22CHP101N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

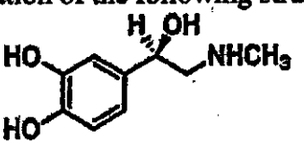
MSc DEGREE EXAMINATION MAY 2025
(First Semester)

Branch - **CHEMISTRY**

ORGANIC REACTION MECHANISM AND STEREOCHEMISTRY

Time: Three Hours Maximum: 75 Marks

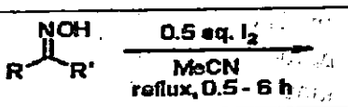
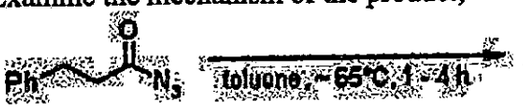
SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	According to the Lewis concept, which of the following is an acid? a) NH_3 b) OH^- c) $AlCl_3$ d) CH_4	K1	CO1
	2	In the solvolysis of 2-chloro-2-methyl butane, the rate of the reaction decreases when hydrogen atom is replaced by deuterium atom. The effect is due to a) primary isotopic effect b) secondary isotopic effect c) kinetic salt effect d) inverted isotopic effects	K2	CO1
2	3	Tropylium ion is an a) aromatic anion b) aromatic cation c) free radical d) neutral molecule	K1	CO2
	4	According to Craig's rule, which of the following factors is most important in determining the stability of a conjugated system? a) The number of π-electrons b) The presence of non-bonding electrons c) The molecular symmetry and delocalization of charge d) The number of carbon atoms in the ring	K2	CO2
3	5	The mechanism of Reimer-Tiemann reaction involves the formation of reactive intermediate a) Carbene b) Carbocation c) Free radical d) Carbanion	K1	CO3
	6	The meta directing and deactivating group in aromatic electrophilic substitution among the following a) -Cl b) $-NO_2$ c) -OH d) $-OCH_3$	K2	CO3
4	7	In which medium Favorskii rearrangement occurs? a) Neutral b) Acidic c) Basic d) Alkaline	K1	CO4
	8	In the Curtius rearrangement, why is the formation of an isocyanate intermediate essential for the reaction mechanism? a) The isocyanate acts as a nucleophile, leading to amide formation. b) The isocyanate undergoes hydrolysis to yield an amine. c) The isocyanate intermediate stabilizes the transition state, preventing side reactions. d) The isocyanate promotes the formation of a stable carbocation.	K2	CO4
5	9	What is the configuration of the following structure?  a) 2R b) 2S c) 1R d) 1S	K1	CO5
	10	How many conformations possible for trans-decal-2-ol? a) 2 b) 3 c) 4 d) 5	K2	CO5

Cont...

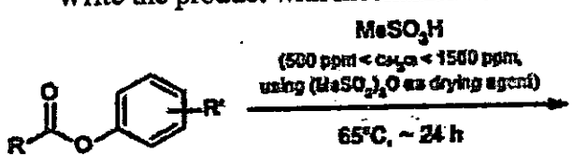
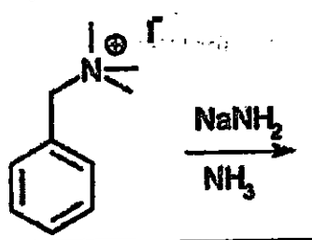
SECTION - B (35 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Construct the Hammond postulate in a detailed manner.	K3	CO1
		(OR)		
	11.b.	Organize a systematic discussion on the primary and secondary kinetic isotopic effects.		
2	12.a.	Apply the Craig's rule to determine the aromaticity.	K3	CO2
		(OR)		
	12.b.	Draw and explain the use of the Frost and Musulin diagram in aromaticity.		
3	13.a.	Analyze the mechanism of Friedel-Craft alkylation and acylation reactions.	K4	CO3
		(OR)		
	13.b.	Examine and explicate the mechanism of Hofmann-Martius reaction.		
4	14.a.	Analyze the product's mechanism, 	K4	CO4
		(OR)		
	14.b.	Examine the mechanism of the product, 		
5	15.a.	Explain the diastereoisomerism in acyclic and cyclic systems with examples.	K5	CO5
		(OR)		
	15.b.	Interpret the stereospecific and stereo selective synthesis with examples.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Derive the following, a) Hammett equation b) Taft equation	K4	CO1
2	17	Compare the aromaticity of azulene and annulenes.	K4	CO2
3	18	Examine the structure, generation and reactions of carbenes.	K4	CO3
4	19	Write the product with mechanism of the following, a)  b) 	K5	CO4
5	20	Discuss the stereochemistry of sulphur and nitrogen compounds.	K5	CO5

Z-Z-Z END