LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

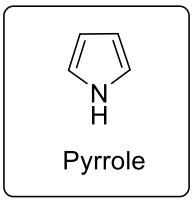
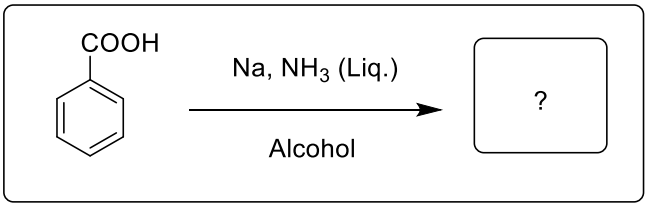
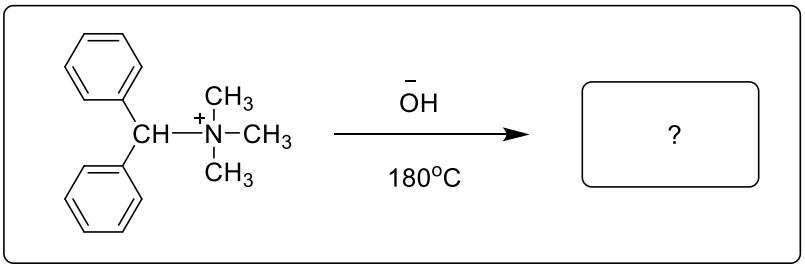
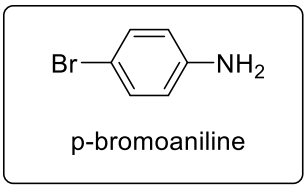
SIXTH SEMESTER – **JULY 2025**

UCH 6503 – SYNTHETIC ORGANIC CHEMISTRY AND HETEROCYCLIC COMPOUNDS

Date: 11-07-2025 Dept. No. Max. : 100 Marks

Time: 10:00 AM - 01:00 PM

	SECTION A - K1 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
1.	**Fill in the blanks**	
a)	In the retrosynthetic approach, the molecule to be synthesized is called _____.	
b)	Reduction of carbonyl compounds with hydrazine to give alkane is called _____ reduction.	
c)	The method of preparation of cyclic compounds using diene and dienophile combination is called _____ reactions.	
d)	For the aromaticity, the structure of pyridine is completely analogous to that of _____.	
e)	Indole contains _____ as a heteroatom.	
2.	**True or False**	
a)	Synthons are idealized molecules.	
b)	$LiAlH_4$ and $NaBH_4$ are chemoselective reducing agents.	
c)	Sigmatropic reactions involve transfer of proton from more substituted carbon to less substituted carbon.	
d)	Piperidine obeys (4n+2) π-electron rule and hence it is aromatic.	
e)	Isoquinoline resembles quinoline except the position of nitrogen in the ring.	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**Match the following**	
a)	Disconnection approach - five and six membered fused heterocyclic ring system	
b)	Clemmensen reaction - five membered heterocyclic aromatic compound	
c)	Frontier molecular approach - an imaginary bond cleavage for retrosynthesis	
d)	Pyrrole - thermal & photochemical reaction theory	
e)	Benzothiophene - reduction of carbonyl compounds into hydrocarbons	
4.	**Define the following**	
a)	Retrosynthesis	
b)	Heterogeneous catalyst	
c)	Group transfer reaction	
d)	Saturated heterocyclic compounds	
e)	Isoindole	
	SECTION B - K3 (CO2)	
Answer any TWO of the following		**(2 x 10 = 20)**
5.	Explain the following terms used in retrosynthesis. (a) Activating group (b) Bridging elements.	(5+5)
6.	List the applications of (a) NBS (b) SeO_2	(5+5)
7.	Explain Cope and oxy-Cope rearrangement reactions with example.	(10)

8.	a) Inspect the aromaticity of the following molecule.  b) Write the method of preparation of indole.	(5) (5)
	SECTION C – K4 (CO3)	
Answer any TWO of the following		**(2 x 10 = 20)**
9.	a) Describe the art of retrosynthesis to the molecule 2,4-dichlorophenoxyacetic acid. b) Elaborate the mechanism of DMSO with oxalyl chloride in oxidation of alcohols.	(5) (5)
10.	a) Find the name of the reaction and write the mechanism for the following reaction.  b) Produce any three oxidation applications of peracids.	(5) (5)
11.	a) Formulate the product in the following reaction and write the reaction mechanism.  b) Describe any three methods of preparations of tetrahydrofuran.	(5) (5)
12.	Write the preparation of pyridine by ring closure reaction and its electrophilic substitution reactions.	
	SECTION D – K5 (CO4)	
Answer any ONE of the following		**(1 x 20 = 20)**
13.	a) i) Explain the protecting group strategy in organic synthesis. ii) Discuss the regiospecific control elements with example. b) Develop a note for the hydroboration-oxidation reactions. c) Elaborate Claisen rearrangement with example.	(5+5) (5) (5)
14.	a) Explain Diels-Alder reaction with examples. b) Write the electrophilic and nucleophilic reactions of quinoline. c) Demonstrate the ring closure method of preparation of benzofuran.	(5) (10) (5)
	SECTION E – K6 (CO5)	
Answer any ONE of the following		**(1 x 20 = 20)**
15.	a) How to synthesis the following organic compound using retrosynthetic approach.  b) List the applications of organoboron reagents in C-C bond synthesis. c) Write short notes on of [3,3]- and [5,5]-sigmatropic rearrangement reactions with example.	(5) (5) (10)
16.	a) Summarise the methods of preparation and electrophilic and nucleophilic reactions of furan. b) List the various methods of preparation and properties of isoquinoline.	(10+10)
