



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELORS OF TECHNOLOGY IN APPLIED CHEMISTRY AND
BACHELOR OF SCIENCE IN MOLECULAR BIOLOGY AND FORENSIC
TECHNOLOGY

ABT 4201: STRUCTURE OF BIOMOLECULES

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: Sep 2018

Instructions to Candidates

You should have the following for this examination

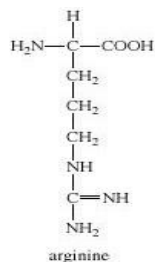
-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

- a) Draw structure of the following;
- i) β - D - glucopyranose (1 mark)
 - ii) C18.2 ($\Delta^{9,12}$) (1 mark)
 - iii) 4-Hydroxyproline (1 mark)
 - iv) Adenine (1 mark)
 - v) D - fructose (1 mark)
 - vi) Valine (1 mark)
- b) The pKa values of arginine are as follows;
- pKa of - COOH = 2.17
 - pKa of - NH₃ = 9.04
 - pKa of R group = 12.48



- i) Write equations showing different ionic forms of arginine. (4 marks)
- ii) Draw the titration curve and calculate the isoelectric point of arginine. (2 marks)
- c) Explain the following terms with relevant examples;
- Epimers (1 mark)
 - Enantiomers (1 mark)
 - Anomeric carbon (1 mark)
- d) State Chargaff's conclusions which assisted in the establishment of the DNA structure. (3 marks)
- e) i) Calculate the pKa of lactic acid when the concentration is 0.010M and the concentration of lactate is 0.087M, at the pH of 4.80. (4 mark)
- ii) Calculate the pH of a mixture of 0.10M acetic acid and 0.20M sodium acetate. The pKa of acetic acid is 4.76. (2 marks)
- f) Outline functions of various types of RNA. (3 marks)
- g) Name the products of nucleotides produced from complete hydrolysis. (3 marks)

Question TWO

Describe the classification of amino acids based on the R group. (20 marks)

Question THREE

- Outline different classes of conjugated proteins giving examples and the prosthetic group. (12 marks)
- Explain the functions of nucleotides. (8 marks)

Question FOUR

Discuss the classification of any four different types of structural lipids (15 marks)

Question FIVE

Discuss the biological functions of proteins (20 marks)