KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

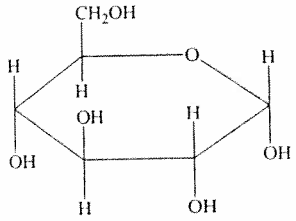
FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 306: CHEMISTRY OF CARBOHYDRATES AND PROTEINS

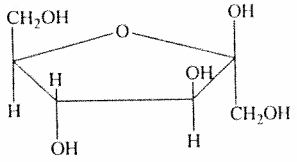
DATE: Wednesday 7th December, 2011 **TIME:** 2.00 p.m. – 4.00 p.m.

Instructions: 1. Answer all Questions
2. Tables of monosaccharides and amino acids have been provided

Q1. The Haworth formulas for α-D-glucopyranose (**A**) and β-D-fructofuranose (**B**) are given below:



A



B

Using the above formulas as reference, draw the Haworth formulas of:

(i) β-L-Mannopyranose
(ii) D-α-D-Sorbosefuranose
(iii) α-D-Talopyranose
(iv) Ethyl-β-D-galactopyranoside
(v) β-D-Fructofuranosyl-α-D-glucopyranoside (sucrose)

(10 marks)

Q2. (a) Using structures, equations or mechanisms where appropriate, explain each of the following terms as applied in the study of carbohydrates and proteins.

(i) Epimers
(ii) Mutarotation
(iii) Glycosides
(iv) Zwitterion
(v) Denaturing of proteins

(10 marks)

(b) Give at least two differences between each of the following pairs.

(i) Polysaccharides and proteins
(ii) Cellobiose and lactose
(iii) Oxytocin and vasopressin
(iv) Collagens and Fibrinogens
(v) Amylose and glycogen

(10 marks)

Q3. (a) Outline reaction scheme for each of the following transformations.

(i) D-Lyrose to D-galactose.
(ii) Strecker synthesis of phenylalanine from phenylacetylaldehyde.

(8 marks)

(b) What product(s) are formed when each of the following compounds is treated with appropriate amounts of periodic acid (HIO_4)? State the number of moles of HIO_4 that are required in each case.

(i) D-Ribulose
(ii) Methyl-β-D-glucofuranoside (5 marks)

Q4. (a) Explain the following statements by use of appropriate examples.

(i) D-fructose is a reducing sugar yet it is a ketose.
(ii) Some lactose is reducing sugars while sucrose is not.
(iii) Proline and hydroxyproline do not give positive tests of amino acids with ninhydrin reagent

(10 marks)

(b) By use of Curly arrows outline the mechanisms for the following reactions.

(i) Synthesis of alanine from ethanal.
(ii) D-Glucose to D-glucosediphenylasazone (7 marks)

Q5. (a) (i).Suggest reason (s) for the fact that the isoelectric point of lysine (Lys) is 9.74, but that of tryptophan (Trp) is only 5.89. (3 marks)
(ii) What is sickle cell anemia and what is its implication? (3 marks)

(b) (i) Using Sanger reagent, show how the terminal-residue analysis of the following peptide can be carried out.

Leu-Gly-Phe-Gly-Ala-Val (4 marks)

****