(b) Friedlander synthesis for Quinoline

(c) Hantzsch synthesis for pyrrole

(d) Doebner-Miller synthesis of quinoline (5,5,5)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5586 **J**

Unique Paper Code : 2172012402

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

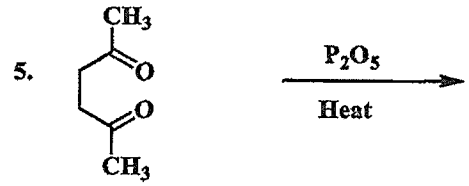
Instructions for Candidates

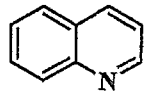
1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **six** questions in all.
3. **All** questions carry equal marks.

1. (a) An aldopentose(**A**) gives an optically active aldaric acid (**B**). (**A**) on Ruffs degradation gives an aldotetrose (**C**) which can be oxidised to an optically inactive aldaric acid (**D**). Give the reactions involved, structure and names of (**A**) (**B**) (**C**) and (**D**).

(b) When crystals of pure α - D-glucose are dissolved in water, the specific rotation gradually changes from + 112.2 to + 52.7. When crystals of pure β-D-glucose are dissolved in water, the specific rotation gradually changes from + 18.7 to + 52.7. Name the phenomena involved and discuss its mechanism. Explain why this phenomenon is faster in 2-hydroxypyridine as compared to that in a mixture of phenol and pyridine.

(c) Convert D-arabinose to D-glucose & D-mannose. Name the reaction involved in it. (5,5,5)

5. 

6 

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(b) How will you carry out the following conversions?

(i) 3-Bromopyridine from pyridine

(ii) Thiophane from acetylene

(iii) Piperidine from pyridine

(iv) Furfural from furan (1×7,2×4)

8. Write short notes on (**Any three**) :

(a) Paal-Knorr synthesis for thiophene

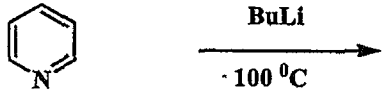
(b) How will you synthesise quinoline by Skraup synthesis? Explain with the help of a suitable mechanism.

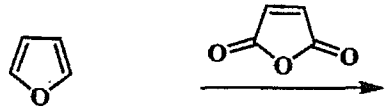
(c) Explain the following :

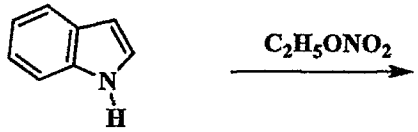
(i) Compare pyrrole and pyridine based on basicity.

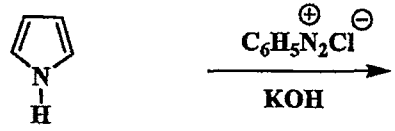
(ii) Discuss the aromaticity of thiophene and compared it with benzene. (5,5,2.5×2)

7. (a) Complete the following reactions :

1. 

2. 

3. 

4 

2. (a) Explain Inter-conversion of D-glucose, D-mannose and D-fructose in a basic solution.

(b) Give Haworth proof (using Fisher Projection) for cyclic structure of D-glucose.

(c) Carry out the following conversions (give complete reaction involved in it) :

(i) D-glucose to n-hexane

(ii) D-glucose to sorbitol

(iii) D-fructose to 2-methyl hexanoic acid

(5,5,5)

3. (a) An unknown disaccharide gives a positive Tollens' test. A glycosidase hydrolyses it to D-galactose and D-glucose. When the disaccharide is treated with methyl iodide (excess) and Ag_2O and then hydrolysed with dilute HCl, the products are 2,3,4,6-tetra-O-methylgalactose and 2,3,6-tri-O-methylglucose. Give structure and name of the disaccharide. Give complete reaction.

P.T.O.

(b) Compare the structure of sucrose & maltose based on composition, reducing nature, type of bonding, nature of anomeric carbon.

(c) What are polysaccharides? Give two differences between starch and cellulose based on monosaccharide units present & glycosidic linkage? Write the Haworth projection of cellulose.

(5,5,5)

4. (a) Define Iodine value of an oil. Draw the structure of glyceryl trioleate and calculate its iodine value.

(b) What are glycolipids? Write the structure of a glycolipid derived from one molecule each of spingosine, palmitic acid and α-D-glucose.

(c) Differentiate between :

(i) fats and oils

(ii) ω - 3 & ω - 6 fatty acids (give example)

(5,5,5)

5. (a) Explain electrophilic substitution in quinoline takes place more readily at the benzene ring rather than the pyridine ring. At which position electrophilic substitution take place.

(b) Explain Why is pyridine more reactive towards nucleophilic substitution compared to benzene? What product forms when pyridine reacts with sodamide? Explain using chemical reactions.

(c) Explain the following :

(i) Why nitration and sulphonation reactions of furan are carried out under mild conditions.

(ii) Why pyridine does not show Friedel-Craft reactions. (5,5,2.5×2)

6. (a) Arrange pyrrole, furan and thiophene in order of their reactivity towards electrophilic substitution reactions. Explain and justify by drawing suitable structures.