A very good attempt
Manage time

Part-II

Show all steps and working for calculations.

SECTION-I

Use diagrams and graphs to illustrate concepts.

QUESTION NO: 02

(a)

Lipids → The word "lipid" is derived from Greek word "lipos" means fat.

Defination: (Biochemistry by Voller)

Lipids are naturally occuring diverse groups of hydrophobic organic molecules that serves as a source of energy.

Energy Reserve:

Lipids serves as a source of energy. It provides 9.1 calories per gram of energy.

Diverse Group:

Lipids belongs to the diverse group of organic molecules because it is present in higher plants, animals and most of other cell types.

Composition of lipids:

It consists of

- Glycerol
- Fatty acids
- Sterols

Lipids are commonly known as "fats and oils"

Basic Unit:

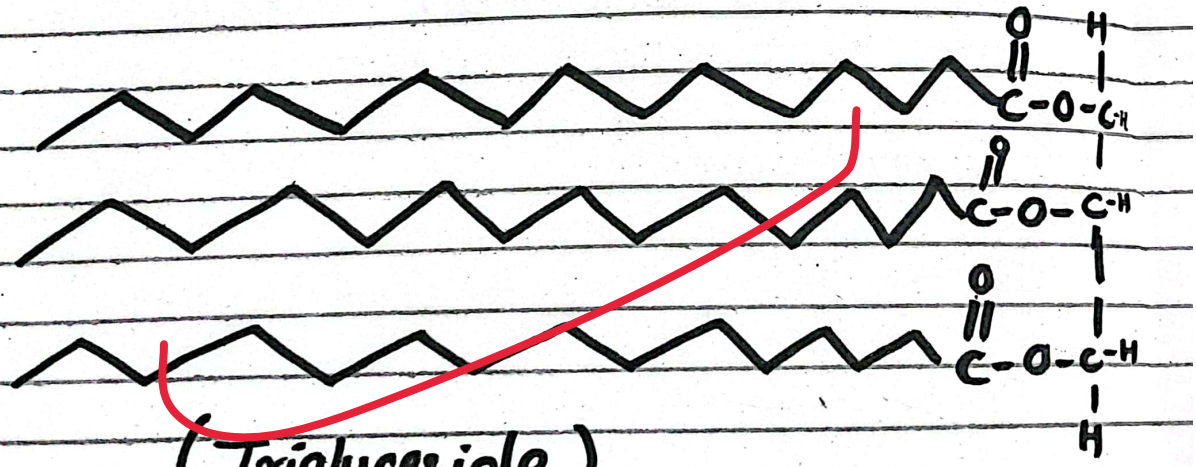
The basic unit of lipid is Triglyceride

It consists of Glycerol (propane-1,2,3-triol) and 3 fatty acids.

Chemical Reaction

Glycerol + 3 Fatty acid → Triglyceride + $3H_2O$

Structure of Triglyceride:



(Triglyceride)

"Triglyceride is a chain of hydrocarbon with carboxylic group at the end of chain"

(Lipids Biochemistry by Michael I Gurr

Types of Lipids

(Furial Lipid Biochemistry) : Reference

Lipids are broadly classified on 2 basis.

Lipids

Classification

On basis of composition
- Simple lipids
- Compound lipids
- Derived lipids

On basis of structure
- Saturated lipids
- Unsaturated lipids

1- Composition:

(a) Simple lipids:

Those lipids which are only composed of glycerol and fatty acids are called simple lipids.

- They are also known as fats and oils.

Example — Triglyceride (e.g, Palmitic acid, Olic acid)

(b) Compound lipids:

Those lipids which have additional groups along with triglycerides are called compound lipids

Example — 1- Phospholipid (1 Glycerol + 2 fatty acid + 1 phosphate group)

2. Glycolipid (carbohydrate)

3- Derived lipids:

Those lipids which are obtained on combination of simple and compound lipids by hydrolysis are called derived lipids.

Example — Steroids
Terpenes

On basis of Structure

1- Saturated lipids:

- Those lipids having no double bond in structure are called saturated lipids
- They are solid at Room temparature. That's why called as **"Solid lipid"**

Sources → Animal source → Meat, Fish, Eggs
→ Tropical oils → Palm oil, Avocado oil

Impacts/Effects on body → They are responsible for increasing cholestrol level in body along with increasing the concentration of Low LDL (Low density cholestrol) that may result in heart diseases.

Daily Requirement → only 10% of daily food is healthy.

2- Unsaturated lipids:

- Those lipids which have double bond in structure are called unsaturated lipids.
- They are **liquid** at room temparature. That's why commonly known as "oils".

Manifestations

mono-unsaturated lipids

- Those having only 1 double bond.
- They are healthy for body
- They help to reduce the level of bad LDL cholestrol and linked with increasing level of good HDL cholestrol in the body.

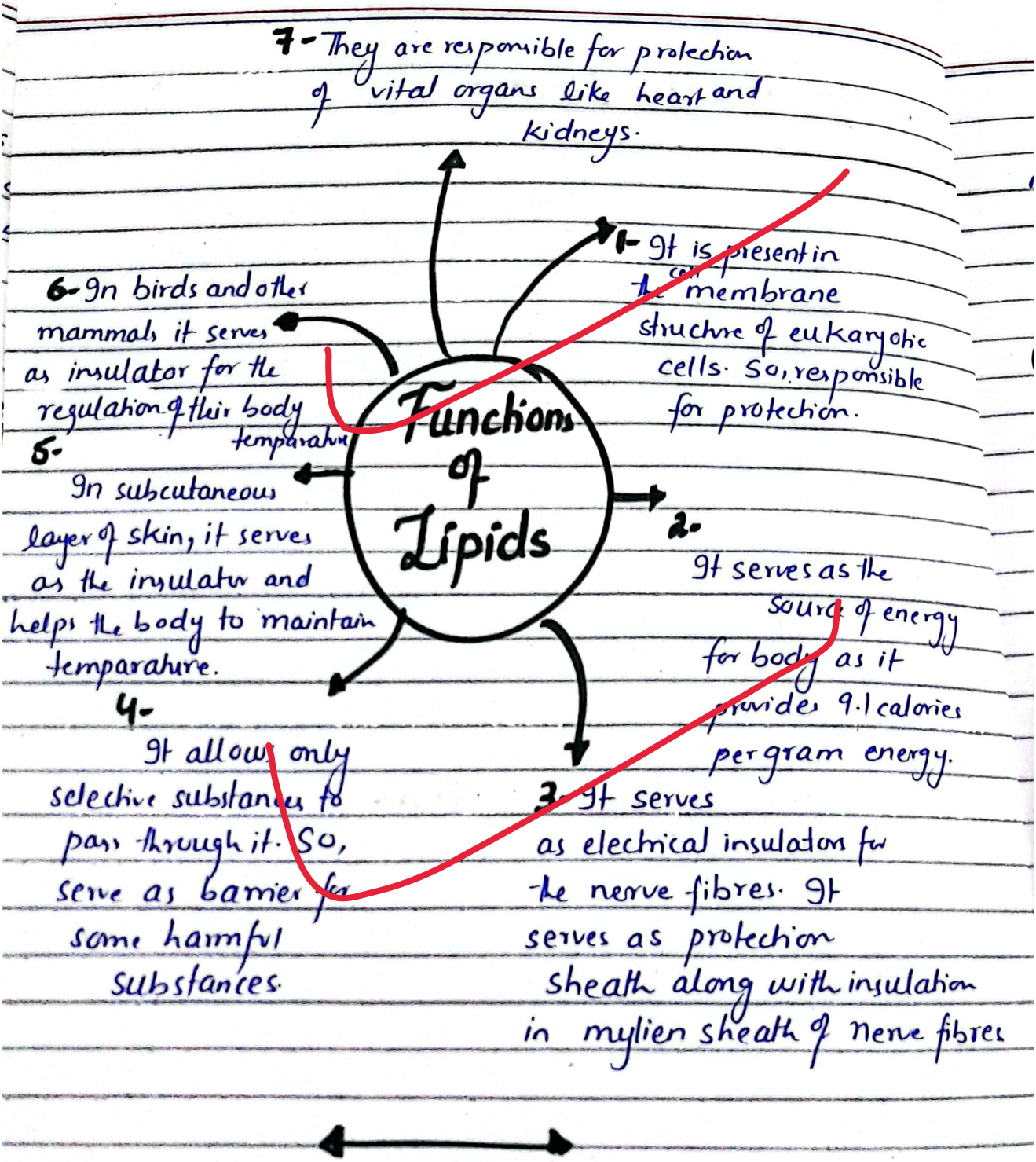
Sources
- Fish
- walnuts
- vegetable oils

polyunsaturated lipids

- Those having more than 1 double bond in structure.
- They are also linked with decreasing the level of bad LDL cholestrol and improving the level of good HDL cholestrol in body.

Sources
- Flax seeds
- Seafoods

Types
- Omega-3 fatty acid
- omega-6 fatty acid.


Functions of Lipids
7- They are responsible for protection of vital organs like heart and kidneys.
1- It is present in the cell membrane structure of eukaryotic cells. So, responsible for protection.
2- It serves as the source of energy for body as it provides 9.1 calories per gram energy.
3- It serves as electrical insulation for the nerve fibres. It serves as protection sheath along with insulation in mylien sheath of nerve fibres
4- It allows only selective substances to pass through it. So, serve as barrier for some harmful substances.
5- In subcutaneous layer of skin, it serves as the insulator and helps the body to maintain temparature.
6- In birds and other mammals it serves as insulator for the regulation of their body temparature

(c)

Hydrogen-Bonding:

- (Organic chemistry by Satya Prakash)-

Defination

(1) Hydrogen bonding is a strong intermolecular force in which hydrogen is bonded with most electronegative element at other side of bond
- It is a type of intermolecular force that is used to satisfy the valency of two different molecules but molecules should contain one electronegative element or a lonepair and hydrogen atom.

(2) It can also be defined as,

"A bond which is formed between a more electronegative element (i.e, Fluorine, oxygen) or a lone pair (that is not involved in bonding) and a more electropositive element (i.e, hydrogen) is called hydrogen bond."

Explanation:

Reason behind formation of hydrogen bond:

As stated earlier, this bond is to be formed between a high electronegative element and a more electropositive element.

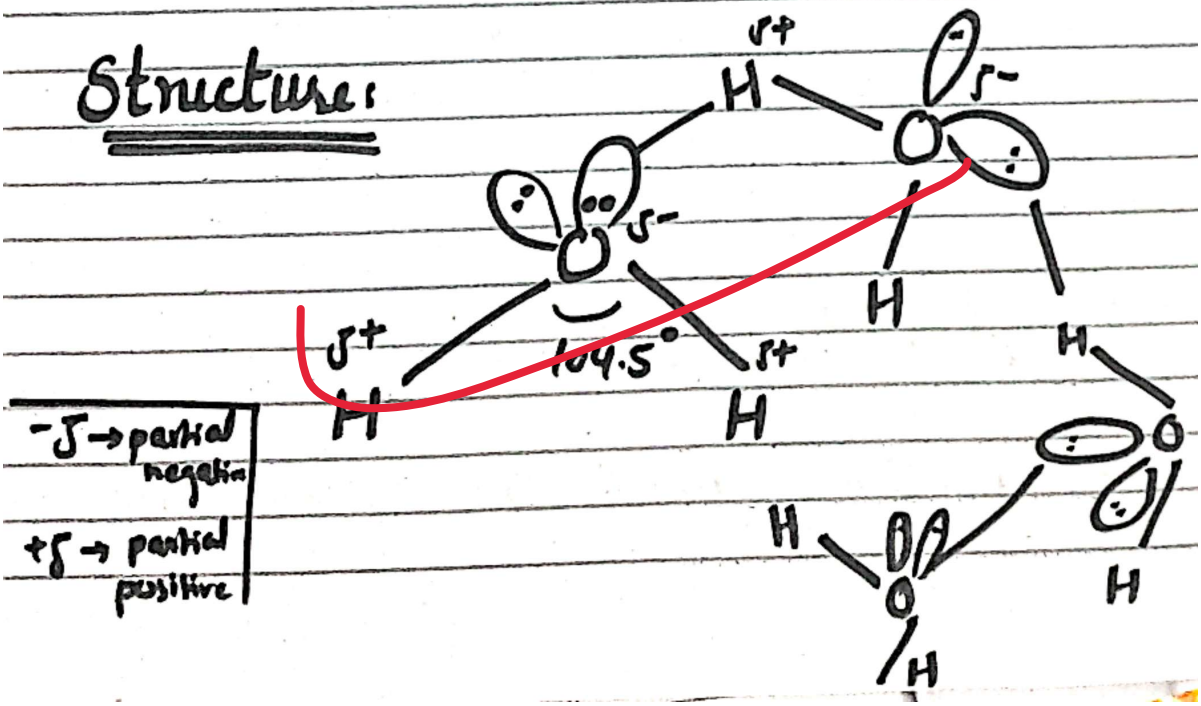
- As electronegative element has tendency to donate its lonepair of electrons to the electropositive element which is deficient of electron. In the result a bond is formed between the two.
- Moreover, as hydrogen atom is the only electropositive element in this bond formation procedure. That's why the bond is termed as the **hydrogen bond** and correspondingly bonding will be termed as **hydrogen bonding**.

Elaboration with Examples:

Example-1:

(Bonding in Water Molecule)

Structure:



Explanation:

As the bonding between hydrogen and oxygen atoms in water molecule is termed as hydrogen bonding.

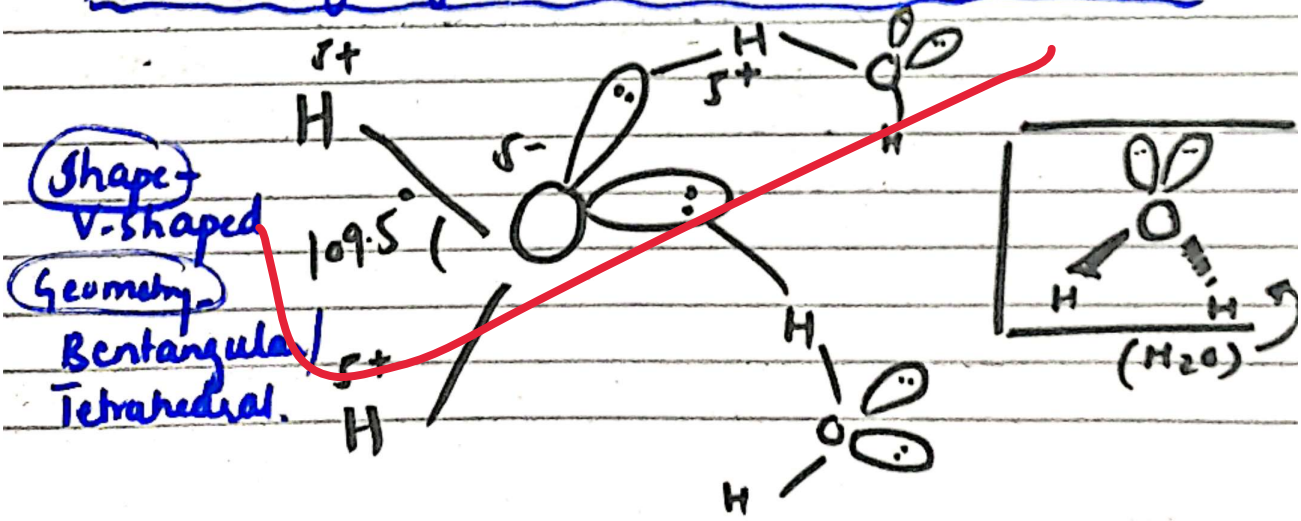
- Oxygen serves as the most electronegative atom with two bond pairs (two attached hydrogen atoms) and two lone pairs (that are not involved in bonding).

- Similarly, hydrogen atom serves as the less electronegative and more electropositive element because of deficiency of electrons. Hence, to satisfy its valency it will accept the lonepair electrons of oxygen atom.

- As, now the bond is formed between lonepair of electron on oxygen atom and hydrogen atom. This bonding is termed as hydrogen bonding.

Point to consider:

As, oxygen atom has two lonepair of electrons. So, it is capable of forming two hydrogen bond at a time



Shape → V-shaped

Geometry → Bentangular / Tetrahedral.

Example: 02

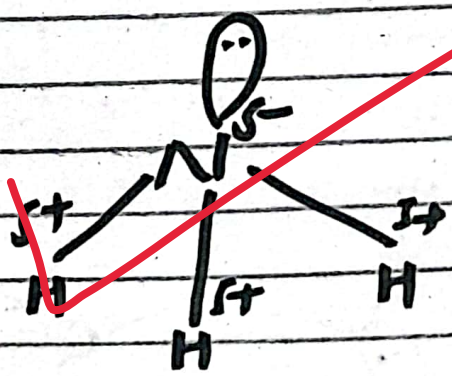
($\ddot{N}H_3$ molecule)

- The bonding formed by NH_3 molecule (with H_2O molecule) is also termed as hydrogen bonding

- Nitrogen as an electronegative element consists of
  1. lonepair of electron which can be donated to the hydrogen of hydrogen molecule.

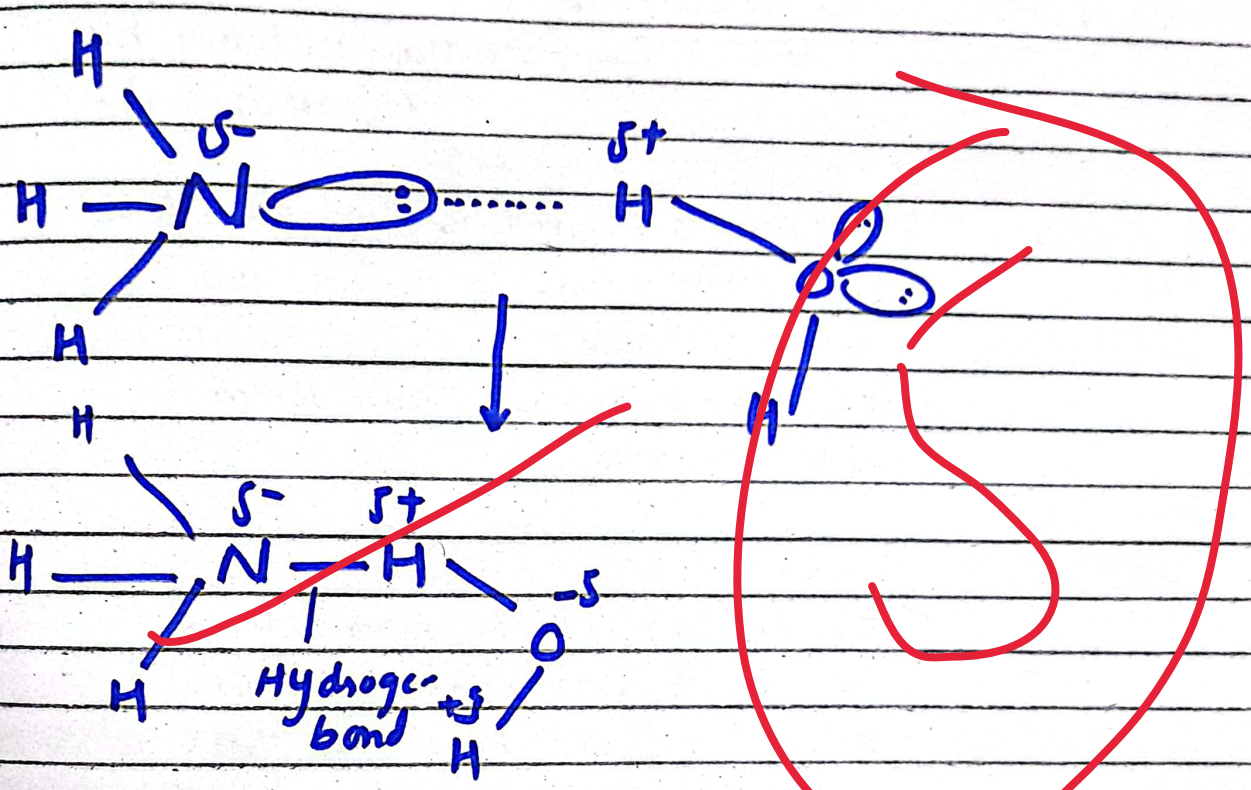
- As, again the bond is formed between the Nitrogen (most electronegative) and hydrogen atom (most elechopositive atom). It is known as hydrogen bonding.

Structure of $\ddot{N}H_3$:



Geometry - tetrahedral
Shape - triangular planar.

Bonding with water molecule (Structural Diagram)



Point to consider:

As, nitrogen consists of only one lonepair of electron. So, it is responsible for formation of only 1 hydrogen bond at a time.

(d)

Nervous System:

— (Gray's Anatomy by Henry Gray) —

System → System is referred as the joint action of multiple organs to produce a desired response.
It is also termed as collective action of multiple organs.

Nervous System → The system which is responsible for the coordination between brain, spinal cord via the nerve fibres or neurons. Such system is defined as nervous system.

Functions:

1- It controls the activities of body including metabolism, sleep cycle, menstuaration cycle, etc.
2. It is responsible for the proper brain functioning.
3. It is also accounts for the movement of body
4. It forms a network of communication in form of neurons in the body for transmitting

and receiving signals from brain and spinal cord.
S.9t controls the mental faculties of individual and also responsible for walking, running, jumping, jogging, etc.

Components of Nervous System:

Nervous system is broadly classified into 2 branches.

- **Central Nervous system (CNS)**
  - consisting of
    - Brain
    - Spinal cord
- **Peripheral Nervous system (PNS)**
  - consisting of nerves that brand out from the brain and spinal cord.

(a) CNS

CENTRAL NERVOUS SYSTEM

(i) Brain:

Brain is the vital organ of the body.

- It is considered as the center point within the body because it controls all life activities that's why termed as **"control unit"**.

Functions

- It controls sleep cycle.
- Responsible for metabolism process control unit.
- Sends and receives messages from body and control life activities.

Various components are responsible for specific function including memory retention (hypothalamus) etc

Control unit of our body.

Components

- Forebrain
- Midbrain
- Hind brain.

(ii) Spinal cord:

- It is extended from chest (thoracic cavity) to the pelvic girdle with extended branches in form of neurons attached with it.

- It is connected to the brain and extend down the body till the pelvic girdle.

- It is responsible for the coordinating activities of

body.

Functions → 1- Movement of body
→ 2. Walking, Running, etc
→ 3. Coordination (sends and receives signals from brain)
4- Maintenance of body posture.
5- Myelin sheath

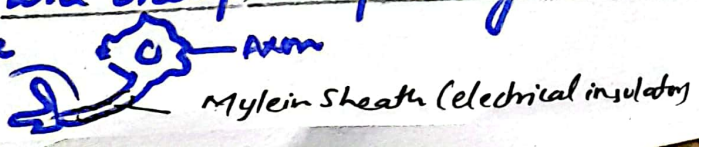
2 types of fluids: Grey matter, White matter

(b) PNS

Somatic Nervous system
- Controls voluntary actions examples
  - moving muscles
- Sensory information from skin, muscles and joints.

Autonomic Nervous system
- Controls involuntary processes such as heart rate, breathing and digestion

Neurons — Serves as communication source between brain and other part of body.



QUESTION: 06

~(C)~

Solution:

Given data:

Diameter of circle = 6cm

Radius of circle = d/2 = 6/2 = 3cm

To find:

Area of circle = ?

Circumference of circle = ?

Solution:

(a) Area of circle

As, we know that

Area of circle = πr^2

$\pi = 3.14$

Area = $(3.14) \times (3)^2$

$= 3.14 \times 9$

Area = $28.26\ cm^2$

(b) Circumference of circle

As we know that,

Circumference of circle = $2\pi r$

$= 2 \times 3.14 \times 3$

$= 6 \times 3.14$

Circumference of circle = 18.84cm

Hence, area of circle is 28.26 and circumference is 18.84cm.

(d)

(i) 13, 24, 46, 90, 178, ____

13, 24, 46, 90, 178, 354.

(ii) 5, 6, 9, 14, 21, ____

5, 6, 9, 14, 21, 30.

QUESTION: 04

(a)

Hepatitis:

Defination:

Hepatitis is defined as the inflammation of liver - generally caused by viral infection.

Type → Viral infection means that hepatitis is caused by virus.

There are various kinds of hepatitis

- Hepatitis-A
- Hepatitis-B
- Hepatitis-C (~~acute and~~ chronic) form
- Hepatitis-E
- Hepatitis-D

Causes of Hepatitis:

(a) Autoimmune hepatitis:

It is a disease that is caused by body itself when antibodies ~~makes~~ are produced by body against liver tissues.

(b) Exposure to alchol, toxins and chemicals:

This hepatitis is caused by a secondary result of continuous exposure to alchol, drugs or toxic chemical such as those found in aerosol sprays and paint.

(c) Non-sterile syringes:

Hepatitis can be caused by the use of non-sterile syringes that are already used to hepatitis patients.

(d) Blood transfusions and body fluid transfusions:

Hepatitis can also be resulted from the blood and body fluid transfusions from the hepatitis patient. Hence, precaution should be kept in mind while blood transfusions.

Symptoms

General Symptoms

- → Weakness and Fatigue
- → loss of appetite
- → Fever (a high temparature) ranging to 38°C (100.4°F) or above
- → Abdominal Pain
- — Tenderness
- — Feeling sick
- — Being sick
- — Headache
- — Jaundice (Yellowing of eyes and skin)
- — Kidney Problems

Symptoms of Chronic hepatitis

- Tiresome situations and conditions felt by body all the time
- Depression and Anxiety
- Jaundice characterized by svere abdominal pain
- General sense of feeling unwell.

As per National Institute of Health (NIH) report 2024:

"Around the world 400 million people are infected with hepatitis B & C more than 10 times the number of people living with HIV"

Prevention

1- Use of sterile instruments:

HIV can be prevented by the use of sterile instruments. It can help to combat the degree of accurement in hepatitis cases.

2- Avoid consumption of alchols:

Alchol consumption especially in smokers and diabetic patients became one of the leading cause of hepatitis around the globe.

- Alchol consist of chemical that are obstructing the normal lifecycle of human beings. It should be controlled.

3- Avoid overconsumption of aerosol sprays:

Aerosol sprays have also emerged as one of the contributing factor among the hepatitis cases. It contains toxins that are harmful to the human body.

4- Controlled and regulated blood transfusions:

Controlled and regulated blood transfusion practices in the hepatitis perspect can be helpful to combat the continuously increasing number of hepatitis cancer. Blood should be properly screened and tested before transfusion to any patient.

On April 9, 2024 - WHO released its global hepatitis report -

"It was calling for equitable access to interventions for viral hepatitis in low and middle income countries."