



RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES

B.Sc. (General / Honours) Degree

Third Year Semester I Examination – September / October 2019

CHE 3209 – NATURAL PRODUCTS

Answer any four (04) questions.

Time: 02 hours

1. (a). Briefly describe the importance of natural products in drug discovery (30 marks)

(b). How many stereoisomers can be present for the following monosaccharides?

Draw all possible structures.

i. Aldo-pentose

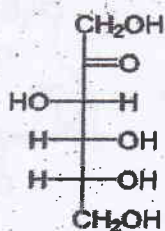
ii. Keto-pentose

(20 marks)

(c). Write mechanisms for the followings:

i. Cyclic hemiacetal formation reaction of D- fructose to D-fructofuranose

ii. Conversion of  $\alpha$ - D- fructofuranose to  $\beta$  - D- fructofuranose.



D- Fructose

(30 marks)

(d). Give the structure of the each product when D- Fructose is treated with following reagents.

i.  $\text{HNO}_3 / \text{H}_2\text{O} / \Delta$

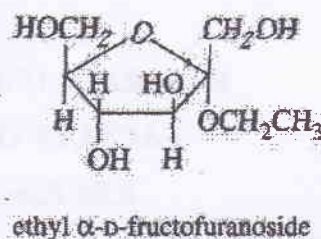
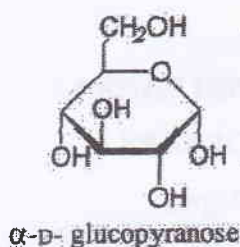
ii.  $\text{PhNHNH}_2$

iii.  $\text{C}_2\text{H}_5\text{SH} / \text{Conc. HCl}$

iv.  $\text{HIO}_4$  (excess)

(20 marks)

2. (a).  $\alpha$ -D-Glucopyranose reacts with  $\text{Ag}(\text{NH}_3)_2^+\text{OH}^-$ , but Ethyl- $\alpha$ -D-fructofuranoside does not react. Explain.

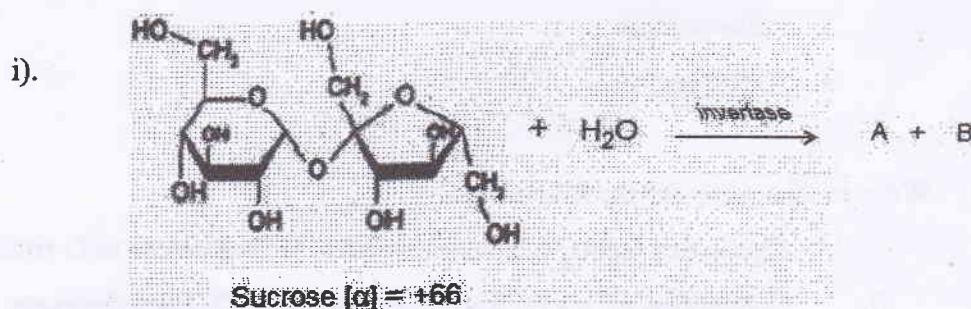


(25 marks)

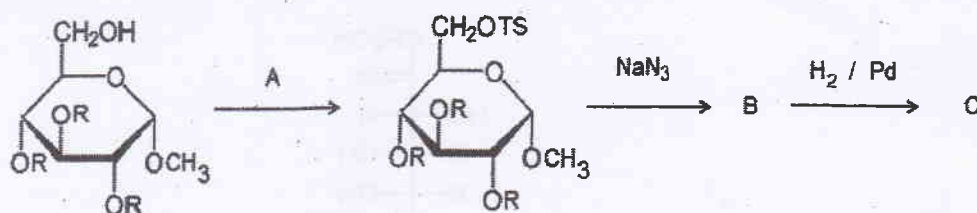
- (b) The periodic acid cleavage of a monosaccharide produced 3 moles of  $\text{HCOOH}$ , 2 moles of  $\text{HCHO}$  and 1 mole of  $\text{CO}_2$ . Identify the relevant carbon atom of the monosaccharide from which each product derived and determine the structure of the monosaccharide. Write the name of the relevant monosaccharide.

(25 marks)

- (c) Identify the reaction medium / intermediate and products A, B and C and complete the following reactions.

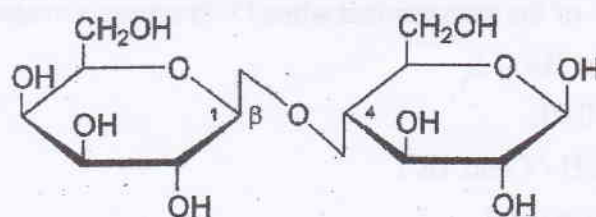


ii).



(30 marks)

- (d) Write the reaction mechanism and identify the products when Lactose is subjected to Hakomori Methylation followed by acid hydrolysis ( $\text{H}^+$ ) and then treated with  $\text{NaBH}_4$ .

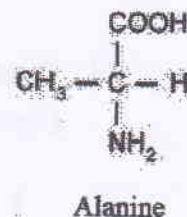
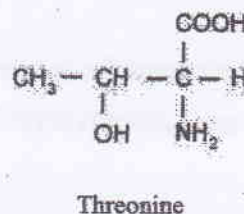
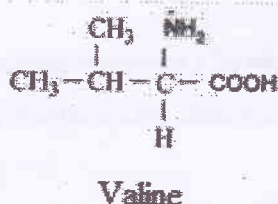
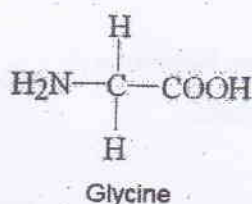


Lactose

(20 marks)

3. (a) Write a short note on "Analysis of Amino acid Composition" (25 marks)

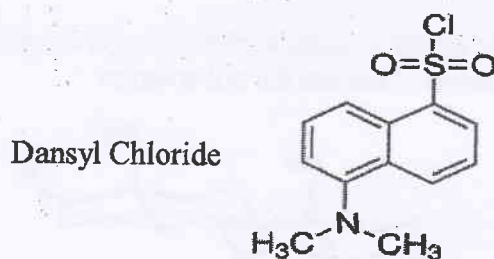
(b) Write down the structures of the tetrapeptide, Thre-Val-Gly-Ala.



(20 marks)

(c) Write the reactions and the structures of all products when the above tetrapeptide (b) is treated with following reagents during structure determination.

i. Reaction with Dansyl Chloride followed by acid hydrolysis.



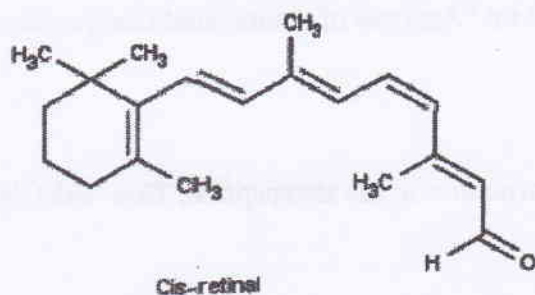
ii. Anhydrous  $\text{NH}_2\text{NH}_2$  followed by  $\text{LiBH}_4 / \text{HCl}$

(30 marks)

(d) Write a short account on isolation and classification of terpenoids

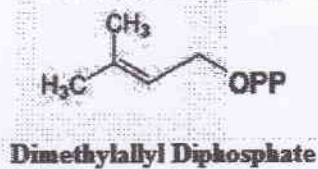
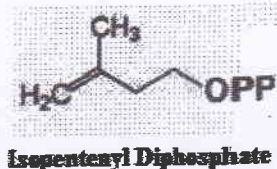
(25 marks)

4. (a) Discuss the importance of cis-retinal and its transformation to trans-retinal



(25 marks)

- (b). Propose a mechanism for the synthesis of Limonene starting from Isopentenyl Diphosphate and Dimethylallyl Diphosphate via Linalyl diphosphate

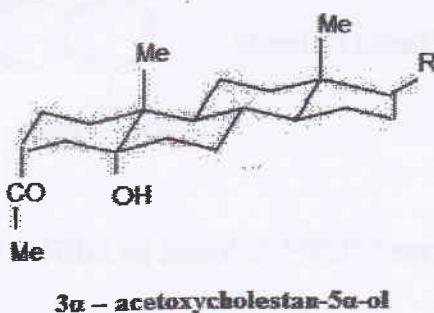


(20 marks)

- (c). Write a brief account on Corticosteroids

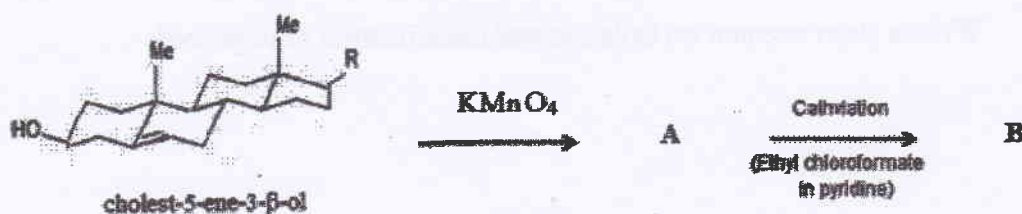
(15 marks)

- (d) Alkalyne hydrolysis of 3 $\alpha$  - acetoxycholestan-5 $\alpha$ -ol proceeds faster than that of corresponding 3  $\beta$  isomer. Discuss the observation.



(20 marks)

- (e). Identify A, B and complete the following reaction



(20 marks)



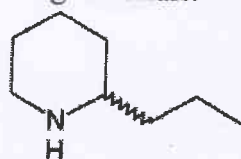
5. (a) Write a short note on traditional classification of alkaloids

(20 marks)

- (b) Write a short note on extraction of alkaloids from natural sources

(20 marks)

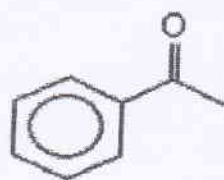
- (c) Coniine is a poisonous alkaloid found in poison hemlock (*Conium maculatum*). Describe the mechanism of synthesis of coniine considering acetaldehyde and 2-methylpyridine as the starting materials.



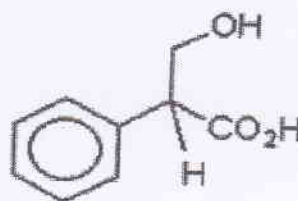
Coniine

(20 marks)

- (d) Describe the synthetic pathway of tropic acid considering the acetophenone as the starting material



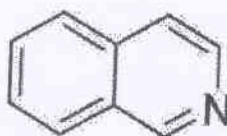
Acetophenone



Tropic acid

(20 marks)

- (e) Describe the Hoffman exhaustive methylation of isoquinoline.



Isoquinoline

(20 marks)

===== END =====