



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

SECOND YEAR MAIN EXAMINATION

FOR THE DEGREE OF

**BACHELOR OF SCIENCE (CHEMISTRY) AND BACHELOR OF
INDUSTRIAL CHEMISTRY**

COURSE CODE: SCH 232

COURSE TITLE: CHEMISTRY OF BIOMOLECULES

DATE: FRIDAY, 29TH APRIL 2022

TIME: 12.00 - 2.00PM

INSTRUCTIONS

- Answer ALL Questions.

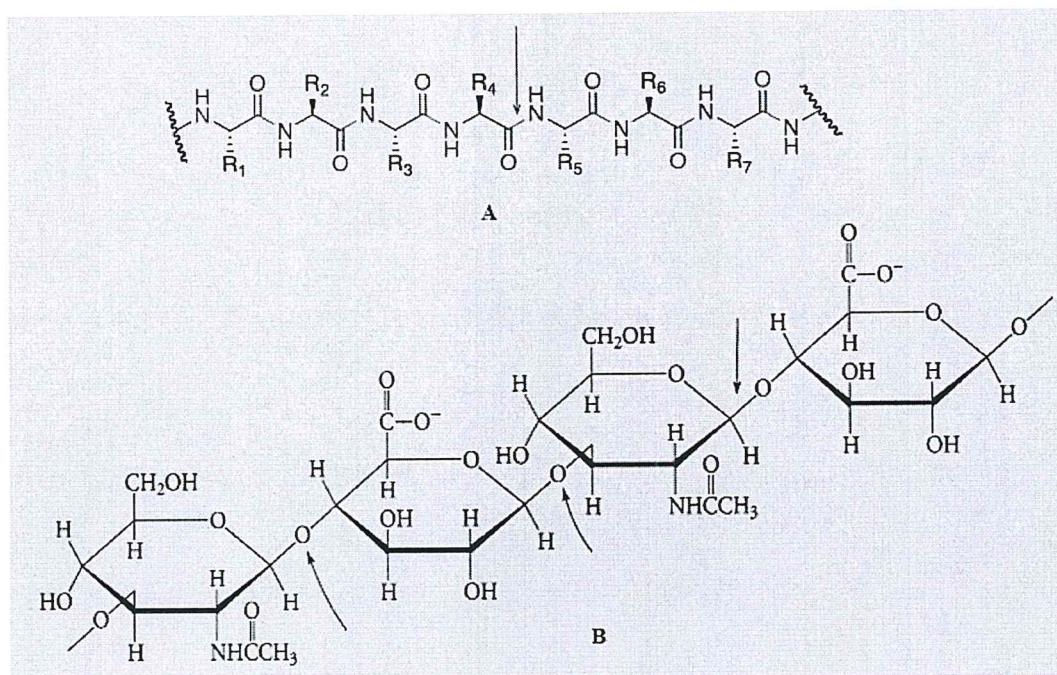
This paper consists of 4 printed pages. Please turn over.



Q1.

(20 marks)

Given below are two (2) structures of primary biomolecules marked **A** and **B** below. Study the structures carefully and answer the questions that follow.

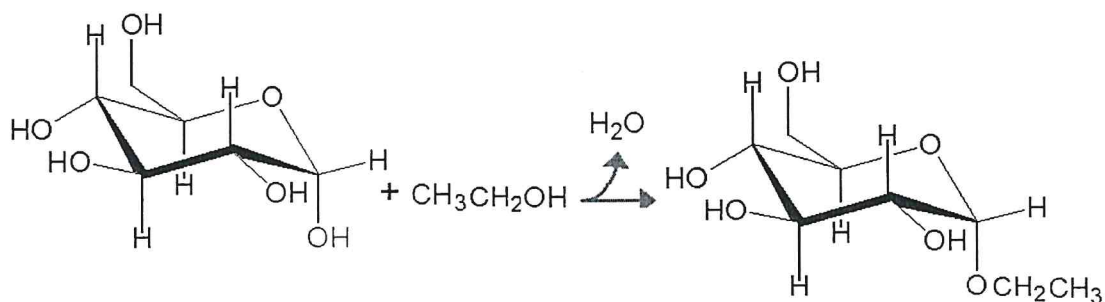


- (a) Based on only the chemical structures depicted above, precisely classify each of the molecules [2]
- (b) The arrows shown on structures **A** and **B** indicate special bonds found in these molecules. Name the two classes of bonds depicted in these molecules. [2]
- (c) Precisely name the three (3) bonds shown in molecule **B**. [3]
- (d) Give five (5) functions of molecules of class **A** and **B**. [10]
- (e) Identify the monomers in polymer **A** and **B**. [3]

Q2.

(22 marks)

- (a) Outline the reaction mechanism of glycosidation reaction shown below. [16]



(b) Explain why the Ethyl - α -D-glucopyranoside product is the major product of the glycosidation reaction in (a) above as compared to Ethyl - β -D-glucopyranoside product. [2]

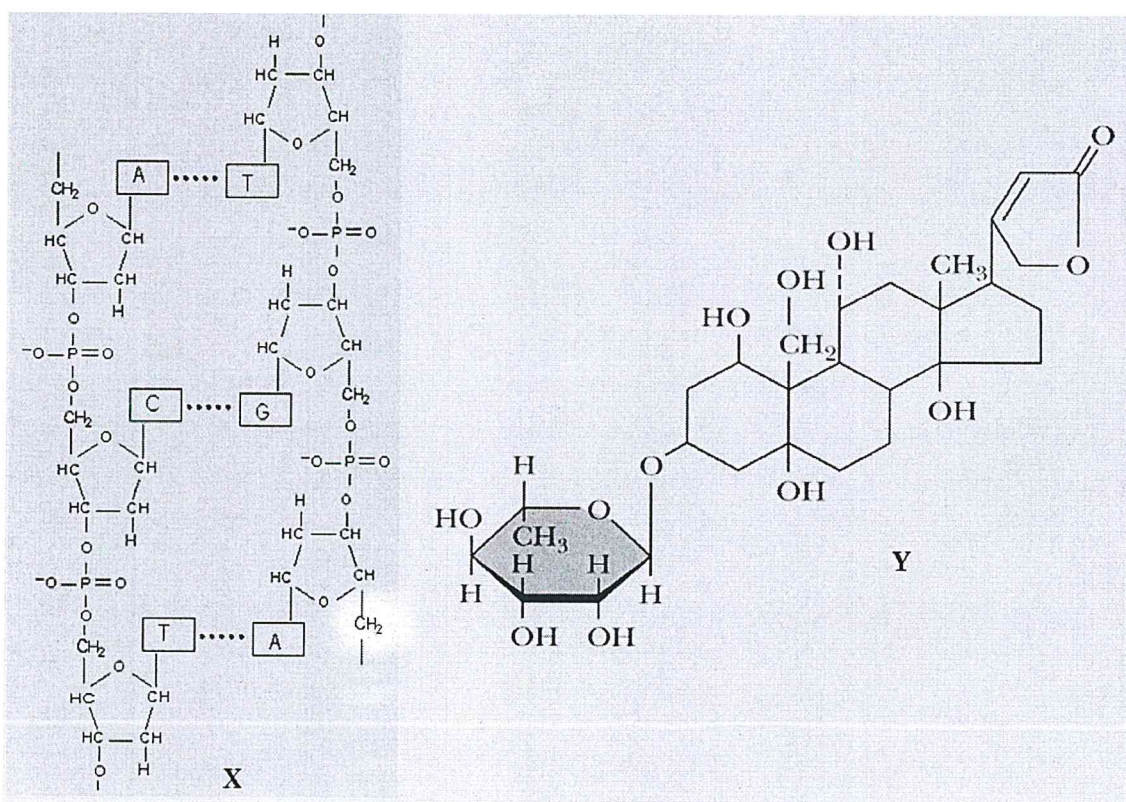
(c) Show the hemiacetal and acetal components in the reaction (a) above. [2]

(d) Calculate the number of possible isomers of Ethyl - α -D-glucopyranoside. [2]

Q3.

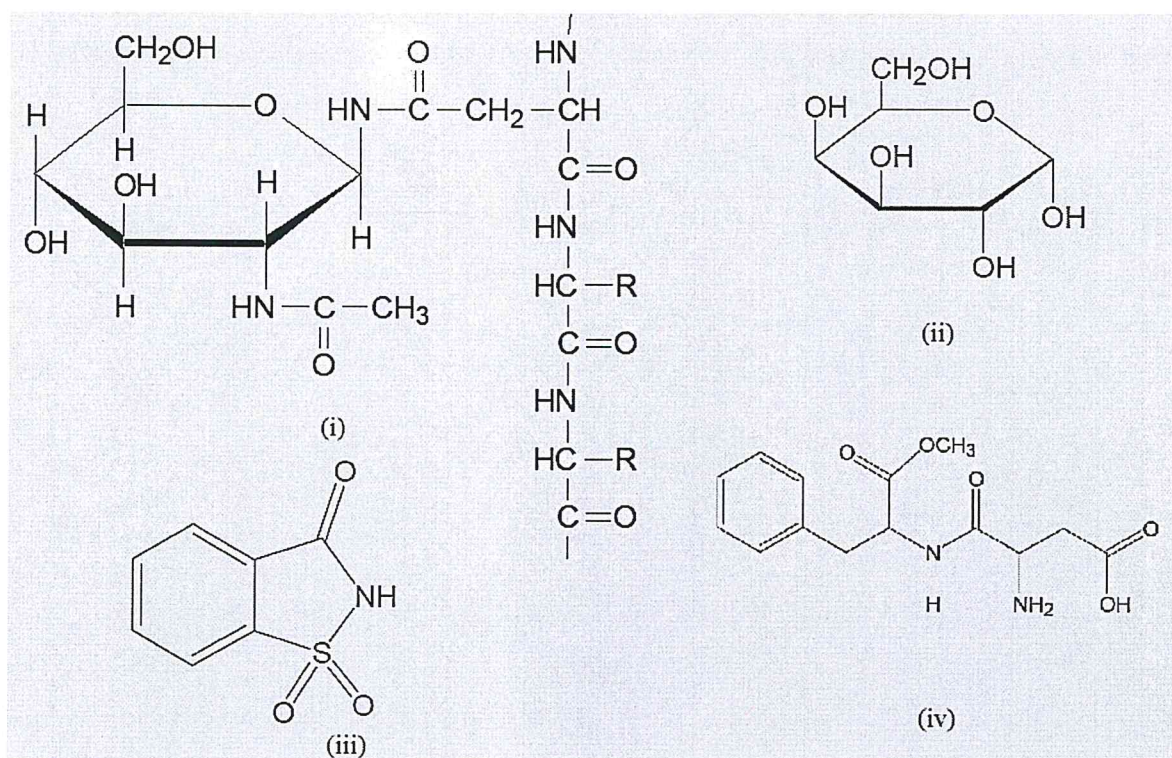
(12 marks)

(a) Below are two (2) very important biomolecules. X is a 1° metabolite while Y is a 2° metabolite. Carefully study the chemical structures of X and Y and identify one (1) key structural similarity between these two molecules. [2]



(b) Count the number of stereogenic centres in the following molecules

[4]



(c) List analytical techniques used in the analysis of proteins and carbohydrates separately. [6]

Question 4

(16 marks)

(a) Express the following bio membrane / cell processes in form of chemical equations [5]

- (i) Oxidation of glucose
- (ii) Photosynthesis and Cellular Respiration

(b) What are the three (3) classes of lipids that exist today? [6]

(c) What are the main functions of lipids? [5]