[This question paper contains 8 printed pages.]

Your Roll No......

Sr. No. of Question Paper : 1369

Unique Paper Code : 32171402

Name of the Paper : Organic Chemistry – III, Heterocyclic Chemistry

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

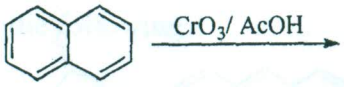
Semester : IV

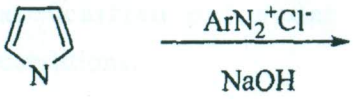
Duration : 3 Hours 30 Mins Maximum Marks : 75

Instructions for Candidates

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

1. (a) Complete the following reactions :

(i) 

(ii) 

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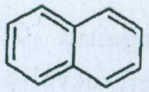
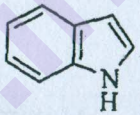
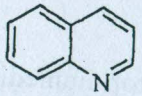
(iii)  $\xrightarrow{H_2, Ni}$

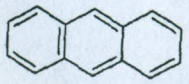
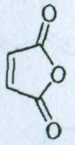
(iv)  $\xrightarrow{Na/\ C_2H_5OH}$

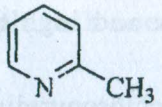
(v)  $\xrightarrow[Pyridine]{SO_3}$

(vi)  $\xrightarrow{Alk.\ KMnO_4}$

(vii) $CH_3CH_2CN \xrightarrow{C_2H_5O^-}$

(viii) $CH_3NC \xrightarrow[2.\ H_2O,\ H^+]{1.\ CH_3MgBr}$

(ix)  +  $\xrightarrow{Heat}$

(x)  $\xrightarrow[NaOH]{CH_3CHO}$

(b) Explain the order of basicity of following anilines :

$PhNH_2$, p-$NO_2C_6H_4NH_2$, m-$NO_2C_6H_4$ NH_2, p-$CH_3OC_6H_4NH_2$ (10,2.5)

2. (a) How will you carry out following conversions :

(i) Quinoline to 8-Hydroxyquinoline

(ii) Naphthalene to 1 -Naphthoic acid

(iii) β-Picoline to 3-Aminopyridine

(b) Give the Gabriel phthalimide synthesis and explain why neopentylamine and aniline cannot be prepared by it. (9,3.5)

3. (a) Explain the following :

(i) Nitration and sulphonation reaction of furan are carried out under mild reaction conditions.

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(ii) Sulphonation of naphthalene gives different products at low and high temperatures.

(iii) Formation of 3-chloropyridine when pyrrole is heated with chloroform in presence of KOH.

(b) Discuss the advantages of Emde's modification over Exhaustive methylation using suitable example? (9,3.5)

4. (a) Explain the following :

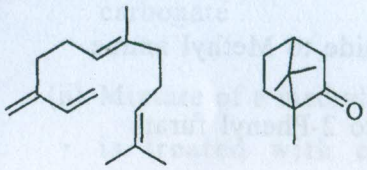
(i) Pyridine undergoes nucleophilic sub reactions at C-2 or C-4. Explain.

(ii) Phenanthrene undergoes electrophilic substitution as well as addition reactions preferentially at C-9 and C-10 positions. Explain with the help of examples.

(iii) Order of aromatic character: Pyrrole, furan, thiophene.

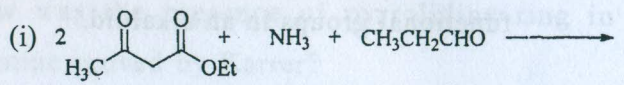
(b) Define 'Isoprene rule'. Mark out the isoprene units

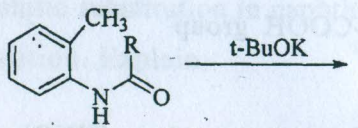
with dotted lines and mention the class of terpenes to which each one belongs to :



(9,3.5)

5. (a) Identify the product,reaction name and suggest the mechanism for the following reaction :

(i) 

(ii) 

(c) How are primary, secondary and tertiary amines distinguished using Hinsberg test ? Give the relevant chemical reactions. (9,3.5)

6. (a) Suggest the best suitable reagent to bring out the following conversions :

(i) Pyrrole to pyrrole-2-aldehyde

(ii) Pyridine to n-Pentane

(iii) Acetamide to Methyl amine

(iv) Furan to 2-Phenyl furan

(b) How will you synthesize 2-Methyl quinoline by Skraup synthesis? Explain with the help of mechanism.

(c) How will you show the presence of the following functional groups in an alkaloid.

(i) O- Methyl group

(ii) -COOH group (4,5,3.5)

7. (a) Write short note on **(any TWO)** :

(i) Reduction of nitrobenzene

(ii) Mannich Reaction

(iii) Pomeranz-Fritsch reaction

(b) Explain how can we synthesize 2,3,4,5-tetramethyl furan starting from acetoacetic ester. (8,4.5)

8. (a) What happens when

(i) Citral is treated with aq. Potassium carbonate

(ii) Mixture of a methylamine and chloroform is treated with ethanolic potassium hydroxide

(iii) Anthracene is treated with bromine in carbon tetrachloride.

(b) How was the presence of pyrrolidine ring in nicotine proved by Karrer?

(c) Electrophilic substitution in naphthalene is favored at 1 -position. Explain. (6,3,3.5)

9. (a) N-Ethyl-N-methylamine is chiral but non-resolvable however 2-aminobutane is resolvable. Explain.

(b) Explain how the presence of two benzene rings fused together was confirmed in case of naphthalene.

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(c) Diazo coupling takes place either in mild acidic medium or mild alkaline conditions. Explain.

(d) Pyrrole behaves like phenol. Justify the statement using suitable examples. (3,3,3,3.5)