



EASTERN UNIVERSITY, SRI LANKA
THIRD EXAMINATION IN SCIENCE
FIRST SEMESTER- 2003/2004 (Repeat)
CH 301 CHEMISTRY OF NATURAL PRODUCTS

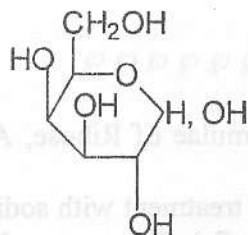
Answer all questions

Time:01 Hour

(1) Answer all three parts (a), (b) and (c).

(a). Draw the Fischer projection of fructose, glucose and galactose sugars having the D-configuration.

A non reducing trisaccharide **P** on complete hydrolysis gives D-fructose, D- glucose and D-galactose as the products. Hydrolysis of **P** with a β - fructosidase gives a reducing disaccharide **Q** and D-fructose. Treatment of **P** with an α - glycosidase gives a non-reducing disaccharide **E** and D-galactose. Complete methylation of **P** followed by hydrolysis with dilute acid gives 2,3,4,6-tetra-O- methyl galactose, 2,3,4 - tri-O- methyl glucose and 1,3,4,6- tetra -O-methyl fructose as products. The disaccharide **Q** when treated with methanol in the presence of HCl gives a compound **F**. Deduce the structures of the compounds **P** , **Q**, **E** and **F**, explaining all the above observations.



D - galactose

(b) (i).Treatment of D-glucose with methanol in the presence of gaseous hydrogen chloride yields mixture of α - and β - methyl glycosides in which the α - anomer predominates. Explain.

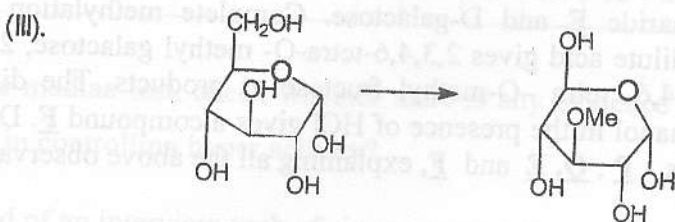
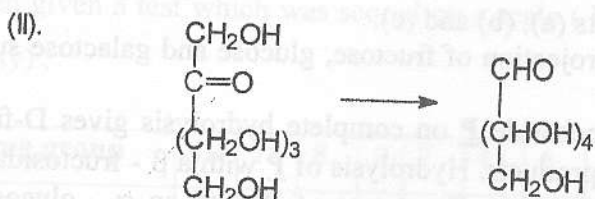
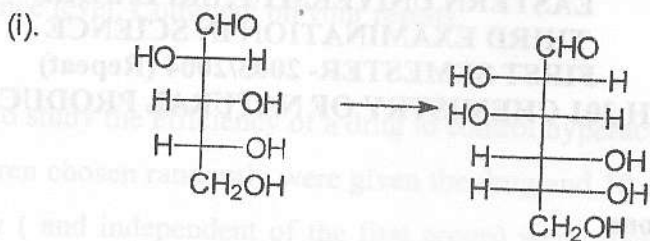
(ii).Complete the following reactions of D-ribose with each of the following reagents by supplying a Fischer projection for each organic product formed (mechanism are not required).

a. HNO_3

b. Excess phNHNH_2

Contd..

(c). Show, by means of equations, how two of the following conversions may be effected. Give essential experimental conditions only.



(2). Answer all parts (a), (b), and (c)

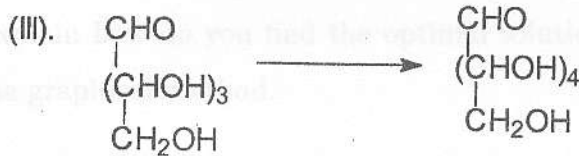
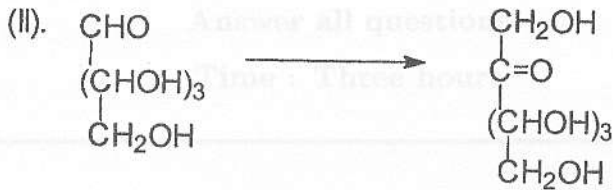
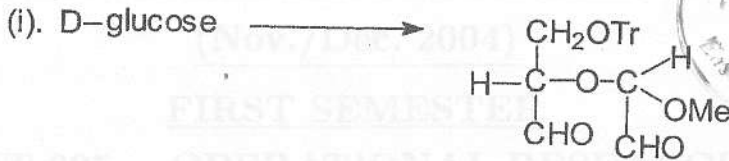
(a). Draw the Fischer projection formulae of Ribose, Arabinose sugars having the D-configuration.

A D(+)-aldopentose **A** ($\text{C}_5\text{H}_{10}\text{O}_5$) on treatment with sodium borohydride (NaBH_4) gives an optically active compound **B** ($\text{C}_5\text{H}_{12}\text{O}_5$). Treatment of **A** with bromine water gives **C** ($\text{C}_5\text{H}_{10}\text{O}_6$), which when heated with concentrated ammonia gives **D** ($\text{C}_5\text{H}_{11}\text{NO}_5$). Treatment of **D** with bromine in sodium hydroxide gives **E** ($\text{C}_4\text{H}_8\text{O}_4$), which reacts with sodium borohydride giving an optically inactive compound **F** ($\text{C}_4\text{H}_{10}\text{O}_4$). Deduce the structures of the compounds **A**, **B**, **C**, **D**, **E** and **F**. By means of equations Show how the compound **A** could be converted to D (+)-fructose.

(b). (i). Give three names and draw the structures of reducing disaccharides and indicate the types of linkage in them.

(ii). Explain why D-glucose and D-fructose are classified as reducing sugars. Draw and explain the structure of a non-reducing sugar.

(c). By means of equations show how two of the following conversions may be effected. Give essential experimental conditions only.



A plant manufactures two products A and B. The profit contribution of each product has been estimated as Rs 20 for product A and Rs 24 for product B. Each product passes through three departments of the plant. The time required for each product and total time available in each department are as follows:

Department	Hours required		Available hours during the month
	Product A	Product B	
1	2	3	1500
2	3	2	1500
3	1	1	800

The company has a contract to supply at most 250 units of product B per month. Formulate the problem of finding a monthly production schedule that maximizes the total profit as a linear programming model and find the optimal solution by using graph.