



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS  
2018/2019 ACADEMIC YEAR  
SECOND YEAR FIRST SEMESTER EXAMINATION**

**SCHOOL OF SCIENCE  
DEPARTMENT OF MATHEMATICS AND  
PHYSICAL SCIENCES  
DEGREE IN BACHELOR OF SCIENCE IN  
CHEMISTRY**

**COURSE CODE: CHE 2216  
COURSE TITLE: BIOCHEMISTRY**

**DATE : 17<sup>TH</sup> APRIL 2019**

**TIME : 0830 -1030HRS**

**INSTRUCTIONS:**

Answer question **ONE** and any other **TWO** questions

*This paper consists of 4 printed pages. Please turn over.*

## **(QUESTION ONE 30 MARKS)**

1. (a) Differentiate between the following terms giving examples in each case
- i) Dextrorotatory molecules and Levorotatory molecules
  - ii) Enantiomers and diastereomers
  - iii) Epimers and anomers **(6 Marks)**
- (b) (i) Define electrophoresis and state its importance in Biochemistry **(1½ Marks)**
- (ii) Draw the structure of starch showing the position of the glucosidic linkage **(2 Marks)**
- (iii) Name the three components of nucleic acids **(1½ Marks)**
- (c) (i) Draw the structures of Histidine, Valine, Phenylalanine, Tyrosine. **(4 Marks)**
- (ii) State and explain the importance of Lipids **(1½ Marks)**
- (iii) State the three factors used when classifying carbohydrates **(1½ Marks)**
- (d) (i) State four characteristics of Glycogen **(2 Marks)**
- (ii) Differentiate between the two major classes of nucleic acids **(2 Marks)**
- (e) (i) Which molecule is split to form two different 3 carbon molecules during glycolysis. **(1 Mark)**
- (ii) Explain why a blue colour is observed when reacting amylose with iodine **(2 Marks)**
- (iii) The specific optical rotation of pure alpha and beta- D-mannopyrose are  $+29.3^\circ$  and  $-17.0^\circ$  respectively. When either form is dissolved in water the observed rotation of the solution changes until a final rotation of  $+14.2^\circ$  is observed. Calculate the percentage of each isomer at equilibrium assuming that only alpha and beta pyranose forms are present in the solution **(5 MARKS)**

## QUESTION TWO (20 Marks)

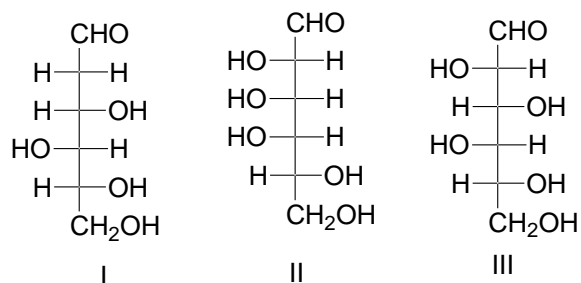
2. (a) (i) List the four factors that would lead to protein denaturation **(2 Marks)**
- (ii) Starting from the Fischer projection, draw the cyclic hemiacetal forms of D-Galactose both as a chair conformation and Haworth projection. **(4 Marks)**
- (i) Write the chemical reaction of amino acid with ninhydrin and show the product Formed **(2 Marks)**
- (b) (i) State three factors that affects enzymes action **(1 ½ Marks)**
- (ii) List the codons to which the following anticodons would form base pairs:  
Anticodon: GAC UGA GGG ACC **(1½ Marks)**  
Codon:
- (iii) Give one of the nucleotide sequences that would translate to: Leu-ala-val-glu-asp-cys-met-trp-lys **(2 Marks)**
- (c) (i) Distinguish between competitive and non competitive enzyme Inhibition **(2 Marks)**
- (ii) Write the Michaelis-Menten equation and describe the terms **(2 Marks)**
- (iii) Sucrose, lactose and maltose are three common disaccharides. Give the two monosaccharides units that make each of the above disaccharides . **(3 Marks)**

## QUESTION THREE (20 Marks)

3. (a) (i) State three functions of Vitamin A **(1½ Marks)**
- (ii) Outline the process of blood clotting **(2½ Marks)**
- (iii) Describe the four steps of Gluconeogenesis **(4 Marks)**
- (iv) List the six classification of enzymes **(3 Marks)**
- (b) (i) Define a codon **(1 Mark)**
- (ii) Outline the Kreb's cycle (TCA) **(8 Marks)**

#### QUESTION FOUR (20 Marks)

4. (a) (i) Define glycolysis **(1 Mark)**
- (ii) Outline and explain in detail the two phases of glycolysis **(10 Marks)**
- (iii) Write the chemical reaction of D-Glucose with phenylhydrazine and give the end products **(3 Marks)**
- (iv) Give the names of each of the following compounds



**(3 Marks)**

- (c) (i) Glycine is the simplest form of amino acids, give its Zwitterionic form **(1 Mark)**
- (ii) Explain the functions of the three classes of RNA **(3 Marks)**

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