KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
SUPLEMETARY EXAMINATIONS

FOR THE DEGREE OF BSC (CHEMISTRY)

COURSE CODE: SCH 223

COURSE TITLE: BIOCHEMISTRY

DATE: 27/07/2022 **TIME: 2:00PM-4:00PM**

INSTRUCTIONS TO CANDIDATES:

TIME: 2 Hours

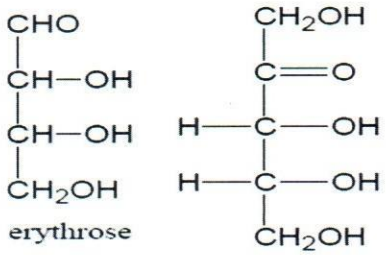
Answer question ONE and any TWO of the remaining

QUESTION ONE [30 MARKS]

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

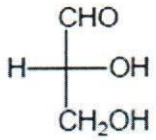
i. Carbohydrates ii. Enantiomers iii. Ketoses iv) Oligosaccharides v) Anomers

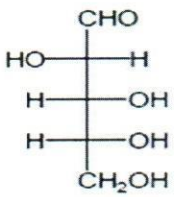
b. i) Identify the following compounds as D or L sugars **(1 mark)**

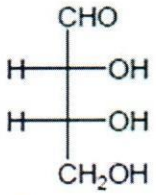


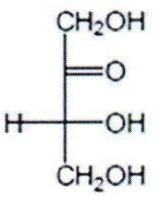
ii. Draw their mirror images **(2 marks)**

c. Calculate the number of stereo isomers present for each of the following carbohydrate molecules. **(4 marks)**

i) 

ii) 

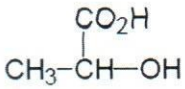
iii) 

iv) 

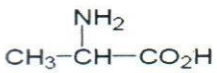
d) a) Draw and name Fischer projections of D and L isomers of the following compounds:

(8 marks)

i) Lactic acid



ii) Alanine:



e) Giving an example in each case differentiate the following **(6 marks)**

i) Saturated and monounsaturated fatty acids

ii) Polar neutral amino acids and polar acidic amino acids

iii) Oligosaccharides and polysaccharides

f) Describe what happens when milk is converted into curd or yoghurt from your understanding of proteins? **(4 marks)**

QUESTION TWO [20 MARKS]

a) Briefly explain the steps followed in an enzymatic catalysis reaction where two substrates (reactants) are converted to one product. **(9 marks)**

b) List the roles of carbohydrates **(8 marks)**

c) State the properties of chiral molecules **(3 marks)**

QUESTION THREE [20 MARKS]

a. You are provided with a mixture of adenine nucleotides containing adenosine, adenosine monophosphate (AMP), adenosine diphosphate (ADP) and adenosine triphosphate (ATP).

i) Using formate as counter ions explain how you would separate the mixture into its constituents using ion chromatography. **(4 marks)**

ii) Giving an explanation, show the order of elution. **(4 marks)**

b. Differentiate between Isocratic and Gradient elution? **(4 marks)**

c i. Outline the similarities between glycogen and cellulose. **(2 marks)**

ii) State their structural differences with the aid of a diagram show this concept. **(6 marks)**

QUESTION FOUR [20 MARKS]

a. Draw and name five polar amino acids **(10 marks)**

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

c. Explain the following types of chromatography as used in the separation of proteins **(6 marks)**

i) Reverse phase chromatography:

ii) Hydrophobic interaction chromatography: