	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**DEPARTMENT OF SCIENCE 2024 – 25** **SUBJECT: BIOLOGY**	**Date :15/04/2024**
Worksheet No: 2 **WITH ANSWERS**	**CHAPTER: BIOMOLECULES**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC:**	**ROLL NO.**

CASE STUDY

OBJECTIVE TYPE QUESTIONS (1 MARK EACH)

Q 1 Proteins perform many physiological functions. For example, some proteins function as enzymes. One of the following represents an additional function that some proteins discharge

a) Antibiotics
b) Pigment conferring colour to skin
c) Pigment making colours of flowers
d) Hormones

Q 2. Glycogen is a homopolymer made of
a) Glucose units
b) Galactose units
c) Ribose units
d) Amino acids

Q 3.The number of 'ends' in a glycogen molecule would be
a) Equal to the number of branches plus one
b) Equal to the number of branch points
c) One '
d) Two, one on the left side and another on the right side

Q 4.The primary structure of a protein molecule has
a) Two ends
b) One end
c) Three ends
d) No ends

Q 5. Enzymes are biocatalysts. They catalyze biochemical reactions. In general, they reduce activation energy of reactions. Many physio-chemical processes are enzyme mediated.' Some examples of enzyme mediated reactions are given below. Tick the wrong entry.
a) Dissolving C02 in water
b) Unwinding the two strands of DNA.
c) Hydrolysis of sucrose
d) Formation of peptide bond

ASSERTION AND REASON (1M)

A. Assertion and Reason are true, and the reason is the correct explanation.
B. Assertion and Reason are true, but the reason is not the correct explanation.
C. Assertion is a true statement, but Reason is false.
D. Assertion and Reason are false statements.

Q 6. Assertion: Unsaturated fats are more reactive compared with the saturated fats.
Reason: Unsaturated fats have only single bonds in their structure.

Q 7. Assertion: Vegetable oils are fats which are present in plant cells in soluble form.
Reason: Vegetable oils occur only in cells of embryo.

Q 8. Assertion: Amino acids are amphoteric in their function.
Reason: All amino acids are necessary for our body.

SHORT ANSWER TYPE QUESTIONS (2 MARKS EACH)

Q 9. What are vitamins? Classify them based on their solubility.

Q 10. What are essential amino acids and non-essential amino acids? Give examples.

Q 11. The two strands of DNA are not identical but complementary. Comment.

Q.12. What is meant by DNA fingerprinting?

LONG ANSWER TYPE QUESTION (3 MARK EACH)

Q 13. (i) What is meant by the denaturation of protein molecules?

(ii) Define the term "specificity" of an enzyme.

Q 14. A child is diagnosed with a bone deformity. What kind of medication should he/she be given initially?

Q 15. Why do carbohydrates often act as reducing agents?

CASE STUDY BASED QUESTIONS (4M)

Almost all enzymes are proteins. There are some nucleic acids that behave like enzymes. These are called ribozymes. An enzyme like any protein has a primary structure, i.e., amino acid sequence of the protein. An enzyme like any protein has the secondary and the tertiary structure. When you look at a tertiary structure you will notice that the backbone of the protein chain folds upon itself, the chain crisscrosses itself and hence, many crevices or pockets are made. One such pocket is the 'active site'. An active site of an enzyme is a crevice or pocket into which the substrate fits. Thus enzymes, through their active site, catalyze reactions at a high rate. Enzyme catalysts differ from inorganic catalysts in many ways, but one major difference needs mention. Inorganic catalysts work efficiently at high temperatures and high pressures, while enzymes get damaged at high temperatures (say above 40°C). However, enzymes

isolated from organisms who normally live under extremely high temperatures (e.g., hot vents and Sulphur springs), are stable and retain their catalytic power even at high temperatures (up to 80°-90°C). Thermal stability is thus an important quality of such enzymes isolated from thermophilic organisms.

Q 16. Answer the following questions:
i) _____ is the pocket like region of an enzyme into which substrate molecules bind.
a) Protein site
b) Co-factors
c) Coenzyme
d) Active site

ii) Identify incorrect statement.

Statement 1 – Nucleic acids which behave like enzymes are commonly termed as nucleozymes.
Statement 2 – An enzyme like any protein has a primary, secondary and the tertiary structure.
Statement 3 – Enzyme catalysts differ from inorganic catalysts in many ways.
Statement 4 – All enzymes are proteins.

a.) Only 1
b) Both 1 & 3
c) Only 3
d.) None of the above

iii) How are active site of enzymes formed?

iv) Explain how Enzyme catalysts differ from inorganic catalysts?

VERY LONG ANSWER TYPE QUESTIONS (5 MARK EACH)

Q 17. Briefly explain four levels of protein structure.

ANSWER KEY

A1. (d) Proteins perform many physiological functions. For example, some proteins function as enzymes. Hormones represents an additional function that some proteins discharge (like insulin).
A2. (a) Glycogen is a homopolymer made of glucose units.
A3. (d) In a polysaccharide chain (say glycogen), the right end is called the reducing end and the left end is called the non-reducing end.
A4. (a) The primary structure of a protein molecule has two ends. A protein is imagined as a line, the left end represented by the first amino acid and the right end is represented by the last amino acid. The first amino acid is also called as N-terminal amino acid. The last amino acid is called the C-terminal amino acid.
A5. (a) Dissolving C02 in water is a physical process.
A6. c) Assertion is a true statement, but Reason is false.
A7. d) Assertion and Reason are false statements.
A8. b) Assertion and Reason are true, but the reason is not the correct explanation.

A9. An organism needs different types of nutrients to run its metabolic activities. It acquires nutrients mainly through food. One of these nutrients is a vitamin. Deficiency in vitamins often leads to diseases like scurvy, rickets, beriberi, etc. In addition to that, various types of skin diseases can be caused by an inadequacy of vitamins in the body.
Based on their solubility, vitamins can be divided into two categories: vitamins that are soluble in fat, and vitamins that are soluble in water. Fat-soluble vitamins include A, D, E, and K, whereas all the vitamins B and C are examples of vitamins soluble in water.

A10. Amino acids are crucial for the growth and development of the body. However, the body cannot synthesize every type of amino acid. Those amino acids that cannot be produced in the body and are acquired through food are called essential amino acids. For example, valine and tryptophan. The amino acids that the body can produce are known as non-essential amino acids. For example, glycine and glutamic acid.

A11. The strands are made up of different nitrogenous bases. Adenine and cytosine form hydrogen bonds with thymine and guanine, respectively. So, on one strand, when there is adenine, the opposite side of the other strand must contain thymine or vice versa. Similarly, when cytosine is present on one strand, guanine must be present on the other side.

A12. DNA fingerprinting is the study of different DNA profiles and comparing them. Any piece of DNA collected from the crime scene is compared to the DNA collected from the suspect to determine whether he is the real culprit or not. This technique is also effective in determining the biological parents of a baby.

A13 i) Denaturation refers to the destruction of the natural properties of protein molecules due to exposure to extreme acidity, extreme basicity, radiation, heat, or salts. In the worst case, the cells containing protein molecules may die.

A13 ii) The specificity of an enzyme refers to its ability to choose a specific substrate to work on. Only a few enzymes show this property. Specificity can be of four types, such as absolute specificity, group specificity, linkage specificity, and stereochemical specificity.

A14. Vitamin D and calcium are essential for healthy bone growth. The deformity in the child, therefore, may have been caused by the deficiency of these two elements. So, vitamin D and calcium supplements can be given to the child initially.

A15. Carbohydrates act as reducing agents because of the presence of aldehydic groups (- CHO) and ketol groups (- CO-CH2OH) in them. Carbohydrates containing aldehyde groups are glucose, mannose, and galactose, and carbohydrates containing ketol groups are fructose.

A16. i) d
ii) a
iii) Enzymes have primary, secondary and tertiary structure like proteins. In tertiary structure, backbone of the protein chain folds upon itself, the chain criss-crosses itself and leads to the formation of many crevices or pockets are made. These pockets are referred as active site of enzyme. An active site of an enzyme is a crevice or pocket into which the substrate fits.

iv) Enzyme catalysts differ from inorganic catalysts in many ways. Inorganic catalysts work efficiently at high temperatures and high pressures, while enzymes get damaged at high temperatures (above 40°C). There are some exceptions such as enzyme isolated from thermophilic organisms.

A17. FOUR LEVELS OF PROTEIN STRUCTURE:-

a) PRIMARY STRUCTURE:- The protein exists as a long chain of amino acids arranged in a particular sequence such a polypeptide is non- functional

b) SECONDARY STRUCTURE:-first amino acid is N-terminal amino acid & last is known as c-
terminal amino acid. There is interaction between every fourth amino acid by formation of

hydrogen bond the polypeptide is folded in a helical shape eg. keratin. When two or more polypeptide chains are held together by intermolecular hydrogen bonds the structure is known as pleated sheet.

c) TERTIARY STRUCTURE:- The polypeptide becomes stabilized by folding & coating by the
formation of ionic bonds or hydrophobic bonds or disulfide bridges. It is called tertiary structure. It gives a three dimensional view of proteins. Biological activity of protein depends on its tertiary structure.

d) QUATERNARY STRUCTURE:- Such proteins are farmed of more than one polypeptide or
subunits each one having primary secondary & tertiary structure. This is called quaternary structure. Each polypeptide chain functions as subunit of the proteins.

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