

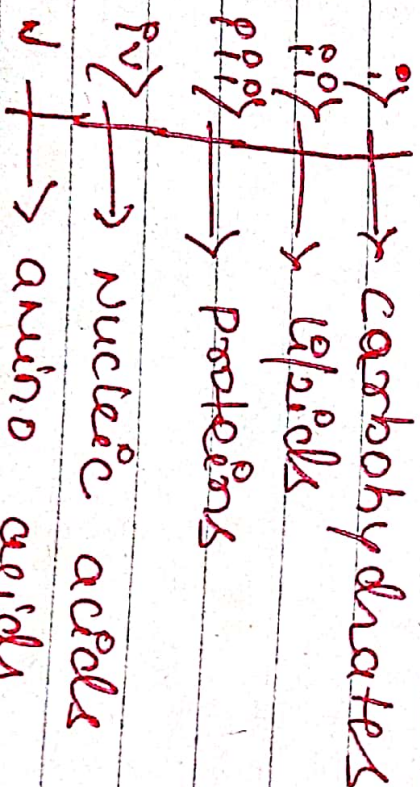
UNIT \Rightarrow 1

BIOMOLECULES

• Biomolecules are molecules that occur naturally in living organisms. Biomolecules include macromolecules like proteins, carbohydrates, lipids & nucleic acids.

• Biomolecules consists mainly of carbon & hydrogen with nitrogen, oxygen, sulphur & phosphorus.

• Classification of Biomolecules



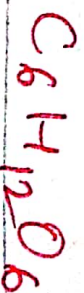
17 Carbohydrates :

- Carbohydrates is an organic compound, it contains only oxygen, carbon & hydrogen.
- Carbohydrates are hydrates of carbon.
- Carbohydrates are also known as Saccharides.

• The empirical formula is $C_n(H_{2n}O)_n$

eg \Rightarrow if we put $n=6$.

then



Glucose

-> Classification of carbohydrates

Carbohydrates

i) Monosaccharides

ii) Oligosaccharides

iii) Polysaccharides

-> Triose

-> Tetrose

-> Pentose

Disaccharide Trisaccharide

-> Homopolysaccharide

-> Heteropolysaccharide

Character Monosaccharide =

Oligosaccharide =

Polysaccharide =

• No. of sugar molecules

1

2-9

More than 9

• Glycoside bond

Absent

Present

Present

• Molecular weight

Low

Medium

High

• Taste

Sweet

Less Sweet

No taste

• Solubility

Soluble

Soluble

Insoluble

• Nature

Reducing sugar

May or may not be reducing sugar

Not reducing sugar

• Example

Glucose, Fructose

Sucrose, Maltose

Starch, Cellulose

→ Function of carbohydrates :

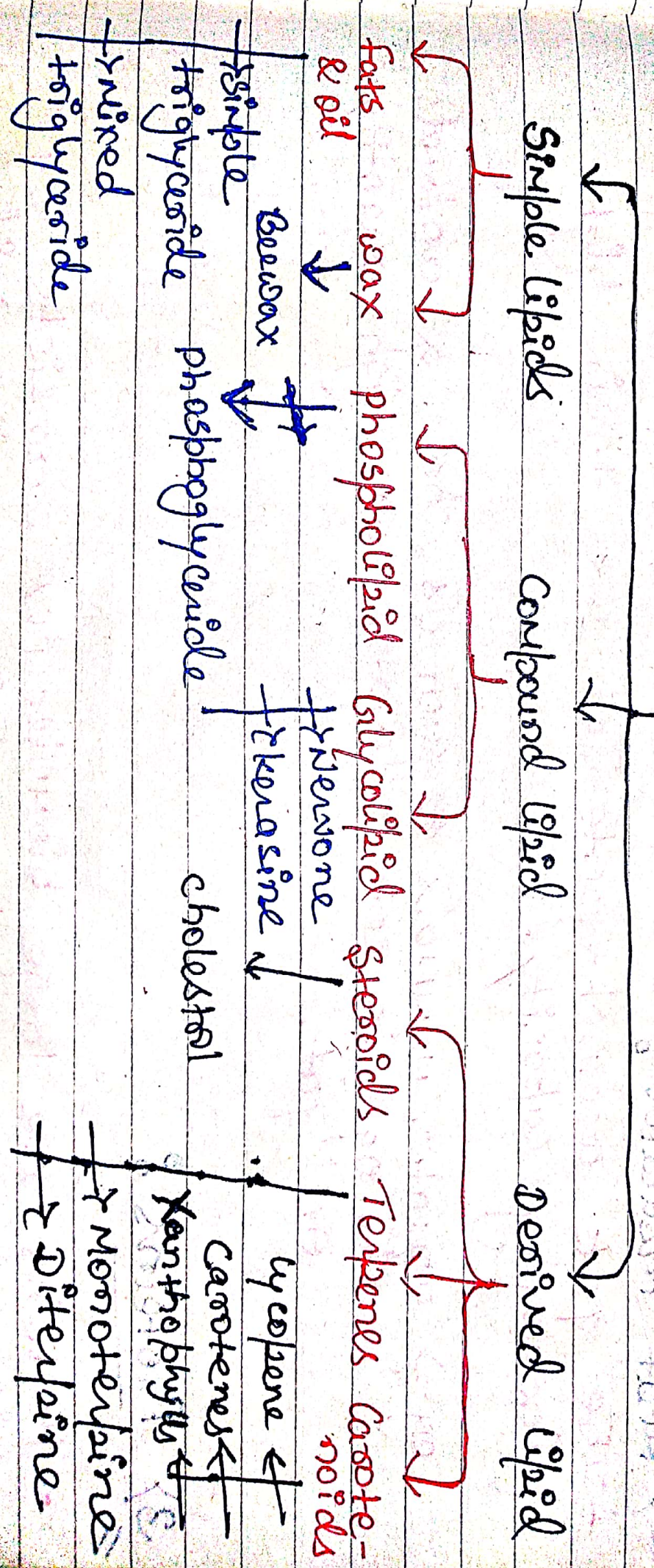
- Glucose is the source of storage of energy. It stored as starch form in plant & glycogen form in animals.
- Glucose is broken in glycolysis to generate ATP.
- carbohydrates are also energy source for brain.
- They form structural & protective component like cell wall in plant & micro-organisms.
- carbohydrates are rich in fibre which prevents from constipation.
- It also helps to development of immune system.

2) Lipids:

- Lipids are a major source of energy for the body, & they provide hydrophobic bases.
- Lipids are mostly insoluble in water but they are soluble in non-polar solvents like ether, chloroform.
- Lipids have high energy content that are metabolised to release calories.

• lipids are also act as electrical insulators
 they insulate nerve axon.

→ classification of lipids



→ Biological role of lipid

i) Food material :

- Lipid provides food, high rich in calorific value. one gram lipid produce 9.3 kilocalorie of heat.

ii) Food reserve :

- Lipids are insoluble in aqueous solⁿ hence can be stored in our body as food reserve.

iii) Vitamine carrier :

Lipids acts as carrier of natural fat-soluble vitamins such as vitamine A, D & E.

iv) structural component.

- lipid are an important constituent of the cell membrane.

v) heat insulator.

- The fats are characterised for their high insulating capacity.

eg \Rightarrow aquatic mammals such as whale & animals living in cold climate have high quantity of fat.

3) Proteins :

- Proteins are large biomolecules, consists of one or more long chain of amino acids.
- Proteins are known as building blocks of life.
- Proteins provide structure, protection to the body in form of skin, hairs, muscle, ligaments.
- Proteins are organic substance; they are made up of nitrogen, oxygen, carbon and hydrogen.
- Protein gives heat & energy to the body.
- Antibodies, blood haemoglobin are also made up of proteins.

→ classification of protein on their shape :

i) Globular Protein :

- They are completely folded & coiled in shape.
- They are usually soluble in water.
- eg → Insulin, plasma albumin.

ii) Fibrous Protein :

- They are mostly found in animals.
- They are not soluble in water.
- fibrous proteins provide protection & structural support.
- eg → collagen, keratin.

→ classification of protein on biological function

i) Structural protein

- These provides strengthening & protect biological structural

eg ⇒ collagen, elastin.

ii) Transport or carrier protein

- helps in transport of ion or molecules in the body

eg ⇒ haemoglobin.

iii) Defense protein

- provide defense against other organisms.

eg ⇒ Antibodies.

ii) Regulatory Protein

- regulate metabolic activity.
- eg \rightarrow Insulin, G protein.

v) Enzymic Protein

- highly specialised proteins with catalytic activity
- eg \rightarrow catalase, cytochrome c.

\rightarrow Structure of proteins

i) Primary Structure


- linear sequence of amino acids forming the backbone of proteins.

Structure

eg of Dystrophin.

ii) Secondary structure: special

- rearrangement of protein by twisting polypeptide chain.

Structure: 

eg \Rightarrow Myoglobin

iii) Tertiary structure:

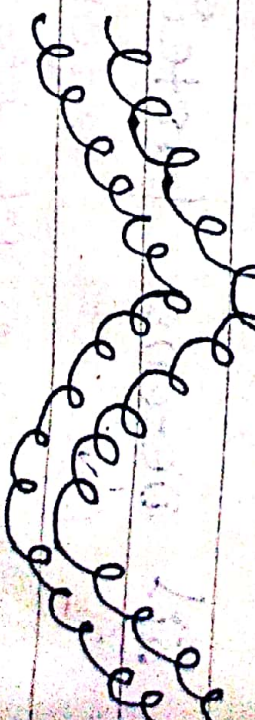
- three dimensional structure of protein

Structure:

eg \Rightarrow Globular protein 

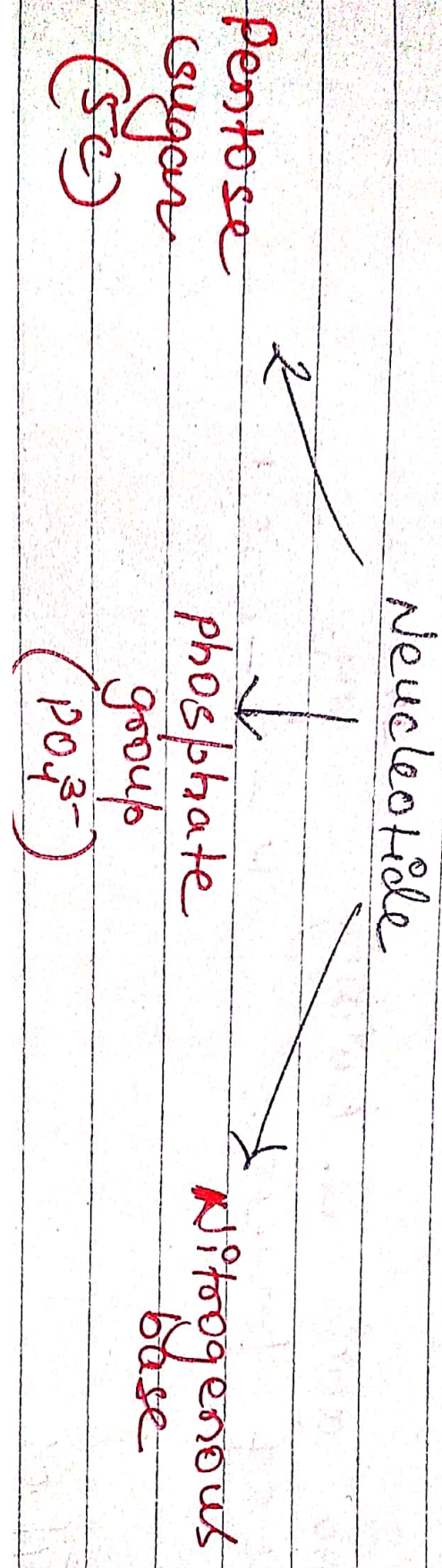
Quaternary structure:

- proteins are composed of two or more polypeptide chains referred to as subunits & these arrangement known as quaternary structure.

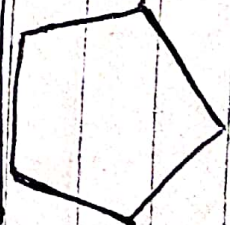
eg \Rightarrow DNA polymerase 

Nucleic Acids

Nucleic acids are made up of polymer of nucleotide. Nucleotide consists of nitrogenous base, pentose sugar & phosphate groups.



phosphate group
PO₃⁻



N Nitrogenous base

- Pyrimidines
- Thymine
 - cytosine
 - uracil
- Purines
- Adenine
 - Guanine

In our body two types of sugar present

i} Ribose



→ Present in RNA

⇒ less stable due

at 2nd carbon

position OH group is present

⇒ messenger

ii} Deoxyribose



→ Present in DNA

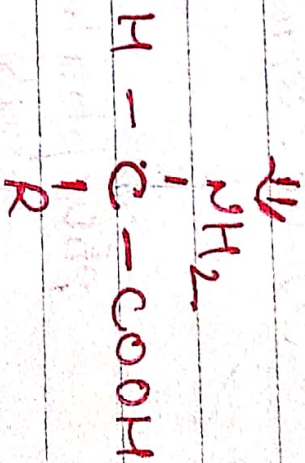
⇒ more stable due to absence of OH group

at 2nd carbon

⇒ Genetic material

↳ Amino Acids

- Amino acids are organic compound containing amine & carboxyl functional groups.
- Amino acids are methane derivatives
- Amino acids are building blocks of protein.



→ Types

- Neutral amino acids

eg ⇒ Glycine

- Basic amino acids

eg ⇒ Alanine

- Acidic amino acids

eg ⇒ Aspartic acid

- Essential amino acids

eg ⇒ Methionine

- Non-essential amino acids

eg ⇒ Tyrosine