss the causes and preventive measures to smog.

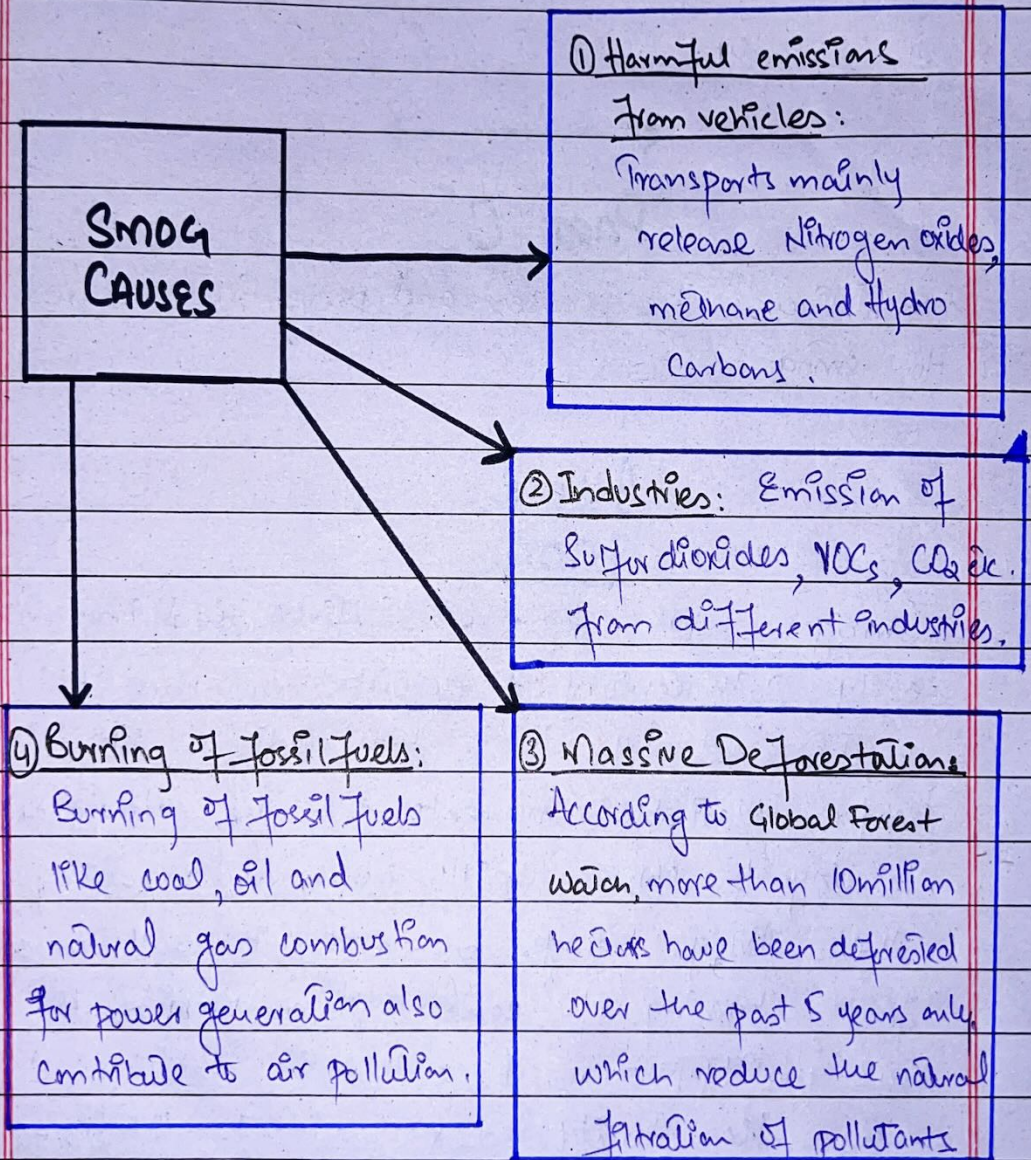
ANSWER

SMOG

Smog - smoke fog - was first used in early 20th century to describe the mix of smoke and fog. It is the addition of major undesirable components into the atmosphere leading to sphere health issues and impacting the living beings on earth. It usually comes from burning of coal and compromises the air quality index. Recently, in Pakistan the Air Quality Index went upto 1000 ~~per~~ - in Punjab specifically. According to a survey of University of Chicago, the average life expectancy has reduced upto 7 years, due to the bad air quality.

CAUSES OF SMOG

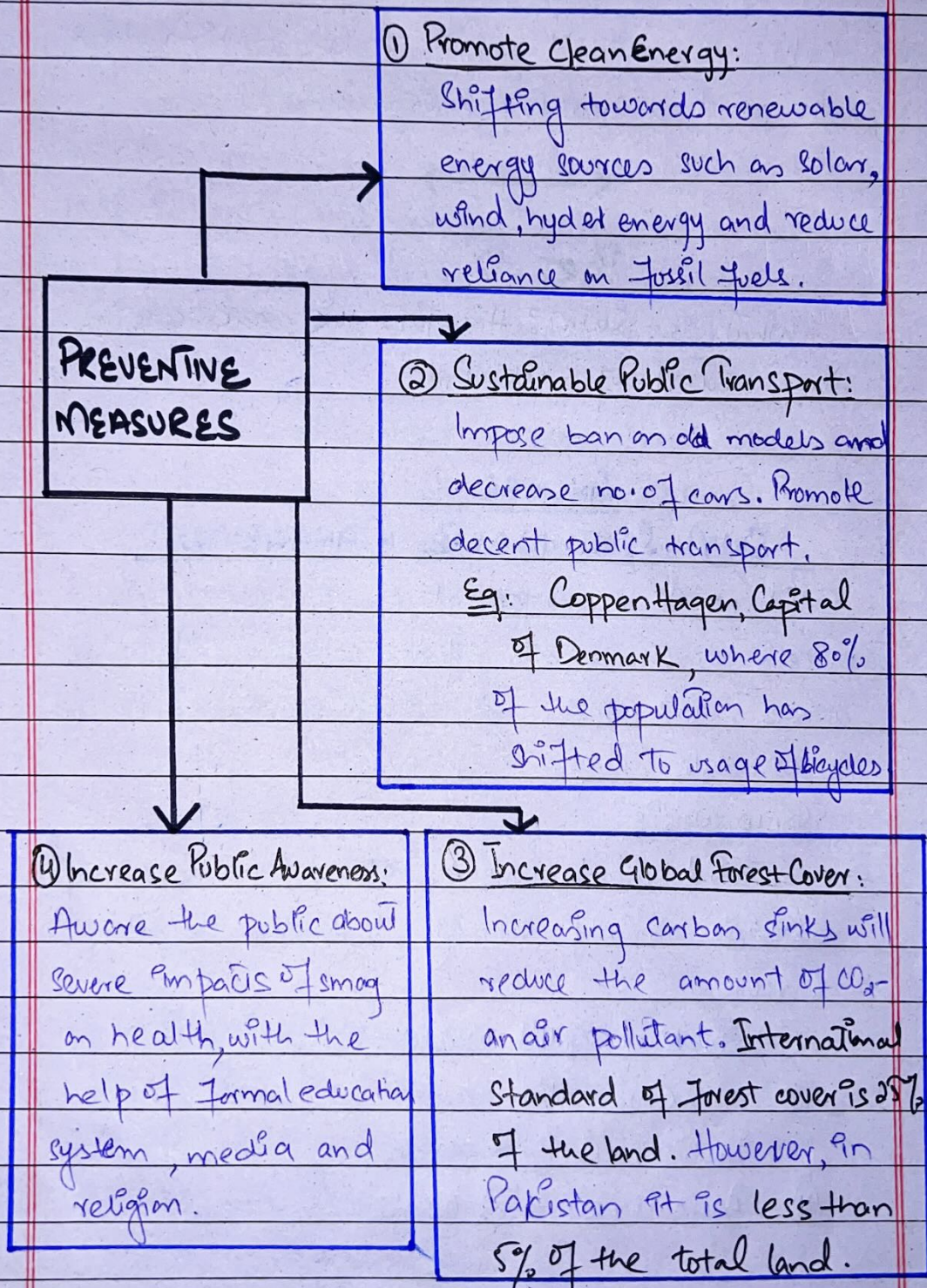
Smog - harmful air pollutant - is mainly caused by the addition of harmful pollutants in the air. The major causes of smog are:



The above mentioned are some of the main causes of smog which must be addressed for reduction of smog.

SMOG - PREVENTIVE MEASURES

To reduce the smog from the air and attain a good air quality, some preventive measures must be adopted, such as;



CONCLUSION

Smog is a significant environmental issue caused by the unwanted air pollutants coming through various human and natural factors. Preventive measures must be taken as the collective efforts will help ensuring clean air and a healthy environment.



"PART-D"

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

ANSWER

SWM- SOLID WASTE MANAGEMENT

Solid waste management is a systematic process which starts from collection of solid waste and ends at disposing it off in a sustainable way.

SOLID WASTE:

Solid waste consists of solid and semi-solid materials, mainly coming from the following sources:

- ① Industrial solid waste
- ② Municipal solid waste
- ③ Institutional solid waste
- ④ Agricultural solid waste.

Management of the solid waste is a supervised handling of waste, which consists of following steps.

SOLID WASTE MANAGEMENT STEPS

STAGE 1 → COLLECTION STAGE:

① Government is responsible for collection of waste via established municipal authorities or through private stakeholders.

② This is the most expensive stage.

STAGE 2 → RECOVERY PROCESS:

① Transfer of waste to the transfer station and segregation of garbage into different categories.

STAGE 3 → WASTE DISPOSAL:

This involves the disposal of the waste according to its specific category.

SWM WEAKNESSES W.R.T PAKISTAN:

There are some weaknesses related to the solid waste management in Pakistan. By addressing those issues the problem of waste mismanagement can be solved.

① Lack of Infrastructure:

In Pakistan very few developed areas have the facility of ~~low~~ decent waste collecting vehicles, equipments and other facilities. However, some areas are lacking proper landfill sites ~~are~~ and weak planning of waste treatment. Such as Karachi, which is considered as the second most polluted city in the world - in a recent survey.

② Poor Waste Segregation:

The segregation of waste is not done properly according to the different categories of the waste.

③ Low Public Awareness:

Public is not aware about waste segregation, waste disposal and importance of ~~of~~ waste management and the burden is solely on the authorities.

④ Financial Constraints:

Budget is mainly not allocated according to the need of this sector due to which huge dependency is on outdated technology and work force is also very minimal which makes it difficult to manage.

CONCLUSION

Solid waste management an important step towards a clean and green environment. However, in Pakistan it is not addressed properly and needs urgent reforms, which will help Pakistan get in the path of a sustainable system and ensure a healthy environment.



QUESTION - 3

"PART A"

Explain the working of human eye.

ANSWER

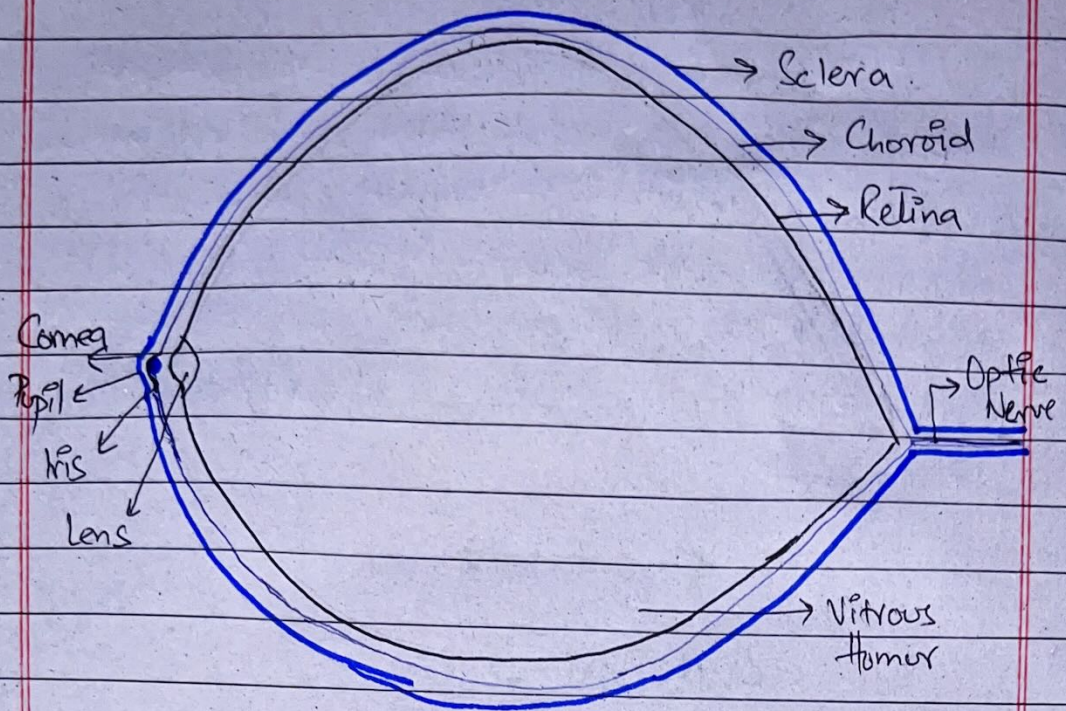
HUMAN EYE

Human eye is a sensory organ which provides the sensory information for the visuals. Working of eye involves the interaction of various parts of the eye and the brain as well.

STRUCTURE AND WORKING

A human eye consists of the following:

- | | |
|---------------|-------------------|
| ① Cornea | ④ Vitreous Humour |
| ② Pupil | ⑤ Sclera |
| ③ Iris | ⑥ Choroid |
| ④ Lens | |
| ⑤ Retina | |
| ⑥ Optic Nerve | |



① Cornea:

Light enters through it, which bends the light waves.

② Lens:

Focuses the light precisely on retina.

③ Retina:

Most sensitive layer where the conversion of light waves into an image takes place, with the help of Cones, Rods and photoreceptors.

④ Optic Nerve:

It transmits the image towards the brain.

⑤ Aqueous Humor:

↳ A fluid filled region which provides nutrients and gases to areas with no access to capillaries.

⑥ Sclera: Provides protection to the eyes

⑦ Pupil:

A small hole for entrance of the light.

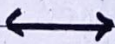
⑧ Iris:

A pigment muscle which controls the movement of pupil.

⑨ Choroid:

Responsible for the nourishment of the eye.

The human eye consists of various sensitive stimuli which help in focusing ~~of~~ on the visuals and interacting with the world.



'PART B'

Give symptoms and preventive measures to malaria and dengue.

ANSWER

Dengue and malaria are two diseases caused by mosquito bites which result in health issues like dengue, fever, pain, headache, vomiting etc.

MALARIA:

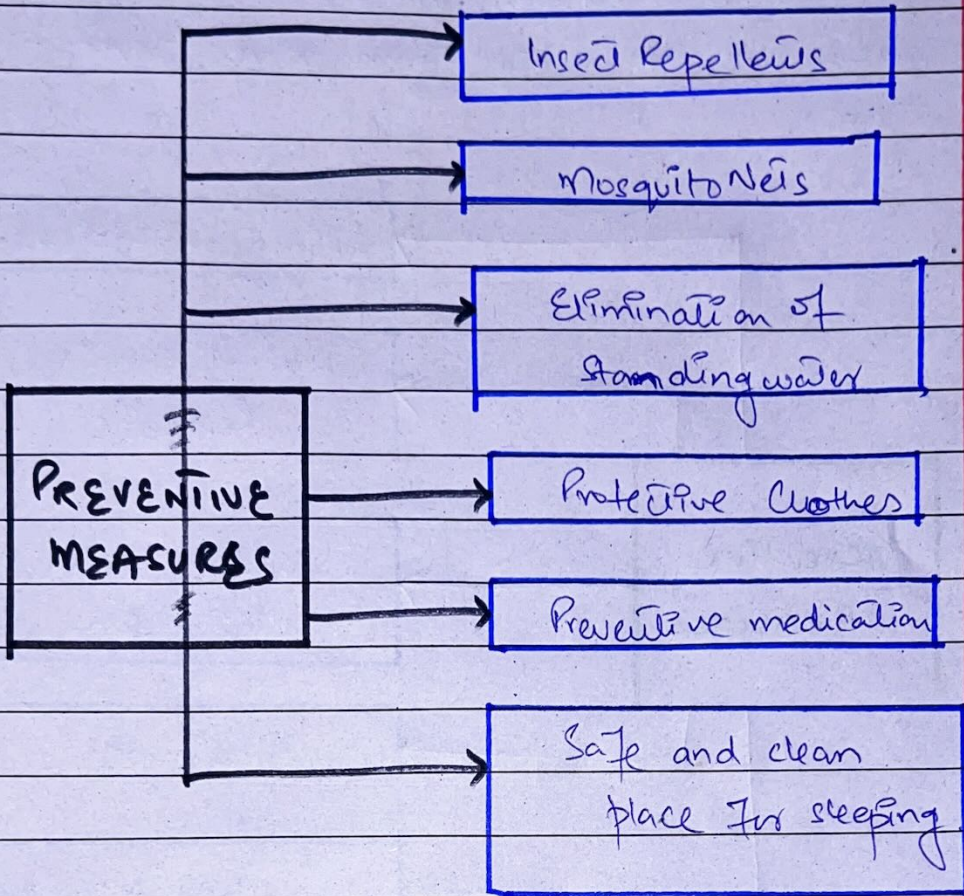
Malaria is a life threatening disease spread in humans caused by the bites of special kinds of mosquitoes.

Symptoms:

- ① High Fever
- ② Headache
- ③ Body Pain
- ④ Nausea
- ⑤ Vomiting
- ⑥ Enlarged spleen in severe cases.

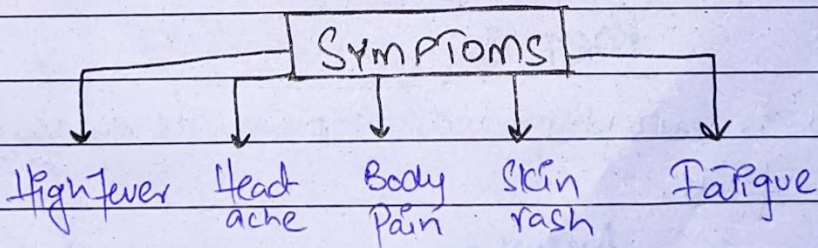
These are some of the major symptoms seen in a patient of malaria disease.

PREVENTIVE MEASURES:



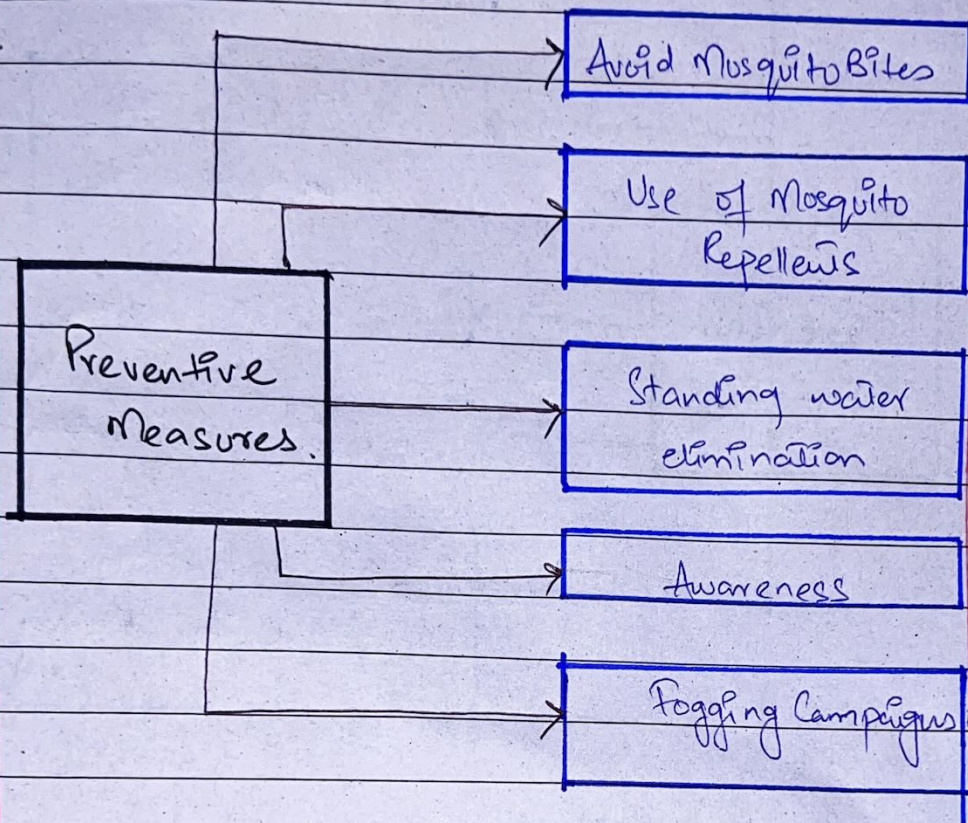
DENGUE

Mosquito bites can also cause dengue which is also a life threatening in rare cases.



PREVENTIVE MEASURES

Preventive measures which are to be taken to be safe from dengue fever are:



Adoption of these preventive measures can help to stay safe from such diseases.



'PART C'

What is eutrophication? Explain its causes and effects.

ANSWER EUTROPHICATION

A process of ~~an~~ over enrichment of water

bodies with nutrients, nitrogen and phosphorus, and leads to excessive growth of aquatic plants and algae.

CAUSES

- ① Agricultural Runoff:
Fertilizers runoff reach the water bodies during rains.
- ② Industrial Discharge:
Nutrients rich effluents dumped into lakes and other water bodies.
- ③ Sewage and waste water:
Untreated organic matter reaching the water bodies.
- ④ Natural Causes:
Erosion and decomposition of organic material also contribute.

EFFECTS

- ① Oxygen Depletion:
Dropped oxygen levels in the water cause harm to aquatic life.
- ② Bio-diversity Loss:
Death of aquatic life due to low oxygen levels disrupt the ecosystem.

③ Growth of Toxic Algal:

Algal blooms produce toxins resulting in the harm of aquatic life.

④ Water Quality Compromised:

Water becomes unsuitable for use and goes to waste.

CONCLUSION

Eutrophication is an environmental issue which has negative impacts especially on the aquatic life and it can be overcome with proper treatment and preservation of aquatic ecosystems.



"PART D"

Differentiate between GIS and GPS.

GIS

Geographic Information System is designed to capture, store, analyze, manage and visualize the geographical data.

GPS

Global Positioning System provides the location and time information.

DIFFERENCE

GIS

- 1) Used for spatial analysis
- 2) Includes software and hardware data
- 3) Integrates various types of data
- 4) Utilizes diverse data sources
- 5) Can incorporate GPS data.

GPS

- 1) Used for determining precise time and location.
- 2) Includes satellites and receivers.
- 3) Pinpoints exact location.
- 4) Relies on satellite signals.
- 5) Provides location data used within GIS systems.

