# General Science And Ability

## GIS

GIS is abbreviated as Geographic Information System. It is basically collection of computer system that is used to store and present information in the form of maps.

### Benefits Of Using GIS:

- As GIS is automatic and computer system so it can store large amount of data as compared to other things like remote sensors.
- Secondly, large amount of data can be interpreted and analyzed using GIS as it is the work of machine and it never gets tired.
- It can reduce the manual field work and is more efficient in terms of data processing.
- Because of it's large capacity, various areas can be studied using GIS

### Applications:

- It plays important role in studying the effect of global warming on glaciers as melting of glaciers can be observed using GIS. It helps in accessing the unaccessible.

to evacuate the land using technology.

## (i)ban Management:
It is more smarter tool of collecting data without much hardwork and plays an important role in urban managem -ent. In planning a city, it is used as it determines the land that is available.

### (1) Question No _ 5 (b)

## Global Warming:

### Definition:
According to Intergovernmental Panel on Climate Change (IPCC) global warming is defined as the gradual increase in the temperature of the earth due to human activities. Both the temperature of the atmosphere and temperature of the surface of the Earth is increased. Global warming is a global phenomena which is alarming as it has inimical impacts on mankind and as well as environment.

### Causes of Global Warming:

* ### Green House Gases:
Those gases

**(4)**

that has ability to trap heat or absorb heat is known as green house gases. Green house gases includes:

- $CO_2$
- $CH_4$
- $CFC_3$
- $N_2O$

According to the IPCC $CO_2$ is the major contributor to global warming as 60% of the global warming is caused by $CO_2$. $CH_4$ contributes 15% and $CFC_3$ contributes 11%.

**Green House Effect:**

It is a normal process that takes place in the atmosphere as some of the heat is trapped by GHGs in the troposphere. However, it is enhanced green house effect which is harmful and is continously increasing the temperature of Earth.

- **Depletion of Ozone Layer:**

Another important cause of global warming is depletion of ozone layer which protects the earth from harmful rays of the sun. It is depleted due to the presence of harmful substances in the environment like Chlorofluorocarbons (CFCs).

# Causes of Global Warming

- GHGs
- Ozone depletion
- population explosion
- Growing industries
- wild fires

## Effects of Global Warming:

- It has resulted in melting of glaciers and due to melting of glaciers sea level is increasing which is a threat to coastal areas. Capital of Indonesia, Jakarta is at the risk of going underwater, because of rising sea levels. Kiribati is another fastest sinking island.
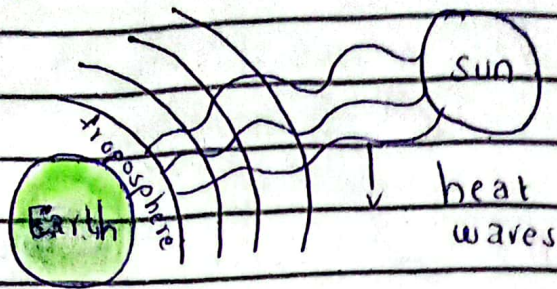
- Global warming has increased the occurence of floods all over the world. Floods in Pakistan that came in 2022 resulted in 33 billion loss. Recently, floods in spain also claimed lives of number of individuals.

- It has also impacts on human beings. Millions of people can die because of heat stroke. 1200 deaths are caused in karachi by heat waves.

- Agriculture is also affected from global warming. It reduce the crop yield. Mango yield in Pakistan decreased by 40% in 2022. It further then reduce the exports and economy is also affected.

## Diagram



## Kyoto Protocol :

It was designed in 1997 in the city of Japan, Kyoto. It's prime objective is to reduce the emission of green house gases so that global warming is reduced.

### Specifically Formed For Developed Countries :

55/. of the global emissions were targeted and it is mostly released by developed countries like America, Europe, US, Germany and upto so on. In short Global North was asked to reduce emissions.

### Committment Rounds :

Committment rounds consists of 8 years. USA first refused to ratify it but later on Canada and USA exit the protocol completely.

### Weaknesses :

- It was not legally binding
- No framework for implementation
- Irresponsible attitute of states like USA
- Countries gave priority to their national interests.

# Question No 5(a)

## Difference Between Eukaryotic And Prokaryotic Cell

### Difference In Cell Structure:

Generally prokaryotic cells are smaller as compared to eukaryotic cells.

### Nucleus:

Prokaryotic cells lacks membrane bounded nucleus and genetic material is not inside nucleus rather it is located in region known as nucleoid. On the other hand, Eukaryotic organisms have proper membrane bounded nucleus where genetic material is present.

### Organelles:

Prokaryotic cells lacks membrane bounded organelles like mitochondria, golgi apparatus and endoplasmic reticulum. Whereas, eukaryotic cells possess organelles like golgi apparatus, endoplasmic reticulum etc.

### DNA:

In prokaryotic cells DNA is single and chromosomes are circular. Whereas, DNA of eukaryotic organisms is double stranded and chromosomes are present which linearly associate with histone proteins.

## Size of Ribosomes:

Eukaryotic cells have 80s ribosomes which is large and it is also present in Rough Endoplasmic Reticulum (R.E.R). On contrary, Prokaryotic ribosomes are smaller in size 70s.

## Cell Wall:

Prokaryotic cells have cell walls made of peptidoglycan. On the other hand, cell wall of some eukaryotes like plants and fungi consists of cellulose or chitin
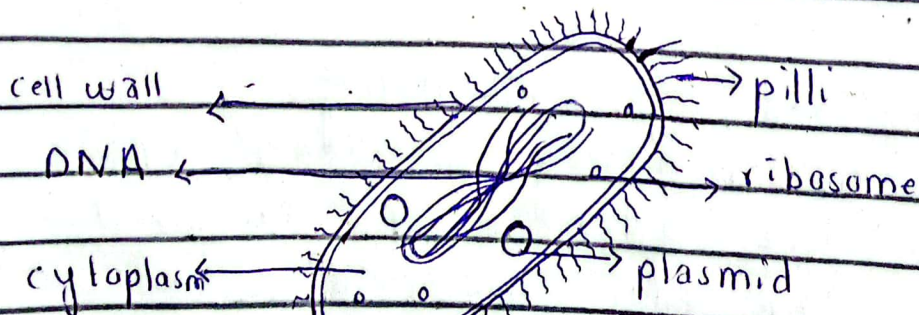
## Cell Division:

Prokaryotes cells are divided using binary fission. The cell replicates and divides into 2. On contrary, cell is divided in eukaryotes through process known as mitosis (somatic cells) and meiosis (for germ cells).

## Example:

Eukaryotes : Fungi, Animal and Plant Cell

Prokaryotes : Bacteria



cell wall

DNA

cytoplasm

pilli

ribosome

plasmid

A. Prokaryote Cell

# Question No.2 (c)

## Hydrogen Bonding:

**Definition:** It is an intermolecular bond that is formed between hydrogen atom of one molecule with the most electronegative atom of another molecule. The electronegative atoms includes Oxygen, Flourine, Nitrogen (O, F, N). So hydrogen bonding is a bond formed between H and O, F, N.

## Characteristics:

① Hydrogen bonding is directional

② Hydrogen bonding is 20 times weaker than covalent bond.

③ It is stronger than diapole-diapole bond

④ It is just like strong form of diapole-diapole interaction

## Uses of Hydrogen Bonding:

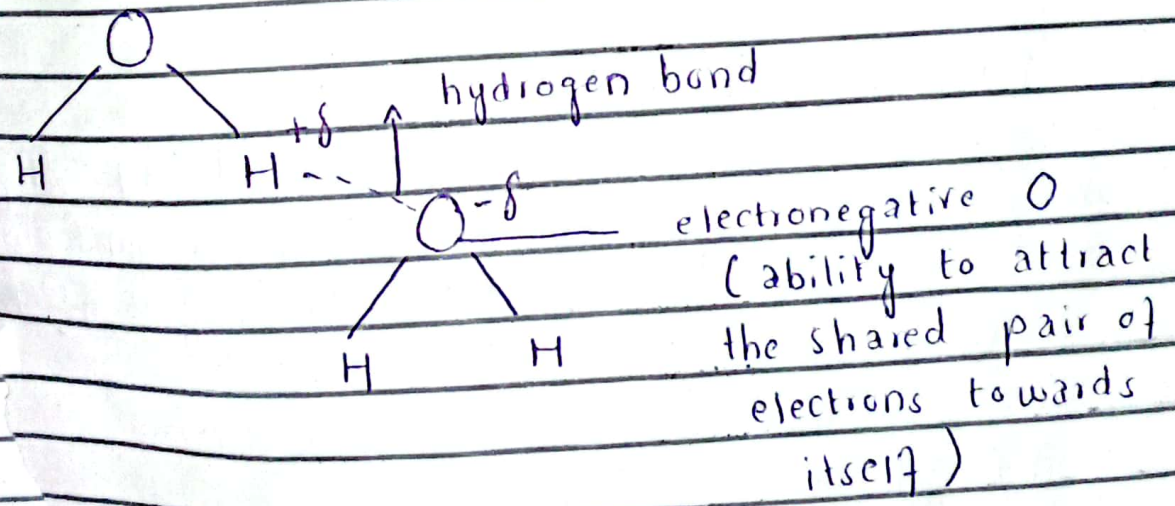Hydrogen bonding between the base pairs like adenine and thymine the DNA molecule.

• It maintains tertiary and secondary structure of protein

- It also plays role in bonding substrate to the enzyme.
- Hydrogen Bonding is used in adhesives as it increases adhesion
- It increases the strength and durability in polymers like Nylon.
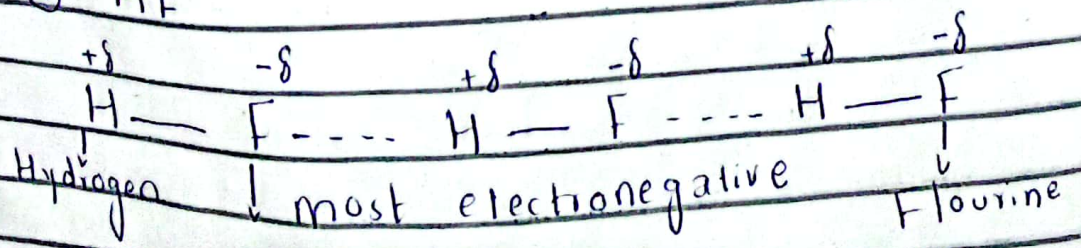- Water unique property is due to hydrogen bonding as it contributes to high surface tension.

### Examples of Hydrogen Bonding:

① $H_2O$ (water molecule)

It is formed between electronegative Oxygen of one molecule and Hydrogen atom of another molecule.

hydrogen bond

electronegative O
(ability to attract the shared pair of electrons towards itself)

② HF

H — F ---- H — F ---- H — F

Hydrogen     most electronegative     Flourine

here Hydrogen bonding is formed between electro -negative Flourine (F) and Hydrogen (H).

## Question No 2(a)

**Lipids:**

These are organic compounds that are insoluble in water but soluble in nonpolar solvents like alcohol.

**Composition:**

They are primarily composed of Carbon, Hydrogen and Oxygen. Other elements such as Nitrogen (N) and phosphorus (P) may also be present. They contain less oxygen and more C-H bonds.

**Types of Lipids:**

① **Phospholipids:**

It is composed of 1 glycerol molecule, 2 fatty acids and 1 phosphoric acid molecule linked to a nitrogen group.

**Two parts:**

It has further two parts:

① **Phosphate Head:**

It is polar, therfore it is soluble in water

② **Two Hydrocarbon Tails:**

They are non-polar and insoluble in water.

② Waxes:

These are formed by long chain of fatty acids bonded to long chain of alcohol.
- They are solid at room temperature
- Usually have high melting point
- Forms water proof layer on surface of some plants such as leaves and fruits.
- It also covers bodies of some animals like sheep and insects.
- It is resistant to degradation

③ Steroids:

These are the lipids which do not contain fatty acids. It is formed of 4 fused Carbon (C) rings containing 17 carbon atoms
- They are different from one another on the basis of functional group attached.
- Example of steroid is cholestrol

④ Acylglycerol:

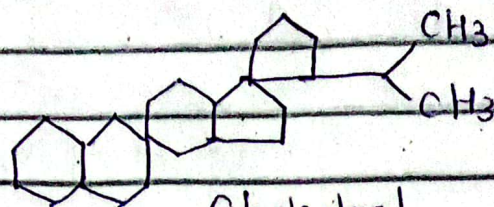These are lipids made of glycerol and fatty acids.

Triglyceride:

It is the most common acylglycerol which contains one glycerol and 3 fatty acids. Glycerol is a 3 carbon compound, to each carbon a hydroxyl group is attached.

Fatty Acid:

It is a long hydrocarbon chain with carboxyl group at one end. (COOH).

Fatty Acids

Saturated          Unsaturated

Cholestrol

Functions of Lipids

- Energy storage molecules in plants and animals. It stores energy more efficiently than carbohydrate.
- Phospholipid and cholestrol are essential components of cell membrane
- They provide thermal isolation and cushions vital organs against shocks. For example, subcutaneous fatty layers in animals.
- Hormones are also lipids in nature that regulates the body processes. Ex : Testosterone and Aldosterone Steroids are precursors of all steroid hormones
- Also prevents water loss in plants and animals. For example, wax on leaves.
- It is essential for the absorption of fat soluble vitamins like (A, D, E and k)
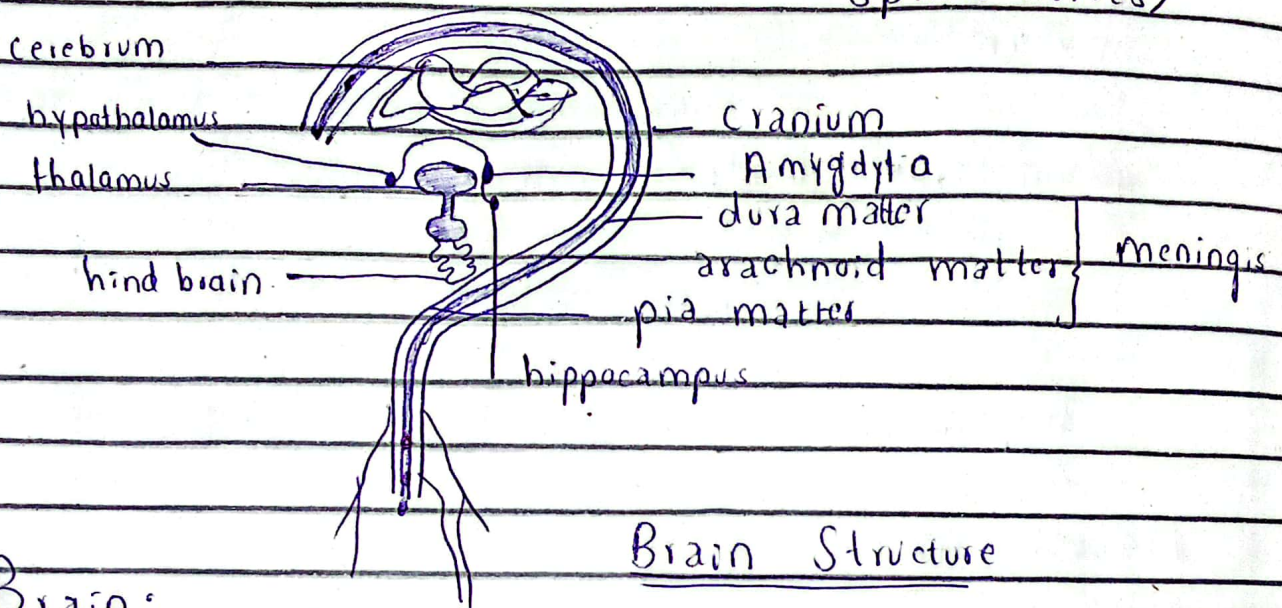
## Question No 2 (d)

## Nervous System:

It is a complex network of cells and tissues that regulates major

activities of the body.

## Nervous System

Central Nervous System (Brain, Spinal Cord)

Peripheral Nervous System (cranial and spinal nerves)

cerebrum
hypothalamus
thalamus

hind brain

cranium
Amygdyta
dura matter
arachnoid matter
pia matter } meningis

hippocampus



Brain Structure

Brain:

It is protected by cranium which provides support to it and meningis which is a fluid filled region that cushions the brain against shock.

## 3 Parts of Brain

Forebrain        Mid-Brain        Hind Brain
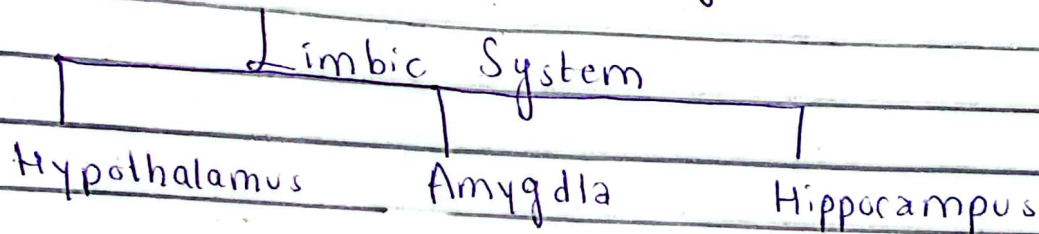
Forebrain:

It is further composed of:

① Cerebrum
② Limbic System
   Thalamus

## Cerebrum:

It is the largest part of brain, and plays important role in learning and memory storage. It is the rational part of the brain and is responsible for thinking, judgement, intelligence and reasoning.

## Thalamus:

It collects and transfer the sensory information to the limbic system.

## Limbic System

Hypothalamus        Amygdla        Hippocampus

## Hypothalamus:

It controls body temperature, hunger and thirst, and menstrual cycle.

## Amygdla:

It controls emotions like happiness, sadness, fear and rage.

## Hippocampus:

It is responsible for the storage of short term memory.

## Mid Brain:

It basically connects fore brain with hind brain. It's main function is regulation of reflex movement of human eyes.

## Hind Brain

| Cerebellum | Pons | Medulla Oblangata |

**Pons:**
It manage sleep cycle and controls transition between sleep and wakefulness.

**Cerebellum:**
It is the 2nd largest part of brain that regulates the voluntary actions in body and controls the balance of body. It also controls the storage of long term memory.

**Medulla Oblangata:**
It usually controls involuntary actions like heart beat, breathing, swallowing and blood pressure management.
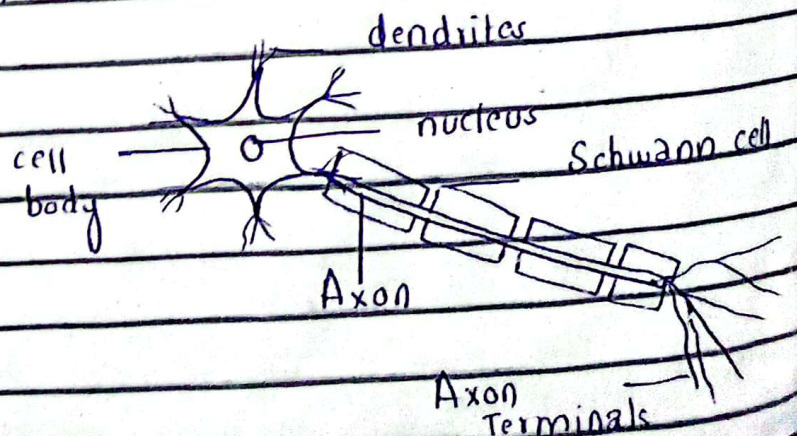
## Functional Unit of Nervous System:

**Neurons:**
These are only cells that cannot be regenerated and are the longest cells in our body. It is the functional unit of nervous system.

**Composition:**
① Dendrites
② Axons
③ Cell body

cell body

dendrites

nucleus

Schwann cell

Axon

Axon Terminals

## Question No 6 (c)

Diameter = 6 cm
Area = ?
Circumference = ?

Formula for area = $\pi r^2$
Now Given d = 6 cm

$$r = \frac{d}{2}$$

to find r divide d by 2

$$r = \frac{\cancel{6}^{\;3}}{\cancel{2}}$$

radius = 3 cm

now put it in formula of area
Area = $\pi r^2$
Area = $3.14 \times 3^2$
= $3.14 \times 9$

$$\boxed{Area = 28.2}$$

Circumference Formula = $2\pi r$
putting values
Circumference = $2 \times 3.14 \times 3$
= $6 \times 3.14$
= 18.8
So circumference = $\boxed{18.84}$