

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR
OF SCIENCE IN AGRICULTURE, AGRICULTURAL EDUCATION, NATURAL
RESOURCE MANAGEMENT, FOOD SCIENCE, HORTICULTURE, ANIMAL
SCIENCE AND ENVIRONMENTAL SCIENCE**

BIOC 200: INTRODUCTORY BIOCHEMISTRY

**STREAMS: BSC (AGRIC, AGED, NARE, FOST, HORT, ANSC, ENSC)
TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 11/4/2018 11.30 A.M. – 1.30 P.M.

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- (a) Calculate the pK_a of lactic acid, given that when the concentration of lactic acid is 0.010 M and the concentration of lactate is 0.087 M, the pH is 4.80. [5 marks]
- (b) In the following structure: [5 marks]

- (i) How many of the monosaccharide units are furanoses and how many are pyranoses?
- (ii) What is the linkage between the two monosaccharide units?
- (iii) What is the name of the above disaccharide unit?
- (iv) Is this a reducing sugar? Explain

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- (c) (i) What are the structural characteristics common to all amino acids found in naturally occurring proteins? [2.5 marks]
- (ii) Only one of the common amino acids has no free amino group. Name this amino acid and draw its structure. [2.5 marks]
- (d) (i) Give the structural illustrations of Adenine, Guanine and Thymine bases. [3 marks]
- (ii) List the general functions of nucleotides. [2 marks]
- (e) Describe the various levels of protein structures. [5 marks]
- (f) Name any two ketone bodies and explain why they form during fasting. [5 marks]

QUESTION TWO (20 MARKS)

- (a) Using structural and chemical formulas, describe the glycolytic pathway and its significance. [14 marks]
- (b) Outline the regulation and control of glycolysis in biological systems. [6 marks]

QUESTION THREE (20 MARKS)

- (a) Describe three functions of triacylglycerols in mammals and one function in higher plants. [3 marks]
- (b) In cells, fatty acids are stored as triacylglycerols for energy reserves. [4 marks]
- (i) What is the molecule to which fatty acids are esterified to form triacylglycerols?
- (ii) Define the logic behind cells storing fatty acids in esterified form.
- (c) Provide a brief account of the nomenclature of fatty acids and explain how saturated, monounsaturated, and polyunsaturated fatty acids structures differ from one another. [8 marks]
- (d) Explain how ATP is produced in the electron transport chain. [5 marks]

QUESTION FOUR (20 MARKS)

- (a) Derive Michaelis-Menten equation and explain its relevance in enzyme kinetics. [14 marks]
- (b) Discuss the factors that mainly influence any enzyme catalyzed reaction. [6 marks]
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