

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR
OF SCIENCE IN BIOCHEMISTRY**

BMET 214: BIOCHEMISTRY OF BIOMOLECULES

STREAMS: BSC BIOMED Y2S1

TIME: 2 HOURS

DAY/DATE: TUESDAY 23/03/2021

8.30 A.M – 10.30 A.M

INSTRUCTIONS:

Answer question one and any other two questions

Do not write anything on the question paper

QUESTION ONE (30 MARKS)

- (a) Translate the following amino acid sequence into one letter code: Leu-Glu-Ala-Arg-Asn-Ile-Asn-Gly-Ser-Cys-Ile-Glu-Asn-Cys-Glu-Ile-Ser-Gly-Glu-Ala-Thr. [2 marks]
- (b) Differentiate between the two broad classes of heterocyclic nitrogen bases that occur in nucleic acids, and provide a structural example of each. [3 marks]
- (c) Give the structural illustration and indicate whether each of the following sugars consists of anomers, epimers or an aldose pair. [4 marks]
- (d) Glucose reacts slowly with hemoglobin and other proteins to form covalent compounds. Explain why glucose is reactive? What is the nature of the adduct formed? [4 marks]
- (e) RNA is readily hydrolyzed by alkali, whereas DNA is not. Explain? [5 marks]
- (f) α D-Mannose is a sweet tasting sugar. β D-Mannose, on the other hand, tastes bitter. A pure solution of α D-Mannose loses its sweet taste with time as it is converted into the β anomer. Draw the structure of a 16-carbon fatty acid as saturated, trans

monounsaturated, and cis monounsaturated and explain why most unsaturated fatty acids found in phospholipids are in the cis rather than conformation. [6 marks]

QUESTION TWO (20 MARKS)

- (a) A mutation that changes an alanine residue in the interior of a protein to valine is found to lead to a loss of activity. However, activity is regained when a second mutation at different position changes an isoleucine residue to glycine. How might this second mutation lead to a restoration of activity. [6 marks]
- (b) All 1 amino acids have an *S* absolute configuration except 1-cysteine, which has the *R* configuration. Explain why 1-cysteine is designated as the *R* absolute configuration. [6 marks]
- (c) Describe the structure and function of the major proteins in muscle. [8 marks]

QUESTION THREE (20 MARKS)

- (a) Describe the features of the Watson –crick model of DNA deduced from the diffraction patterns. [10 marks]
- (b) Describe the structural and functional differences between DNA and RNA. [10 marks]

QUESTION FOUR (20 MARKS)

- (a) Monosaccharides are reducing sugar. Describe an experiments that can be used to deduct his. [10 marks]
- (b) Briefly describe the different classes of lipids. [10 marks]
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