



# 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) Glycoside (2mk)
  - (ii) Protecting group (2mks)
  - (iii) Kinetic resolution of amino acids (2mks)
  - (iv) Peptide bond (2mks)
  - (v) Anomer (2mks)
- (b) Explain the acid-base behaviour of proteins (4mks)
- (c) State with reason(s)
- (i) two disaccharides that are reducing sugars (4mks)
  - (ii) Two amino acids that are basic (4mks)
  - (iii) Two reagents that oxidize monosaccharides to corresponding carboxylic acids (4mks)
- (d) State any FOUR applications of proteins (4mks)

## Question TWO

(a) State TWO differences between

(i) Amylose and Amylopectin (4mks)

(ii) Maltose and cellobiose (4mks)

(b) Draw the structures of the following

(i) D-Glucose (ii) D-Mannose (iii) D-Glyceraldehyde

(iv)  $\alpha$ -D-Glucose (v)  $\alpha$  glycoside (10mks)

(c) Explain the relationship between (i) and (ii) in (b) above (2mks)

## Question THREE

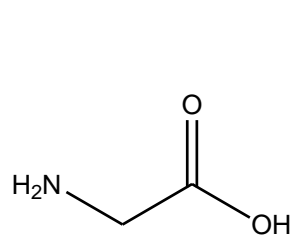
Outline the following

(i) chain lengthening of D-arabinose to D-glucose by Kiliani synthesis (10mks)

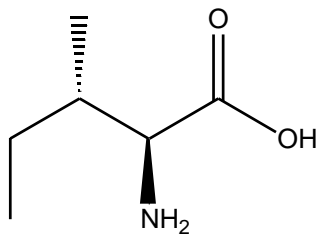
(ii) Chain shortening of D-glucose to D-arabinose by Ruff degradation (10mks)

## Question FOUR

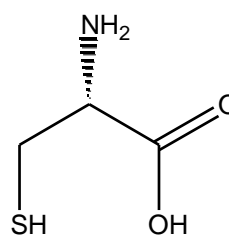
(a) State with a reason which of the amino acids below is



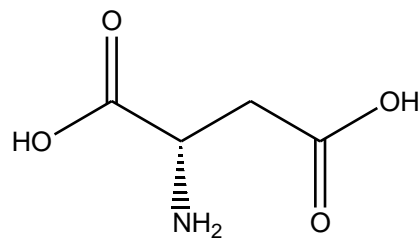
A



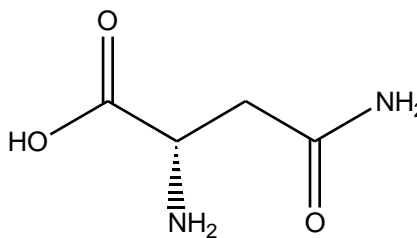
B



C



Aspartic acid



Asparagine

(i) Neutral amino acid (4mks)

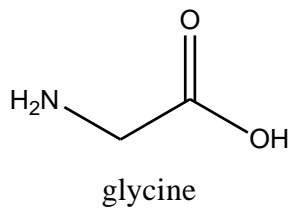
(ii) A basic amino acid (2mks)

(iii) An essential amino acid (2mks)

(iv) A non-essential amino acid (2mks)

(b) Name amino acid A, B and C (3mks)

(c) With reference to glycine explain how the charge of a neutral amino acid depends on PH.



(7mks)

### Question FIVE

Explain the following citing examples in each case

(i) Mechanism of mutarotation (5mks)

(ii) Mechanism of glycoside formation the planar carbocation (5mks)

(iii) Outline any FIVE properties of monosaccharaides (5mks)

(iv) Distinguish between the disaccharides maltose and sucrose (5mks)