



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
FIRST YEAR FIRST SEMESTER**

**SCHOOL OF NATURAL RESOURCES
ENVIRONMENTAL STUDIES AND
AGRICULTURE
BACHELOR OF SCIENCE
(ANIMAL HEALTH AND PRODUCTION)**

COURSE CODE: AHP 1104-1

COURSE CODE: BIOCHEMISTRY 1

DATE: 2/2/2024

TIME: 1100-1400 HRS

Instructions

A. Answer ANY TEN (10) questions.

B. Illustrate your answers with diagrams and give examples where appropriate.

SECTION A (MULTIPLE CHOICE QUESTIONS): Answer **ALL** the questions (20 mrks)

1. In enzyme kinetics K_m implies
 - A. The substrate concentration that gives one half V_{max}
 - B. The dissociation constant for the enzyme substrate complex
 - C. Concentration of enzyme
 - D. Half of the substrate concentration required to achieve V_{max}
 - E. Specificity of the enzyme
2. An example of hydrogen transferring coenzyme is
 - A. CoA
 - B. NAD^+
 - C. Biotin
 - D. TPP
 - E. Cabolamine
3. Which statement below **BEST** explains isoenzymes
 - A. Chemically, immunologically and electrophoretically different forms of an enzyme
 - B. Different forms of an enzyme similar in all properties
 - C. Enzymes catalysing different reactions
 - D. Enzymes having the same quaternary structures like the enzymes
 - E. Enzymes with different catalytic sites
4. Choose a statement that is **FALSE** about microfilaments
 - A. They form cytoskeleton with microtubules
 - B. They provide support and shape
 - C. They form intracellular conducting channels
 - D. They are involved in muscle cell contraction
 - E. They provide support to extracellular matrix
5. is the power house of the cell
 - A. Nucleus
 - B. Cell membrane
 - C. Mitochondria
 - D. Lysosomes
 - E. Endoplasmic reticulum
6. The most important epimer of glucose is
 - A. Galactose
 - B. Fructose
 - C. Arabinose
 - D. Xylose
 - E. Fructose
7. The sugar found in DNA is
 - A. Xylose
 - B. Ribose
 - C. Deoxyribose
 - D. Ribulose
 - E. Glucose
8. Which carbohydrates has the monosaccharide units linked by 1 → 4 glycosidic linkage?
 - A. Maltose
 - B. Sucrose
 - C. Cellulose

- D. Cellobiose
 - E. Dextrin
9. Select a statement that is TRUE about solutions of amino acids at physiological pH
- A. All amino acids contain both positive and negative charges
 - B. All amino acids contain positively charged side chains
 - C. Some amino acids contain only positive charge
 - D. All amino acids contain negatively charged side chains
 - E. All amino acids are hydrophobic
10. A tripeptide functioning as an important reducing agent in the tissues is
- A. Bradykinin
 - B. Kallidin
 - C. Tyrocidin
 - D. Glutathione
 - E. Oxytocin
11. The α -helix of proteins is
- A. A pleated structure
 - B. Made periodic by disulphide bridges
 - C. A non-periodic structure
 - D. Stabilised by hydrogen bonds between NH and CO groups of the main chain
 - E. Has disulphide bonds and hydrophobic interactions
12. amino acid contains a guanidine group in its structure
- A. Histidine
 - B. Arginine
 - C. Citrulline
 - D. Ornithine
 - E. Tryptophan
13. In denaturation of proteins, the bond which is not broken is
- A. Disulphide bond
 - B. Peptide bond
 - C. Hydrogen bond
 - D. Ionic bond
 - E. Van der Waals forces
14. In proteins the α -helix and β -pleated sheet are examples of
- A. Primary structure
 - B. Secondary structure
 - C. Tertiary structure
 - D. Quaternary structure
 - E. Imino structure
15. Which lipid contains alcoholic amine residue in its structure?
- A. Phosphatidic acid
 - B. Ganglioside
 - C. Glucocerebroside
 - D. Sphingomyelin
 - E. Cholesterol
16. Cephalin consists of
- A. Glycerol, fatty acids, phosphoric acid and choline
 - B. Glycerol, fatty acids, phosphoric acid and ethanolamine
 - C. Glycerol, fatty acids, phosphoric acid and inositol
 - D. Glycerol, fatty acids, phosphoric acid and serine
 - E. Glycerol, fatty acids, phosphoric acid and amine

17. In mammals, the major fat in adipose tissues is
 - A. Phospholipid
 - B. Cholesterol
 - C. Sphingolipids
 - D. Triacylglycerol
 - E. Phosphoinositols
18. Which state BEST defines the composition of glycosphingolipids?
 - A. Ceramide with one or more sugar residues
 - B. Glycerol with galactose
 - C. Sphingosine with galactose
 - D. Sphingosine with phosphoric acid
 - E. Glycerol and amines
19. vitamin is required for the formation of hydroxyproline (in collagen)
 - A. Vitamin C
 - B. Vitamin A
 - C. Vitamin D
 - D. Vitamin E
 - E. Vitamin B1
20. An important function of vitamin A is
 - A. To act as coenzyme for a few enzymes
 - B. To play an integral role in protein synthesis
 - C. To prevent hemorrhages
 - D. To maintain the integrity of epithelial tissue
 - E. To act as antioxidants

SECTION B (SHORT ANSWER QUESTIONS): Answer ALL question (40 mrks)

1. Vitamins are organic substances normally required in minute amounts in the diet for proper growth and development
 - a. Draw the structure of riboflavin (4 mrks)
 - b. Outline the biochemical processes in which thiamine act as a coenzyme (4 mrks)
2. Enzymes are organic catalysed that increases the rate of biochemical reactions
 - a. Show the enzyme structure (3 mrks)
 - b. Derive the Michael Menten equation for enzyme catalysed reactions (5 mrks)
3. Write short notes on the following minerals
 - a. Calcium (4 mrks)
 - b. Magnesium (4 mrks)
4. Compounds dissociates differently in solvents. Based on this fact answer the questions below:
 - a. Define the term pH (1 mrk)

- b. Explain the significance of pKa (2 mrks)
 - c. Derive the Henderson-Hasselbalch equation (5 mrks)
5. Explain the following concerning nucleic acids
- a. Biological significance of nucleotides (4 mrks)
 - b. Clover structure of tRNA molecule (4 mrks)

SECTION C (LONG ANSWER QUESTIONS): Answer any **TWO** questions of your choice

1. Buffers enables enzymatically driven biochemical reactions to take place in an organism by resisting changes in pH. Based on these discuss:
 - a. The mechanism of bicarbonate and phosphate buffer systems (10 mrks)
 - b. Conditions arising from failure of bicarbonate buffer system (10 mrks)
2. Sphingolipid are important biomolecules especially in the nervous system. Discuss the structures and functions of biologically important sphingolipids (20 mrks)
3. Conjugated proteins on hydrolysis give a protein part and a non-protein one. With appropriate examples discuss the biological significance of different classes of conjugated proteins (20 mrks)

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