KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE OF BSC (CHEMISTRY)

COURSE CODE: SCH 223

COURSE TITLE: BIOCHEMISTRY

DURATION: 2 HOURS

DATE: 16/2/2021 **TIME: 8:00-10:00A.M**

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) 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 **4** printed pages. Please Turn Over

KIBU observes ZERO tolerance to examination cheating

QUESTION ONE [30 MARKS]

a. Outline three properties of biomacromolecules: **(3 marks)**

b. Giving an example in each case differentiate the following terms: **(4 marks)**

i. Saturated and monounsaturated fatty acids

ii. Isomerases and ligases

c. Define the following terms **(5 marks)**

i. Enzymes

ii. Nucleotide

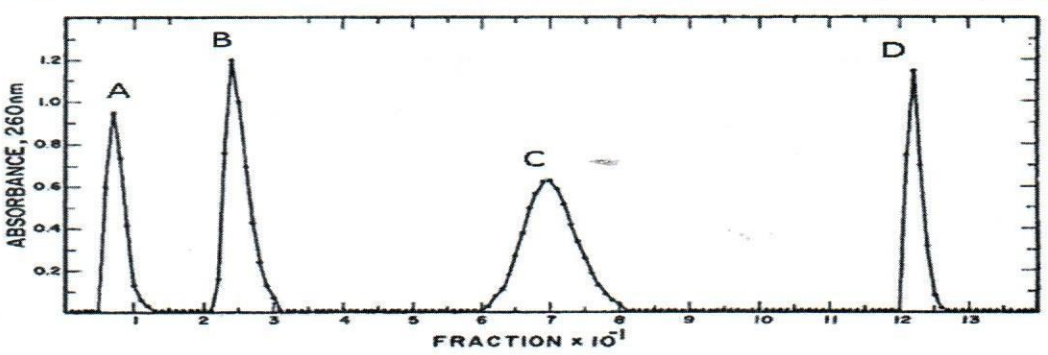
iii. Nucleoside

iv. Chiral carbon

v. Cofactors

d. List any four functions of membrane proteins: **(4 marks)**

e. The following chromatogram was obtained during separation of a mixture of adenine nucleotides containing adenosine, adenosine monophosphate (AMP), adenosine diphosphate (ADP) and adenosine triphosphate (ATP). Using formate as counter ions in ion exchange chromatography. Study the chromatogram and answer the questions that follow.

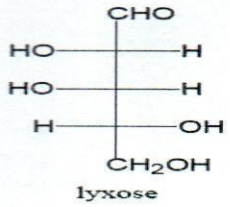


i. Name the peaks A, B, C and D. **(2 marks)**

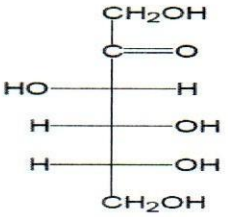
ii. Explain the order of elution. **(5 marks)**

f. Briefly explain how antibodies act as protective agents in the body. **(3 marks)**

g. Identify the following compounds as D or L isomers, draw and name their mirror images **(4 marks)**



lyxose



fructose

QUESTION TWO [20 MARKS]

a. Outline the main function of the following macro molecules and indicate in which organism each substance is found: **(4 marks)**

b. Dehydrogenase activities are easily measured in spectrophotometric assays because of strong absorbance of reduced flavin nucleotides (NADH and NADPH) at 340 nm as compared to the oxidized nucleotides (NAD^+, $NADP^+$). The ε_{340} of either NADH or NADPH is 6.22 $x10^3$ liter/cm·mole. Calculate the amount of glutamate dehydrogenase (GDH) activity expressed in µmoles glutamate formed per min per mg protein using the following reaction parameters: the protein concentration in the sample is 0.23 mg/ml; 0.01 ml of sample was measured the final cuvette volume was 1 ml; the A_{340} decreased from 0.60 to 0.52 in 10 minutes; and the A_{340} of a blank (containing no enzyme) decrease from 0.60 to 0.59 in 10 minutes. GDH catalyzes the following reaction: α-ketoglutarate + $NH4^+$ + NADPH ↔ glutamate + $NADP^+$ **(5 marks)**

c. A student was provided with a mixture of proteins. Briefly explain how he could use differential precipitation to separate the protein mixture. **(5 marks)**

d. Biomembranes need to be fluid. Why? **(4 marks)**

e. Calculate the number of stereo isomers present in the following molecules. **(2 marks)**

QUESTION THREE [20 MARKS]

a. Define the term carbohydrate **(1 mark)**

b. Give an example of a mono, di and polysaccharide **(3 marks)**

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