



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PURE & APPLIED SCIENCES
OCTOBER/NOVEMBER 2019_2 EXAMINATION

COURSE CODE: CHM 315

COURSE TITLE: CARBOHYDRATE CHEMISTRY

CREDIT: 2 UNIT

TIME ALLOWED: 2 HOURS

INSTRUCTION: Answer question one (1) and any other three (3) questions

QUESTION ONE

- (i) Using α , β anomer of glucose, show the reaction equation leading to the formation of glycoside **(3 marks)**
- (ii) Mention three characteristic use in classifying monosaccharide. **(1 ½ marks)**
- (b) (i) Describe the formation of furanose and pyranose (ring-chain monosaccharide) from straight chain monomer. **(3 marks)**
- (iii) Discuss the formation and distinguish between alpha and beta anomer of ring form of glucose. **(7 marks)**
- (c) Complete the table below:

Disaccharide	Sources	Component monosaccharides
sucrose	common table sugar	glucose $1\alpha \rightarrow 2$ fructose
maltose		
trehalose		
lactose		
melibiose		

(2 marks)

- (ii) Give the structures of the under listed disaccharides:

Maltose, Cellobiose, Trehalos, Gentiobiose, Lactose and Glucose. **(6 marks)**

(iii) What is Homopolysaccharides? give three example of Homopolysaccharides. (2 ½ marks)

QUESTION 2

(a)

(i) Write a short note on the following: Dextrins, High Fructose Corn Syrup (HFCS), Modified starch and Polydextrose. (7 ½ marks)

(b)

(ii) Compare and differentiate between Inulin and oligofructose. (4 ½ marks)

(iii) Give the structure of inulin. (3 marks)

QUESTION 3

(i) Group the following disaccharides into reducing and non-reducing sugar; Cellobiose, Trehalose maltose and gentiobiose. (2 marks)

(ii) What was your basis for the grouping? (1 mark)

(b) Write the equation for the reaction of glucose with five out of the following reagents: (5 marks)

(i) Excess pyridine (CH₃CO)O.

(ii) NaBH₄

(iii) HCN

(iv) Br₂ in water

(v) Dilute HNO₃

(vi) HI then apply heat

(c)

(i) Spot the difference in the structure of a glucose and glucosamine. (2 ½ marks)

(ii) Give the structure of the following; dihydroxyacetone, D-(-)-Fructose, D-(-)-Xylulose, D-(-)-Ribulose. (4 marks)

(iii) Why do sugar monomers rotate the plane of polarized light? (1 mark)

QUESTION 4

(a) What are glycosides? (5 marks)

(b) Write the reaction which leads to the formation of two monomeric form of methyl glucosides. (5 marks)

(c) Give the equation for the mutarotation of anomeric form of glucose. (3 marks)

(ii) How does glycosides affect lipids? **(1 mark)**

(iii) Predict the name of the monosaccharide if the carbonyl group is: **(1 mark)**

1. Aldehyde
2. ketone

QUESTION 5

(a) Differentiate between psedoheptoluse and fructose. **(1 ½ mark)**

(ii) What are enantiomers? **(½ mark)**

(b) Give the structure of glucose in boat, chair and Fischer spacial presentations of glucose. **(3 marks)**

(c) Write short note on the role of monosaccharaides in living organisms. **(3 marks)**

(d) What are sugar alcohols? **(7 marks)**