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MAIN EXAMINATION

JANUARY - APRIL 2017 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF CHEMISTRY

REGULAR PROGRAMME

CHEM 305: CHEMISTRY OF CARBOHYDRATES AND PROTEINS

Date: APRIL 2017	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and any other Two Questions	

Q1**.**

A) Define the following terms as used in chemistry. **(6 marks)**

a. Glycocidic bond
b. Active sites
c. Anomeric carbon
d. Electrophoresis
e. Enzyme
f. Zwitter ion

B) Distinguish the following terms. **(6 marks)**

i) Peptide bond and Glycocidic bond

ii) Reducing sugar and Non-reducing sugar

iii) Co-enzyme and co-factor.

C) For each of the following structures decide whether the carbohydrate is: **(8 marks)**

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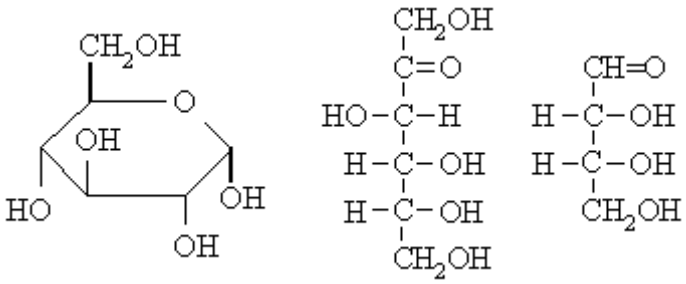
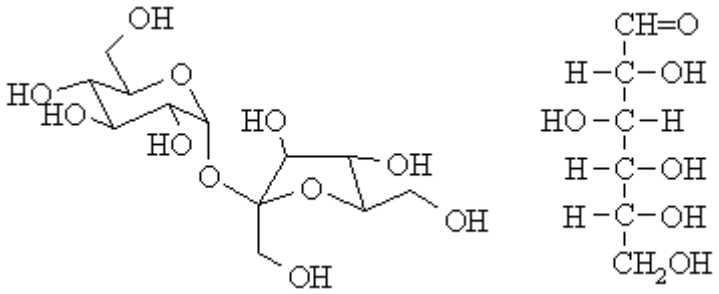
(i) An aldose or ketose, and (ii) a tetrose, pentose or hexose. Give an explanation



(a) (b) (c)

D. Which of the following sugars are reducing sugars? explain **(4 marks)**



(a) (b)

E. a) distinguish polar and non polar amino acids giving examples. **(4 marks)**

b). discuss two importance of polysaccharides. **(2 marks)**

Q2.

a) Are any of the following carbohydrates L-sugars? What makes something an L-sugar as opposed to a D-sugar? Rewrite each structure into an L-sugar if they are not already in that conformation.(8 marks)

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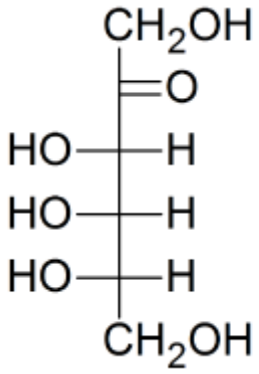
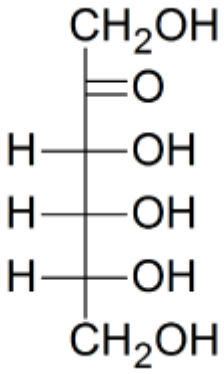
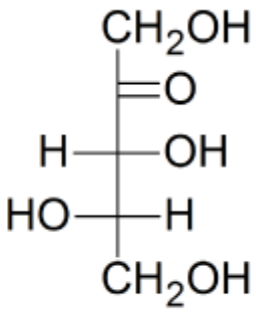
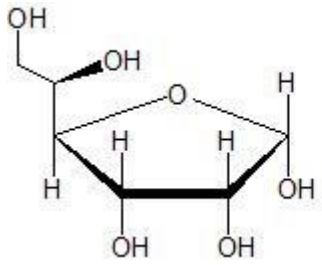


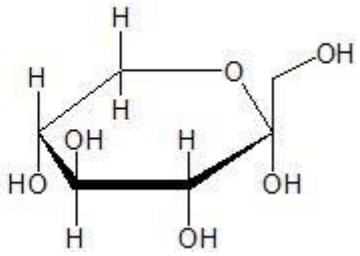


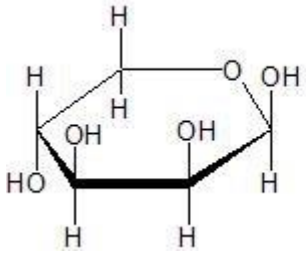


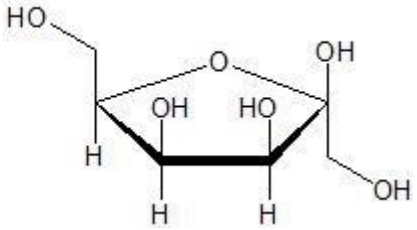
(b) Which carbon is considered the anomeric carbon? How do you distinguish between the alpha and beta types of anomers? **(3 marks)**

(c) Study these projections to answer the following for each of them.









a. What type of projection is this? **(1 mark)**
b. Is it an alpha or beta anomer? **(4 marks)**
c. Circle the anomeric carbon. **(4 marks)**

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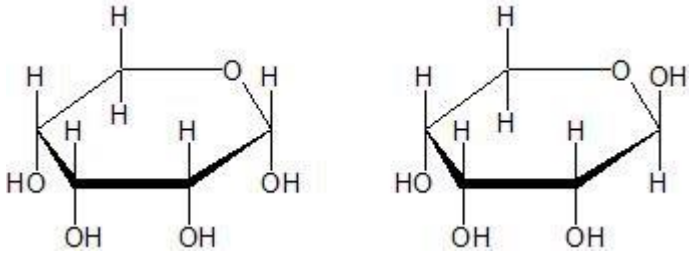
Q3.

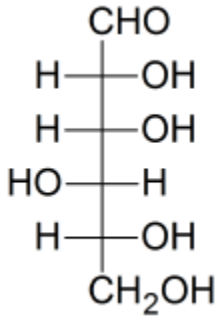
a) Study these projections to answer the following for each of them



a. Circle each anomeric carbon. (1 mark)
b. Which of the two is the alpha anomer and which is the beta anomer? (2 marks)
c. Are these monosaccharides reducing sugars? Explain.(4 marks)
d. Can you convert the alpha anomer to a beta anomer? Explain (3 marks)
e. discuss using graphs factors affecting efficiency of enzymes. (10 marks)

Q4.

I) Examine the structure of this Fischer projection of D-gulose.



a. Number each carbon from 1 to 6. What number is the anomeric carbon? **(3 marks)**
b. Circle the –OH group that determines whether it is a D- or L-sugar. **(1 mark)**
c. Sketch the structure of L-gulose for comparison. Are the two versions of glucose enantiomers of one another or diastereomers? **(3 marks)**
d. Now sketch the structure of D-glucose for comparison. **(3 marks)**

e)a) Discuss the formation of formation of starch, cellulose and glycogen from glucose.

(6 marks)

b**)** Show the formation of polypeptide from amino acids. **(4 marks).**

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Q5.

a). draw the structure of any amino acid showing it as zwitter ion**.** **(4 marks).**

b) Discuss various classifications of proteins. **(6 marks)**

c) Discuss five physical properties of amino acids. **(10 marks)**

END

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