CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY

BIOC 204: INTRODUCTION TO AMINO ACIDS AND PROTEINS

STREAMS: BSC. BIOC **TIME: 2 HOURS**

DAY/DATE: MONDAY 14/04/2025 **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS

- **Answer Question ONE and any other TWO questions**
- **Do not write on the question paper**

QUESTION ONE (30 Marks)

(a) Briefly describe the differences between the α-helix and β-pleated sheet forms of protein secondary structures. [6 Marks]

(b) Outline physical properties of amino acids. [4 Marks]

(c) Describe the amino acids' reaction with ninhydrin and explain its relevance in amino acid determination. [7 Marks]

(d) List and describe the agents that cause protein denaturation. [5 Marks]

(e) What are the major functions of plasma proteins in the body? [5 Marks]

(f) Differentiate between semi-essential and non-essential amino acids. [3 Marks]

QUESTION TWO (20 Marks)

(a) Describe peptides of physiological importance. (10 marks)

(b) Discuss the central dogma of molecular genetics as applied in gene expression. (10 marks)

QUESTION THREE (20 Marks)

(a) Using an illustrative diagram, discuss the structure of β_2-adrenergic receptor in relation to signal transduction. [10 Marks]

(b) Discuss the distribution and structure-function relationship of myosin protein. [10 Marks]

QUESTION FOUR (20 Marks)

(a) Arginine has the following pKa values: pK1=2.17, pK2=9.04, pK =12.48. What is the structure and net charge of arginine at the following pH values? 2, 4, 10, and 12. [8 Marks]

(b) With the use of suitable diagrams, describe the structure, chemical properties and functions of aromatic amino acids found in proteins. [12 Marks]

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