

60



KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2015/2016 ACADEMIC YEAR**

**FIRST YEAR SECOND SEMESTER
MAIN EXAMINATIONS**

FOR THE DEGREE OF BACHELOR OF SCIENCE DEGREE

COURSE CODE: SCH 214


COURSE TITLE: BIOCHEMISTRY

DURATION: 2 HOURS

DATE: THURSDAY 5TH MAY 2016 TIME: 11.30 – 1.30PM

INSTRUCTIONS TO CANDIDATES

- Answer ALL Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 5 printed pages. Please Turn Over 

KIBU observes ZERO tolerance to examination cheating

REQUIREMENTS: Calculator, graph paper.

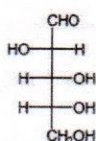
QUESTION ONE [14 MARKS]

- a. Describe the following interactions in protein structures. (4 marks)
- i. Hydrophobic Interactions
 - ii. Hydrogen Bonding
 - iii. Salt Bridges
 - iv. Dipole-dipole attractive forces:
- b. Calculate the number of stereo isomers present for each of the following carbohydrate molecules. (4 marks)

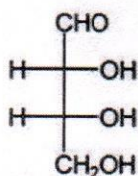
i.



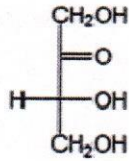
ii.



iii.



iv.



- c. Briefly explain the steps followed in an enzymatic catalysis reaction where two substrates (reactants) are converted to one product. (6 marks)

QUESTION TWO [14 MARKS]

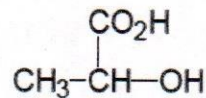
- a. Differentiate the following terms/phrases: (6 marks)

- i. Oligosaccharides and polysaccharides
- ii. Aldoses and ketoses
- iii. Polar neutral amino acids and polar acidic amino acids

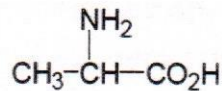
- b. Draw Fischer projections of D and L isomers of the following compounds:

(6 marks)

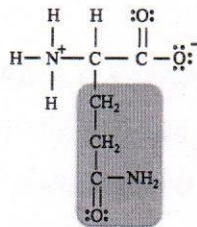
- i. Lactic acid



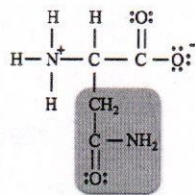
- ii. Alanine:



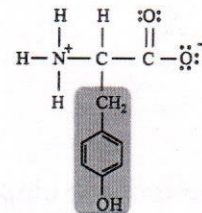
- c. A student was asked to separate the following proteins using gel filtration chromatography. Giving an explanation, indicate the order of elution. (2 marks)



glutamine



asparagine



tyrosine

QUESTION THREE [14 MARKS]

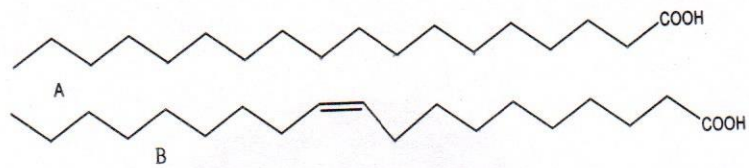
- a. Briefly explain the concept of enzyme inhibition by following. **(6 marks)**
- Reversible inhibitors
 - Irreversible inhibitors
- b. You are provided with a mixture of adenine nucleotides containing adenosine, adenosine monophosphate (AMP), adenosine diphosphate (ADP) and adenosine triphosphate (ATP).
- Using formate as counter ions explain how you would separate the mixture into its constituents using ion chromatography. **[4 marks]**
 - Giving an explanation, show the order of elution. **(4 marks)**

QUESTION FOUR [14 MARKS]

- a. Draw a sketch showing the basic components of spectrophotometric instruments and label the parts. **(5 marks)**
- b. To determine the enzyme activity of acetyl choline esterase in the reaction $\text{acetylthiocholine} \rightarrow \text{thiocholine} + \text{acetate}$ (catalyzed by ACHE) and $\text{thiocholine} + \text{DTNB} \rightarrow 5\text{TNB} + \text{oxidized thiocholine}$, in a sample with a protein concentration of 0.34 mg/ml, 30 μl of the sample are added to a cuvette in final volume of 1 ml containing all the necessary substrates. The A_{405} increases from 0.015 to 0.287 in 10 minutes. The A_{405} of a blank containing all the same reagents except the protein sample goes from 0.014 to 0.073 in 10 minutes. The ϵ_{405} for 5TNB is $13.3 \times 10^3 \text{ litcm}^{-1}\text{mol}^{-1}$. Use this information to answer the questions that follow.
- Plot a graph for the data from the spectrophotometer. **(5 marks)**
 - Determine the enzyme activity in the reaction. **(4 marks)**

QUESTION FIVE [14 MARKS]

- a. Explain the following occurrences: **(4 marks)**
- Animal fats are solid while vegetable oils are liquid at room temperature:
 - The boiling point of the fatty acid (A) in the figure below is higher than that of (B).



b. Outline any two roles of each of the following steps during isolation of nucleic acids. (2 marks)

i. Cell lysis: (2 marks)

ii. Enzymatic treatment: (2 marks)

iii. Phenol extraction: (2 marks)

c. Giving an explanation in each case, classify the following amino acids as hydrophobic, polar and charged. (4 marks)

