SNS COLLEGE OF ALLIED HEALTH SCIENCE, COIMBATORE -35.
(Affiliated to The Tamil Nadu Dr M.G.R. Medical University, Chennai)

B.Sc., OPERATION THEATRE AND ANAESTHESIA TECHNOLOGY

FIRST YEAR

SUBJECT CODE & NAME – 1131 - BIOCHEMISTRY

PUZZLES - TOPIC – CARBOHYDRATES

1. Case-Based Puzzle: "Mystery in the Lab - Identifying Unknown Sugars"

Objectives:

- To apply knowledge of carbohydrate structures, properties, and classifications
- To enhance critical thinking by analyzing clues related to monosaccharides, disaccharides, and polysaccharides.
- To reinforce understanding of physical and chemical properties of sugars like glucose, fructose, lactose, etc.

Tasks and Clues:

Scenario (Task): You are a biochemist in a food lab investigating three unknown samples (Sample A, B, and C) from a contaminated dairy product batch. Using the provided clues, identify each sample as one of the following: Glucose, Fructose, Lactose, Sucrose, Starch, or Glycogen. Explain your reasoning for each identification based on structures, properties, and functions from the documents.

Clues:

1. **Sample A:** A monosaccharide with a ketone group at carbon 2, forms a five-membered furanose ring, and is commonly found in fruits. It has the formula C6H12O6 and is sweeter than glucose.
2. **Sample B:** A disaccharide made of glucose and galactose linked by a β-1,4 glycosidic bond, known as milk sugar, with formula C12H22O11. It yields glucose & galactose on hydrolysis and is less sweet than sucrose.
3. **Sample C:** A polysaccharide composed of glucose units with alpha-1,4 and alpha-1,6 linkages, serves as energy storage in animals, and is found in liver and muscles.

Rubrics:

Criteria	Description	Marks Allotted (Total: 10)
Correct Identification	Accurately identifies all three samples (2 marks each).	6
Reasoning and Explanation	Provides logical explanations linking clues to structures/properties/functions (1 mark per sample).	3
Use of Document Knowledge	References specific details from documents (e.g., formulas, bonds).	1

2. Reasoning Puzzle: "Sugar Logic Grid"

Objectives:

- To develop logical skills using classifications (mono/di/poly/oligo-saccharides), properties of carbohydrates.
- To integrate knowledge of functions, structures, and properties to eliminate options systematically.
- To promote analytical thinking by cross-referencing clues from the documents.

Tasks and Clues:

Task: Use the logic grid below to match four carbohydrates (Glucose, Sucrose, Cellulose, Starch) to their categories (Disaccharide, Polysaccharide – Homopolysaccharide, Monosaccharide), primary functions (Energy source for cells, Plant structural component, Table sweetener, Plant energy storage), and key properties (Branched alpha-1,4/1,6 glucose chains insoluble in cold water, Non-reducing with glycosidic linkage of glucose+fructose, Linear β-1,4 glucose chains insoluble in water, Aldohexose with pyranose ring). Fill the grid and explain

Logic Grid Template:

	Glucose	Sucrose	Cellulose	Starch
Category				
Function				
Property				

Clues:

1. The disaccharide is non-reducing, composed of glucose+fructose, and is used as a table sweetener (formula C12H22O11, decomposes to caramel).
2. The monosaccharide is an aldohexose with a pyranose ring and serves as the main energy source for cells (from document: broken down to ATP).
3. The remaining one is a homopolysaccharide with alpha linkages, insoluble in cold water, and stores energy in plants (amylose + amylopectin).
4. It is a homopolysaccharide with β-1,4 linkages, insoluble, and acts as a plant structural component (found in cell walls, used in paper/clothing).

Rubrics:

Criteria	Description	Marks Allotted (Total: 10)
Correct Matching	Accurately fills the grid for all four carbohydrates (1.5 marks each).	6
Logical Deductions	Explains step-by-step reasoning using clues and eliminations.	3
Integration of Concepts	Incorporates document-specific terms (e.g., linkages, formulas).	1