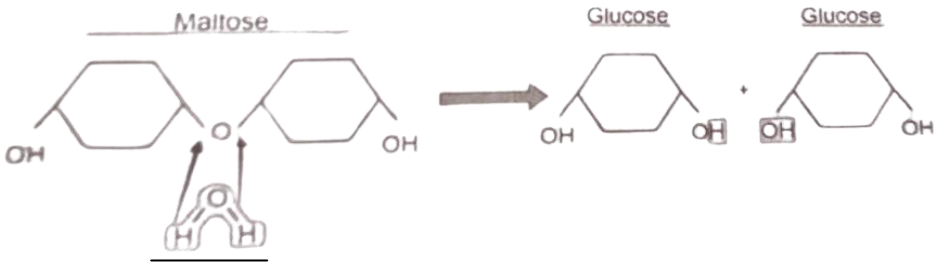
Chapter	4 (Molecular Biology)	Class	1st Year	Subject	Biology

Give Short Answers of the Following Questions

1. Draw a sketch of hydrolysis reactions.

Ans. Hydrolysis:

- Hydrolysis is a chemical process in which macromolecule (polymer) is broken down into smaller fragments by the addition of water molecules.
- Reverse of Dehydration Synthesis: Along with making polymers by combining their monomers, cells keep on breaking polymers too. It is the reverse of dehydration synthesis.
- Cells break bonds between monomers by adding water to them.
- In this process, OH group from a water molecule joins to one monomer and hydrogen joins to the second monomer.
- **Example:** Breakdown of maltose into two glucose monomers by the addition of a water molecule is an example of hydrolysis.

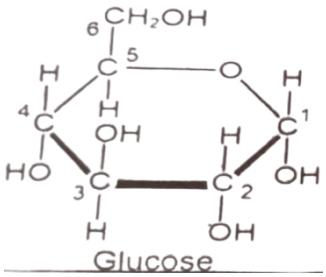


Water

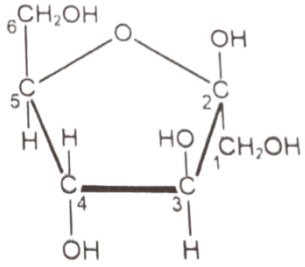
2. Draw the ring structure of glucose and fructose.

Ans.

Pyran Ring: (Pyranose)	Furan Ring: (Furanose)
• In case of glucose, oxygen-bridge develops between carbon number 1 and 5. So, a six cornered ring (Pyran) is formed.	• In fructose, oxygen-bridge is formed between carbon number 2 and 5. So, a five cornered ring (Furan) is formed.



Glucose



Fructose

3. Define isomers and stereoismers.

Ans.Isomers:

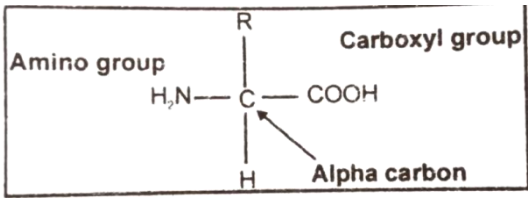
- Compounds with the same molecular formula but different structural formulas.

Chapter	4 (Molecular Biology)	Class	1st Year	Subject	Biology

- Can be classified into structural isomers and stereoisomers.
- **Stereoisomers:**
- Isomers that differ in the spatial arrangement of atoms.
- Include enantiomers (non-superimposable mirror images) and diastereomers (not mirror images).
- Have the same molecular formula and sequence of bonded atoms but differ in their three-dimensiona structure.

4. Draw the sketch of amino acid.

Ans.



- General Structure: NH2-CHR-COOH, where R is the side chain.

Components:

- Amino group (-NH2)
- Carboxyl group (-COOH)
- Side chain (R group), which varies among different amino acids.
- Importance: Amino acids are the building blocks of proteins, and their sequence determines the structure and function of proteins.

5. Outline the synthesis of peptide linkages.

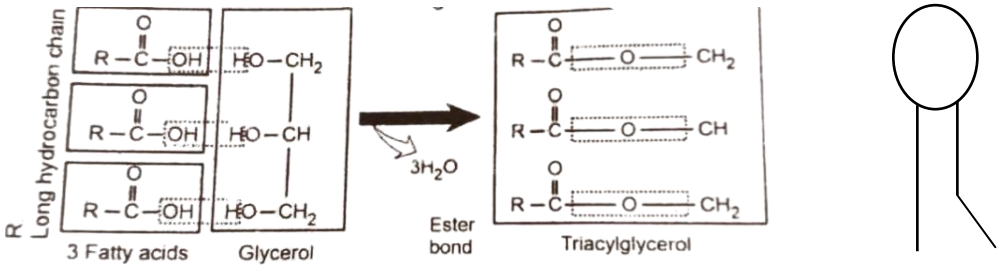
Ans.• Process: Peptide linkages form between amino acids through dehydration synthesis (also known as condensation reaction).

- **Reaction:** Involves the carboxyl group of one amino acid and the amino group of another.
- **Result:** Results in the formation of a peptide bond (-CO-NH-) and the release of a water molecule.
- **Importance:** Peptide bonds link amino acids together to form peptides and proteins.

6. Draw the sketch of acylglycerol, phospholipid and terpene.

Ans. Aclglycerol:

- Gylcerol esterified with one, two or three fatty acid chains.
- Can be monoaclglycerol, diaclglycerol, or triacylglycerol.



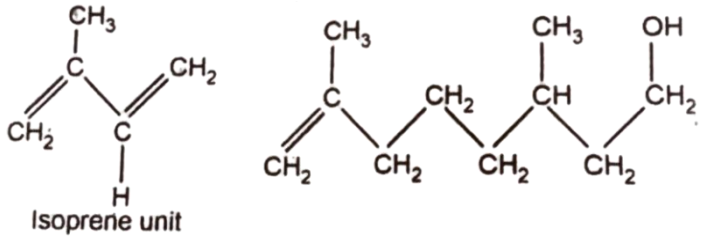
Phospholipid:

- Contains a phosphate group and fatty acids attached to a glycerol backbone.
- Forms a major component of cell membranes, contributing to their structure and function.

Terpene:

- Hydrocarbon derived from isoprene units (C_5H_8).
- Can be classified based on the number of isoprene units:

  Monoterpenes (C_{10}), sesquiterpenes (C_{15}), etc.
- Found in essential oils and have various biological functions.



7. Differentiate between nucleoside and nucleotide.

Ans. Nucleoside:

- Consists of a nitrogenous base and a sugar (ribose or deoxyribose).
- Does not contain phosphate group.

Nucleotide:

- Consists of a nucleoside and one more phosphate group.
- The phosphate group is attached to the sugar.
- Nucleotides are the building blocks of nucleic acids **(DNA and RNA).**

8. Illustrate the formation of phophodiester bond.

- **Ans. Process:** Phosphodiester bond forms between the phosphate group of one nucleotide and the sugar of another.
- **Reaction:** Occurs during DNA and RNA synthesis, where nucleotides are linked together.

Chapter	4 (Molecular Biology)	Class	1st Year	Subject	Biology

- **Result:** Links nucleotides together in a polynucleotide chain, forming the backbone of DNA and RNA.
- Importance: Essential for the structure and replication of genetic material.

9. Sate the central dogma of gene expression.

Ans. Overview: The central dogma outlines the flow of genetic information from DNA to proteins.

Steps:

1. **Transcription:** DNA is transcribed into RNA.
2. **Translation:** RNA is translated into protein.

- **Importance:** Describes how genetic information is used to synthesize proteins, which perform various functions in the cell.