FACULTY	AGRICULTURE, ENGINEERING AND NATURAL SCIENCES		
SCHOOL	AGRICULTURE AND FISHERIES SCIENCES		
DEPARTMENT	ANIMAL PRODUCTION, AGRIBUSINESS & ECONOMICS		
MODULE	BIOCHEMISTRY		
MODULE CODE	AASC3612		
DATE	October 2023		
DURATION	3 hours	**MARKS**	100
SECOND OPPORTUNITY EXAMINATION PAPER			

Second Opportunity Examination Paper:

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Internal Moderator: Dr T. O. Amushendje

External Moderator: Prof. Evison Bhebhe

This Second Opportunity Examination Paper consists of 5 pages, including this front page.

Instructions

This second opportunity examination paper consists of four sections that are divided into sections A, B, C, and D.

1. Read the questions carefully. Follow the instructions preceding each part/section.
2. Answer ALL questions.
3. Write clearly and concisely.
4. Pay attention to the questions, where you are asked to explain or discuss, listing of keywords is not adequate.
5. Please be reminded that cheating in the examination will result in a failing grade.
6. Hand the answer booklet to the invigilator at the end of the examination

UNIVERSITY OF NAMIBIA EXAMINATIONS

SECTION A: Multiple Choice Questions (1 mark per question) **[15 marks]**

1. Which of the following types of bonds or interactions are least likely to be involved in stabilizing the three-dimensional folding of proteins?
   a. Ester bonds
   b. Hydrophobic interactions
   c. Disulfide bonds
   d. Hydrogen bonds

2. All of the following compounds are capable of forming hydrogen bonds with water except,
   a. Methanol
   b. Hexane
   c. Ethanolamine
   d. Deoxynucleotide triphosphate

3. Which of the following is not a coenzyme for pyruvate dehydrogenase complex?
   a. TPP
   b. NADPH
   c. Lipoate
   d. Coenzyme A

4. Which of the following functional groups is found in the amino acid serine & threonine, but not in other amino acids?
   a. Sulfhydryl
   b. Hydroxyl
   c. Methyl
   d. Amino

5. The functional group of R-S-H is called
   a. Thiol
   b. Schiff base
   c. Ester
   d. Carbonyl

6. Dehydrogenases are classified as?
   a. Hydrolases
   b. Lyases
   c. Isomerases
   d. Ligases

7. The enzyme phosphoglycerate mutase that catalyze 3- phosphoglycerate to 2-phosphoglycerate is an example of,
   a. Isomerases
   b. Synthetases
   c. Transferases
   d. Oxidoreductases

8. Which of the following best predicts the direction of a chemical reaction?
   a. S (entropy change)
   b. H (enthalpy change)
   c. E_{act} (energy of activation)
   d. G (Gibbs free energy change)

9. Which of the following acids is a vitamin?
   a. Aspartic acid
   b. Pentanoic acid
   c. Ascorbic acid
   d. Adipic acid

10. For every molecule of sugar glucose which is oxidized _____ molecule(s) of pyruvic acid is/are produced
    a. 4
    b. 2
    c. 1
    d. 3

11. Water is generally a good solvent for polar molecules and a poor solvent for nonpolar molecules. These solvent properties are best explained by
    a. the high density of liquid water relative to polar solvents
    b. high surface tension
    c. the ability to form intermolecular hydrogen bonds
    d. the density of solid water being less than the density of liquid water

12. Beri-Beri is a deficiency disease or condition caused by lack of which of the following vitamins?
    b. Vitamin A
    c. Vitamin D
    d. Vitamin B1
    e. Vitamin B3

13. Which type of enzyme inhibition involves a reversible binding of the inhibitor to the active site of the enzyme, preventing the substrate from binding?
    a. Competitive inhibition
    b. Non-competitive inhibition
    c. Mixed inhibition
    d. Uncompetitive inhibition

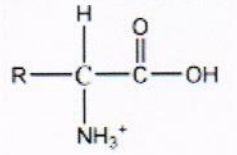
14. Which of the following is a type of lipid that is a major component of cell membranes and is characterized by its amphipathic nature?
    a. Triglyceride
    b. Phospholipid
    c. Steroid
    d. Waxes

15. What is a zwitterion in biochemistry?
    a. A molecule with both a positive and a negative charge
    b. A molecule with no net charge
    c. A molecule with only a positive charge
    d. A molecule with only a negative charge

SECTION B: Short Answer Questions (3-5 marks per question) **[35 marks]**

1. Which vitamin is required as a coenzyme for converting ribonucleotide triphosphate to deoxyribonucleoside triphosphate? [2]

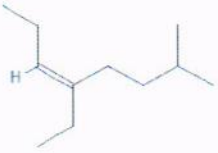
2. In what pH range is the below ionized amino acid expected to be found in? [2]



3. What are the 2 factors that limit the digestion of protein in the stomach? [2]

4. Why it is hard to accurately determine the K_m (Michaelis-Menten constant) using the Michaelis-Menten plot? [3]

5. Use the IUPAC (International Union of Pure and Applied Chemistry) nomenclature system,
    a. To derive a name for the following compound:



[3]

    b. To draw a 2,5-dimethyl 4-ethyl heptane: [3]

6. State the 4 enzymes that are specific to gluconeogenesis but not found in glycolysis. [4]

7. Why is water used as a coolant for cars? [2]

8. Why it is not recommended to use very high temperature when frying in unsaturated fatty acids? [2]

9. Animals reduce pyruvate to lactate which is considered as a "dead end" in metabolism and causes muscular cramps in the animal. Explain then, why would animal cells convert pyruvate to lactate. [2]

10. State the three enzymes that catalyzes the irreversible steps of glycolysis pathway [3]

11. Indicate whether each of the following pairs of sugars consists of anomers, epimers or aldose-ketose pair [3]
    a. D-glucose and D-mannose
    b. D-glucose and D-fructose
    c. α-D-glucose and β-D-glucose

12. Sketch the chemical structure of the following substrates:
    a. Urea [2]
    b. Pyruvate [2]

SECTION C: Structured Questions (10 marks per question) [40 marks]

1. Concerning the classification of amino acids based on the metabolic fate, give a full description of ketogenic amino acid, glucogenic amino acid, and those that are both glucogenic and ketogenic. In your narration include two examples of each mentioned category. [10]

2. Briefly narrate the redox of Electron-Transport Chain steps. [10]

3. Describe coenzymes and give an overview of the coenzymes associated with B-complex vitamins. [10]

4. Give an overview of the Krebs cycle substrates. In your narration, indicate why it is referred to as a "cycle", as you mention all the substrates involved. [10]

SECTION D: True or False Questions (1 mark per question) [10 marks]

STATEMENT	True or False
1. Amino acids are classified as buffers	
2. D- sugars are biologically much less abundant than L- sugars, therefore the D prefix is often omitted.	
3. Insulin is secreted in response to low levels of blood glucose	
4. Water is the only natural substance that is not found in all three states of matter at the temperatures normally found on Earth.	
5. Proteins & nucleic acids are known as informational macromolecules.	
6. Cohesion is the attraction between two dissimilar substances while adhesion is the attraction between similar substances.	
7. Glucose cannot be made from acetyl CoA during gluconeogenesis	
8. All enzymes are proteins.	
9. Glycolysis pathway ends with pyruvate as the product and takes place anaerobically.	
10. Carbohydrates, proteins & lipids are polymers but not nucleic acids.	

END OF EXAM