Course Title: Biochemistry I
Summer Semester
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Max Marks: 30

Note: There are FIVE questions, each carry 6 mark with grand total of 30 marks
ATTEMPT all questions
Avoid copy paste material, as it may deduct your marks

Q1: Write down the points of cell theory.

Q2: Classify monosaccharides on the basis of number of C-atom along with example.

Q3: Briefly discuss the function of Macromolecules found in Cell Membrane.

Q4: Discuss amino acids on the basis of requirement in protein synthesis.

Q5: Explain Digestion and Absorption of Carbohydrate.

Q No 1:

Ans: CELL THEORY

All living organisms are composed of one or more cells. The cell is the basic unit of structure and organization in organisms. Cells arise from pre-existing cells.

CLASSICAL CELL THEORY:

First proposed by Matthias Schleiden and Theodor Schwann, consisted of three primary points:

All living things are made up of cells.

Cells are the basic units of structure, function and physiology in living things.

Living cells can come only from other pre-existing cells.

Modern cell theory adds two additional points.

Cells contain and pass on hereditary information during cell division.

All cells are relatively the same in relation to chemical composition and metabolic activity.

Q No 2:

Ans: **Monosaccharides can be classified by the number x of carbon atoms they contain: triose (3), tetrose (4), pentose (5), hexose (6), heptose (7), and so on. Glucose, used as an energy source and for the synthesis of starch, glycogen and cellulose, is a hexose.**

COMMON NATURALLY OCCURRING MONOSACCHARIDES

Glucose or dextrose.

Fructose.

Galactose.

Mannose.

Ribose and deoxyribose.

EXAMPLES: **of monosaccharides include glucose (dextrose), fructose (levulose), and galactose. Monosaccharides are the building blocks of disaccharides (such as sucrose and lactose) and**

polysaccharides (such as cellulose and starch). ... Some other monosaccharides can be converted in the living organism to glucose.

Q No 3:

Ans: CARBOHYDRATES. The most common monosaccharide is glucose, which is one of the most valuable sugars for all animals and plants. The function of carbohydrates is to act as an energy source for storage and structure for all living things. For plants, starch is the chief energy source and cellulose is what provides structure and support. For animals, glycogen supplies energy and chitin provides the structure and support.

LIPIDS:Lipids come in three forms -- fats, steroids and phospholipids. The main function of these lipids is energy and insulation. Fats come in either saturated or unsaturated forms, and are insoluble and therefore, buoyant. Saturated fats are found in animals and are solids at room temperature; unsaturated fats are found in plants and are liquids or oils at room temperature. Lipids, in the form of phospholipids, are also important elements in membranes.

PROTEINS:Proteins are very important macromolecules; they have many levels of structure and a number of functions. Every cell in the human body contains proteins and most bodily fluids contain proteins as well. Proteins make up a large part of human skin, organs, muscles and glands. Proteins assist the body in repairing cells and making new ones, and are an important dietary and energy requirement, especially for growing adolescents and expectant mothers.

NUCLEIC ACIDS:Nucleic acids include the all-important DNA and RNA. DNA is the blueprint for genetic development for all life-forms; it holds the necessary information required for protein synthesis. RNA is the carrier of this information to the actual site of

protein production. The body is made up of hundreds of thousands of proteins and each has to act in a specific way to function properly. Nucleic acids contain the information necessary for these proteins to develop and act the way they are supposed to.

Q No 4:

Ans: **Amino acids are required for the synthesis of body protein and other important nitrogen-containing compounds, such as creatine, peptide hormones, and some neurotransmitters. Although allowances are expressed as protein, a the biological requirement is for amino acids.**

Q No 5:

Ans: Digestion of Carbohydrates:

Human digestive systemBefore the body can use the food that is eaten, it must be "digested" (i.e. broken down) into its basic nutrient components.The digestive system works like a giant food processor. During digestion, starches and sugars are broken down both mechanically (e.g. through chewing) and chemically (e.g. by enzymes) into the single units glucose, fructose, and/or galactose, which are absorbed into the blood stream and transported for use as energy throughout the body.Digestion of starches into glucose molecules starts in the mouth, but primarily takes place in the small intestine by the action of specific enzymes secreted from the pancreas (e.g. α-amylase and α-glucosidase). Similarly, the disaccharides sucrose, lactose, and maltose are also broken down into single units by specific enzymes .

ABSORPTION OF CARBOHYDRATES

The end products of sugars and starches digestion are the monosaccharides glucose, fructose, and galactose. Glucose, fructose, and galactose are absorbed across the membrane of the small

intestine and transported to the liver where they are either used by the liver, or further distributed to the rest of the body (3, 4).

ABSORPTION OF FRUCTOSE

There are two major pathways for the metabolism of fructose (5, 6): the more prominent pathway is in the liver and the other occurs in skeletal muscle. The breakdown of fructose in skeletal muscle is similar to glucose. In the liver and depending on exercise condition, gender, health status and the availability of other energy sources (e.g. glucose), the majority of fructose is used for energy production, or can be enzymatically converted to glucose and then potentially glycogen, or is converted to lactic acid (See figure below).

The notion that fructose is an unregulated energy substrate and directly fuels fat synthesis in the liver is not supported by the scientific literature; within the normal consumption range very minimal amounts (<1%) of fructose are converted to fat (5, 6). It is important to note that the metabolism of fructose involves many regulated reactions and its fate may vary depending on nutrients consumed simultaneously with fructose (e.g. glucose) as well as the energy status of the body.

THE END OF PAPER