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# KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR

FORTH YEAR FIRST SEMESTER  
MAIN EXAMINATIONS

FOR THE DEGREE OF BSC (CHEMISTRY)

**COURSE CODE:** SCH 433E

**COURSE TITLE:** CHEMISTRY OF CARBOHYDRATES

**DATE:** 19/07/21

**TIME:** 9:00-11:00AM

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## INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 3 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

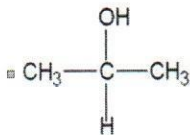
**QUESTION ONE (30 MARKS)**

a) Define the following terms **(5 marks)**

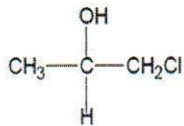
- i) Anomeric carbon    ii) Chiral carbon    iii) Dextrorotatory substance    iv) Raffinose  
v) Glycolysis

b) Identify the chiral carbons by putting an asterick (\*) against it in the following. **(4 marks)**

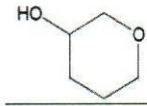
i



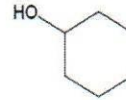
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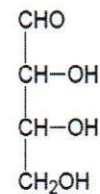
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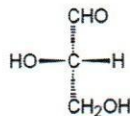


c) State four biological importance of carbohydrates **(4 marks)**

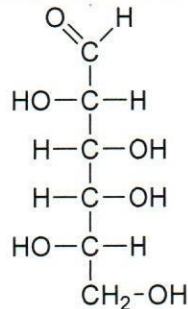
d i) What are the symptoms of lactose intolerance **(3 marks)**

ii) Outline the treatment of lactose intolerance **(4 marks)**

e) Given below is the structure of glyceraldehyde. Draw and name the Fischer projections of D and L glyceraldehyde. **(4 marks)**



f) Carefully study the structure of galactose below and answer the questions that follow.



i) Classify the above compound is a D or L isomer. **(1 mark)**

ii) Draw mirror image of the compound and indicate whether it is a D or L isomer **(1 mark)**

iii) How many isomers will the compound above have? **(2 marks)**

iv) In which direction will the galactose isomer in (i) above rotate plane polarised light? Explain. **(2 marks)**

**QUESTION TWO (20 MARKS)**

a) List the importance of the glycolysis pathway **(5 marks)**

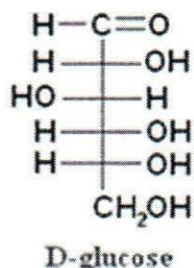
b) With the aid of a diagram explain the step involved in the glycolytic pathway **(15 marks)**

**QUESTION THREE (20 MARKS)**

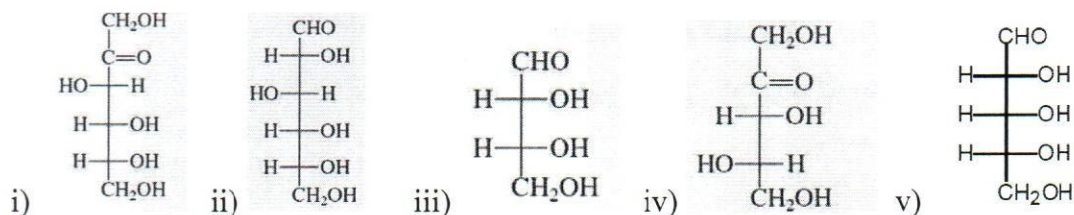
a) Differentiate between the following terms:

- i) Fischer Projection and Haworth projection (2 marks)
- ii) Oligosaccharides and polysaccharides (2 marks)
- iii) Amylose and amylopectin (3 marks)

b) Given D-glucose below, draw and name the Haworth projections and chair conformations of  $\alpha$ -D-glucose and  $\beta$ -D-glucose. (8 marks)



c) Classify the following monosaccharides according to both the carbon atoms present and type of carbonyl group present. (5 marks)



**QUESTION FOUR (20 MARKS)**

- a) Discuss digestion and absorption of carbohydrates, including the actions of carbohydrate digestive enzymes (17 marks)
- b) Differentiate between glycemic response and glycemic index (2 marks)
- c) State two factors that affect carbohydrate absorption (1 mark)

**QUESTION FIVE (20 MARKS)**

- a) Maillard reaction occurs in carbohydrates. Explain this reaction in detail (5 marks)
- b) Sugar can be substituted in manufacturing industries. Draw and discuss three of this substitutes available in the market today (15 marks)