



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY 14S & 15S

ACH.4212: CHEMISTRY OF CARBOHYDRATES AND PROTEINS

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2 HOURS

DATE: Pick Date May 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

(a) Define the following terms citing an example in each case

- | | |
|----------------------|--------|
| i) Carbohydrates | (3mks) |
| ii) Epimer | (2mk) |
| iii) Electrophoresis | (2mk) |
| iv) Mutarotation | (2mks) |
| v) Amino acid | (1mk) |

(b) Give reason(s) why

- | | |
|---|--------|
| (i) humans cannot utilize cellulose as a source of energy | (3mks) |
| (ii) Formation of OSAZONE stops further reaction | (2mks) |
| (iii) Fructose gives a positive test with Tollen's reagent while ketones will give a negative test for the same reagent | (3mks) |
| (iv) Glycogen is most suitable as a storage form of carbohydrates in animals | (2mks) |

(c) Draw the products formed when

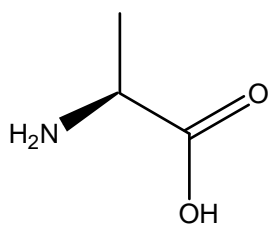
- (i) Two α -D-Glucose molecules are joined together by α -1,4-glycosidic linkage (2mks)
- (ii) α -D-Glucose and fructose are bonded together to form sucrose (2mks)
- (d) State
- (i) The acid-base character of amino acids (2mks)
- (ii) FOUR applications of proteins (2mks)
- (iii) TWO basic amino acids (1mks)
- (iv) TWO acidic amino acids (1mks)

Question TWO

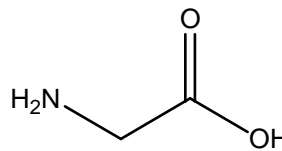
- (a) Draw a scheme to summarize the reactions of D-glucose with the following reagents
- (i) $\text{Br}_2/\text{H}_2\text{O}$ (2mks)
- (ii) Hydroxylamine(NH_2OH) (2mks)
- (iii) Nitric acid (3mks)
- (iv) Phenyl hydrazine (3mks)
- (v) Acetic anhydride (3mks)
- (vi) H_2/Ni (3mks)
- (vii) Water (2mks)
- (viii) Tollen's reagent (2mks)

Question THREE

- (a) State any TWO protecting agents commonly (2mks)
- (b) Outline how you would synthesize a specific dipeptide Ala-Gly in the following steps



Ala



Gly

- (i) Protecting the C terminal (4mks)
- (ii) Protecting the N terminal (4mks)
- (iii) Formation of the peptide bond (4mks)
- (v) Deprotection of both C and N-terminal (6mks)

Question FOUR

- (a) Outline the steps involved in
- (i) Kiliani Fischer synthesis for chain lengthening of D-arabinose to D-glucose (10mks)
 - (ii) Ruff degradation of D-glucose to D-arabinose (10mks)

Question FIVE

- (a) Explain the following
- (i) Amino acids are insoluble in diethyl ether but *N*-acetyl amino acids are soluble (3mks)
 - (ii) Tryptophan is not classified as a basic amino acid even though it has a heterocycle containing nitrogen atom. Why is the N in the five membered ring of Tryptophan not readily protonated. (3mks)
- (b) Draw the structure of Glycine and Alanine at their isoelectric point (4mks)
- (c) Outline
- (i) How you would test a solution for reducing sugar (5mks)
 - (ii) How you would test a sample for starch (3mks)
- (d) State any TWO differences between amylose and amylopectin (2mks)