

(iii) Killiani-Fischer synthesis

(iv) Friedlander synthesis of Quinoline

(b) Write the structure of Glyceryl trioleate. Give the products obtained on its hydrolysis and hydrogenation. (4,4,4,3)

[This question paper contains 8 printed pages.]

Your Roll No.....

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Name of the Paper : DSC: Carbohydrates, Lipids
and Heterocyclic Compounds

Name of the Course : B.Sc. (Hons)

Semester : IV

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt six questions in all.
3. All questions carry equal marks.

1. (a) Compound A, $C_6H_{12}O_6$, a monosaccharide reacts with HCN followed by acid hydrolysis to give B, $C_7H_{14}O_8$ (a hydroxy acid). B on reduction with HI/P gives 2-Methylhexanoic acid. Identify A and B. Give complete sequence of reaction with structures. What inference can be drawn from above sequence.
- (b) Write open chain structure for the aldarc acid obtained by Nitric acid oxidation of D-(+)-Mannose. Is the product optically active? Explain with the help of structure.
- (c) What are epimers and anomers? Suggest a method to convert D-(+)-Glucose to D-(+)-Mannose.
- (d) Explain Mutarotation taking Glucose as an example. (4,4,4,3)
2. (a) Draw conformational structures of α -D-(+)-Glucopyranose and β -D-(+)-Glucopyranose. Which of the two is more stable, give reason.

- (iii) Furan on heating with Maleic anhydride
- (iv) Thiophene on hydrogenation in presence of Raney Ni
- (v) Indole reacts with $CH_3COCl/SnCl_4$
- (vi) Quinoline reacts with conc. H_2SO_4 at $220^\circ C$
- (b) Quinoline on oxidation with $KMnO_4$ gives a dicarboxylic acid A ($C_7H_5O_4N$). A on heating with Se/H_2SO_4 undergoes selective decarboxylation to give B which on further treatment with PCl_5 and NH_3 gives C. C on Hoffmann bromamide reaction gives 3-Aminopyridine. Complete the sequence of reaction giving structures of A, B and C. (6×2,3)
8. (a) Write short notes on (Any three) :
 - (i) Hantzsch synthesis for Pyrrole
 - (ii) Fischer Indole synthesis

6. (a) Define acid value and iodine value of oils and fats. Give their significance.
- (b) In Skraup synthesis, violent reaction occurs when Aniline reacts with glycerol and conc. sulfuric acid in the presence of Nitrobenzene. Give the reaction and its mechanism. What is the role of Nitrobenzene in this reaction. How can this reaction be controlled.
- (c) Explain why Pyridine is more basic than Pyrrole but less basic than aliphatic amine.
- (d) Give one example each of ω - 3 & ω - 6 fatty acids with their structures. (4,4,4,3)
7. (a) Write the complete reaction and the product formed :
- (i) 2,5-Hexadione is heated with NH_3
- (ii) Pyrrole is reacted with Benzenediazonium chloride in presence of dil. alkali

- (b) Explain Amadori rearrangement for the formation of Glucosazone from D-Glucose.
- (c) How the ring size of Glucose was confirmed as pyranose ring with periodic acid method? Justify your answer.
- (d) Why D-(-)-Fructose inspite of having a ketonic functional group gives positive test with Fehling's solution? Give the relevant reaction. (4,4,4,3)
3. (a) How will you convert Pyrrole into 3-Chloropyridine? Give the reaction and the mechanism involved.
- (b) Arrange the following compounds in increasing order of aromaticity. Draw the relevant resonating structures and explain.
- Furan, Thiophene. Pyrrole
- (c) Carry out the following conversions :
- (i) Pyridine to 3-Aminopyridine

(ii) Pyrrole to N-Methyl pyrrole

(d) What happens when Quinoline reacts with sodamide in presence of ammonia followed by hydrolysis. What type of reaction is it.

(4,4,4,3)

4. (a) Pyrrole can act as a weak acid as well as a weak base. Give reason and reaction of Pyrrole with a strong acid and a strong base.

(b) Pyridine undergoes Nucleophilic substitution reaction preferably at C-2 position. Show the attack of nucleophile to justify the above statement.

(c) Electrophilic substitution in Indole occurs in the pyrrole ring but in Quinoline, benzene ring is more reactive towards electrophilic substitution. Give reason.

(d) What are phospholipids? Give one example and their biological importance. (4,4,4,3)

5. (a) Explain why Maltose reduces Fehling's solution. What are the products formed on hydrolysis of Maltose. Write down the Haworth projection of the hydrolysis product. What type of linkage is present in Maltose.

(b) What happens when Lactose reacts with

(i) $\text{HCl}/\text{H}_2\text{O}$

(ii) $\text{CH}_3\text{OH}/\text{HCl}$

Give the chemical reactions involved in both.

(c) Answer the following :

(i) What is invert sugar? How is it formed?

(ii) Give Haworth projection of Sucrose. Also give its systematic name.

(d) What are polysaccharides? Give two differences between starch and cellulose? (4,4,4,3)