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. Anomeric carbon (1mark)
   ii. Optical isomers (1mark)
   iii. Pyranose (1mark)
   iv. Specific heat capacity (1mark)

b. In the equation, HA --> A^- + H^+ if a two molar solution of such an acid (HA) dissociates 0.5% in solution, what is the dissociation constant, Ka, for HA. (5 marks)

c. Illustrate the reaction of an amino acid with methanol. (5 marks)

d. Calculate the percent dissociation of a weak acid in a 0.050 M HA solution, (Ka=1.60 x 10-5). (5 marks)

e. Draw the structure of the following.
   i. Uracil (2 marks)

   ii. Cytidine (2 marks)

iii. Stearic acid (2 marks)

f. Describe the biological properties of water. (5 marks)

Question TWO

Discuss the Hersey-Chase (1952) experiments demonstrating that DNA is the hereditary material. (20 marks)

Question THREE

a. Explain the titration curve of aspartate with a hydroxide solution (PKa^1=2.1, PKa^2=3.9, PKa^3=9.8, PI=3.0) (10 marks)

b. Draw the structure of the following

i. Arginine (2 marks)

ii. Histidine (2 marks)

iii. Maltose (2 marks)

iv. Palmitoleic acid (2 marks)

v. Phosphatidylserine (2 marks)

Question FOUR

Determine the hydrogen ion concentration $[H^+]$, pH and percentage (%) dissociation in 0.10 $molL^{-1}$ HNO_2 (aq). ($K_a = 5.0 \times 10^{-4}$ at 25°C). (20 marks)

Question FIVE

a. Discuss the experiments performed by Avery et al., 1944, demonstrating that DNA is the transforming principles. (15 marks)

b. Illustrate the formation of sucrose from α-D-glucose and β-D-fructose. (5 marks)