



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

**Faculty of Health, Natural
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QUALIFICATION : BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 7
COURSE: BIOCHEMISTRY: BIOCHEMICAL PRINCIPLES AND PRACTICE	COURSE CODE: BPP702S
DATE: JANUARY 2025	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY / SUPPLEMENTARY: EXAMINATION QUESTION PAPER

EXAMINER: ***PROF LAMECH MWAPAGHA***

MODERATOR: ***DR HARRIS ONYWERA***

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

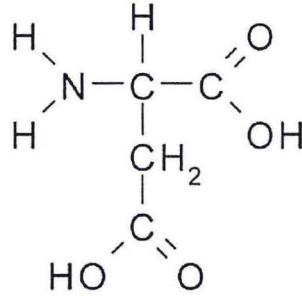
1. Non-Programmable Calculator

This question paper consists of three (3) pages including this front page.

Question 1**[10]**

- (a) A buffer was prepared by mixing 1.00 mol of ammonia and 1.00 mol of ammonium chloride to form an aqueous solution with a total volume of 1 L. To 500 mL of this solution was added 30.0 mL of 1.00 M NaOH. What is the pH of this solution. (K_b for $\text{NH}_3 = 1.8 \times 10^{-5}$). (4)

- (b) Given the structure of aspartic acid and the pK_a values as shown below:



$$\text{pK}_{a1}=1.88$$

$$\text{pK}_{a2}=3.65$$

$$\text{pK}_{a3}=9.68$$

Determine the pI value of aspartic acid and show clearly how you arrive at the answer. (6)

Question 2**[14]**

- (a) What is the genetic code, and why is it considered universal? (6)
- (b) Briefly describe **FOUR (4)** classes of enzyme specificity (8)

Question 3**[16]**

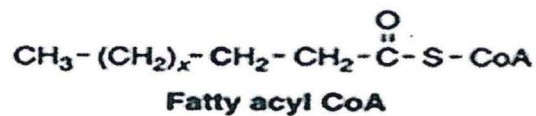
- (a) Briefly describe how the movement of sodium and potassium ions takes place across the cell membrane. (8)
- (b) What happens if oxygen is unavailable to the electron transport chain? How does this affect cellular respiration? (8)

Question 4**[14]**

- (a) State **SIX (6)** functions of the amino acid Threonine (6)
- (b) Briefly discuss the principles of metabolic pathways (8)

Question 5**[14]**

- (a) Using structural formulas, write the balanced chemical equation for the reaction where the production of the electron carrier FADH₂ takes place in the Krebs cycle. (6)
- (b) With the aid of the fatty acyl CoA structure below, discuss the production of energy (ATP) through the process of β-oxidation (breakdown) of fatty acids. (8)

**Question 6****[14]**

- (a) Lipids are known to be insoluble in water, briefly elucidate on how dietary lipid are digested, absorbed and transported in the body. (8)
- (b) The genetic code is the set of rules defining how the four-letter code of DNA is translated into amino acids, which are the building blocks of proteins. Discuss **THREE (3)** characteristics of the genetic code (6)

Question 7**[18]**

- (a) Discuss **FIVE (5)** challenges faced during the drug development process and how they can be addressed. (10)
- (b) Discuss how cholera toxin disrupts the regulation of intestinal secretion following GPCR signalling. (8)

THE END