TECHNICAL UNIVERSITY OF MOMBASA

APPLIED AND HEALTH SCIENCES

PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BTAC

ABT 4201: STRUCTURE OF BIOMOLECULES

END OF SEMESTER EXAMINATION

SERIES: DECEMBER SERIES

TIME: 2HOURS

DATE: DECEMBER

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 (**30 marks, Compulsory**) and any other TWO questions.

Do not write on the question paper.

Question ONE

a. Define the following terminologies:
   i. Mutarotation (1mark)
   ii. Epimers (1mark)
   iii. Zwitterion (1mark)
   iv. Ampholytes (1mark)

b. In the equation, CH_3CO_2H --> $CH_3CO_2^-$ + H^+ if a one molar solution of acetic acid (CH_3CO_2H) dissociates 0.4% in solution, what is the dissociation constant, Ka, for acetic acid. (5 marks)

c. Outline Five functions of lipid membranes. (5 marks)

d. Draw the structure of the following.
   i. Adenine (2 marks)
   ii. Linolenic acid (2 marks)
   iii. Uridine (2 marks)

e. Illustrate the formation of cystine (5 marks)

f. List FIVE characteristics of monosaccharides. (5 marks)

Question TWO

a. Explain the importance of Nucleotides. (15 marks)
b. Illustrate the formation of a maltose. (5 marks)

Question THREE

Explain the properties of phosphoglycerides. (20 marks)

Question FOUR

a. A certain weak acid, HA , has a K_a value of 9.2×10^{-7}

i. Calculate the percent dissociation of HA in a 0.10 M solution. (5 marks)
ii. Calculate the percent dissociation of HA in a 0.010 M solution. (5 marks)
iii. Calculate the percent dissociation of HA in a 0.0010 M solution. (5 marks)

b. Draw the structure of the following.

i. 7-Methylguanine (3 marks)

ii. 5-Methylhydroxycytosine (2 marks)

Question FIVE

a. Discuss the titration of alanine with a hydroxide solution. (pK^1=2.34, pK^2=9.69). (14 Marks)

b. Determine the pH of solutions with the following hydrogen ion concentrations $[H^+]$;

i. $[H^+] = 0.00000003$ M (3 marks)

ii. $[H^+] = 0.006$ M (3 marks)