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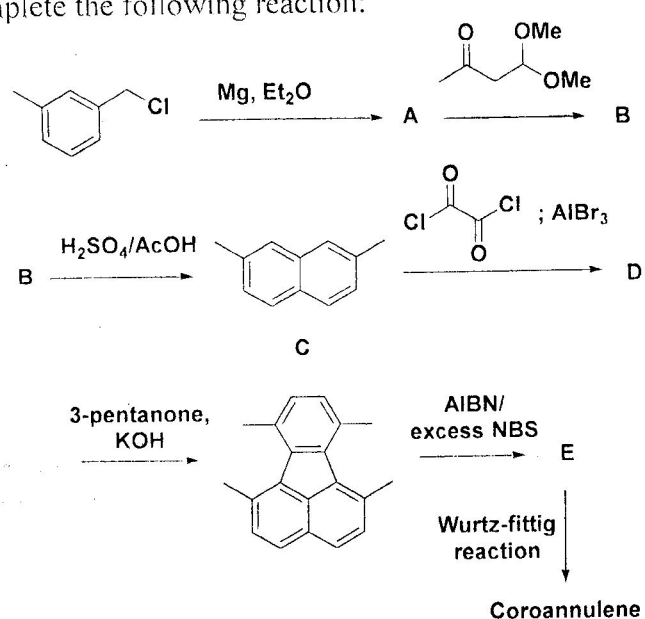
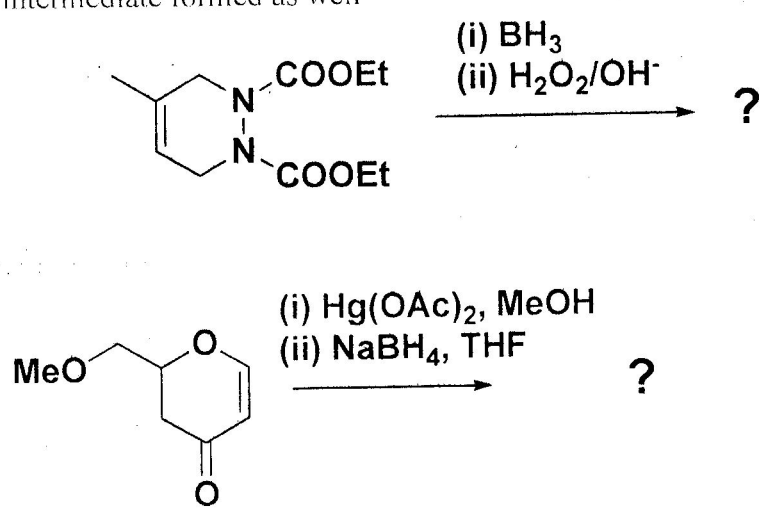
Jamia Hamdard
Department of Chemistry
School of Chemical & Life Sciences
M.Sc. Chemistry
Semester-II Examination 2025
Paper Title: Organic Synthesis II
Paper Code: MCHCC-202

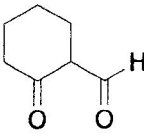
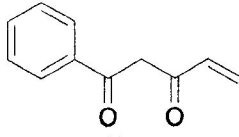
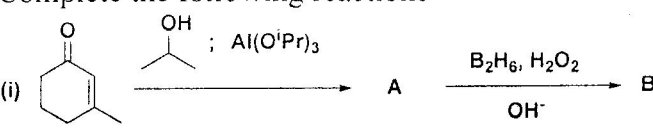
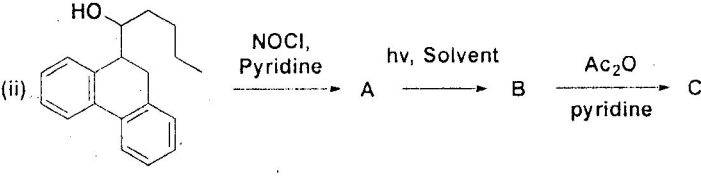
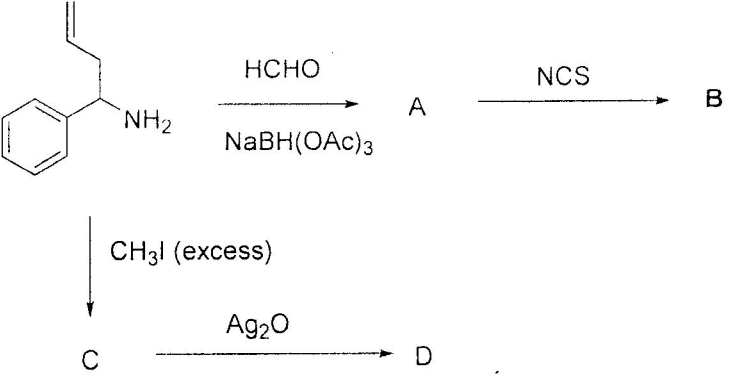
Time: 2 ½ hours

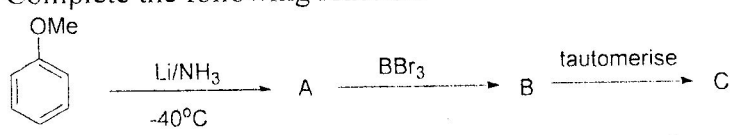
Maximum Marks: 60

Abbreviations Used: CLO- Course Outcome, PLO- Program Outcome, BTL- Bloom Taxonomy Level:
BT level 1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create.

Q. No.		BTL	CLO	PLO
SECTION A				
Very Short Type Questions (Attempt any ten):		(1.5x10=15 marks)		
A1	Which mechanism (E_1/E_2) is favoured by a strong, bulky base?	2	2	1-2
A2	What is an arenium ion intermediate? Draw its general structure.	2	2	1-2
A3	What is meant by 'ipso attack' in aromatic substitution?	1	2	2
A4	Give the reagents used in the Vilsmeier reaction.	2	2	3
A5	What is a free radical? Give an example.	1	1-2	1-2
A6	What does NBS stand for and what is its primary use?	2	3	3
A7	Briefly explain the Role of geminal dihalide in the generation of carbene.	1	2	2
A8	State the Sandmeyer reaction.	1	2	3
A9	What is hydroboration?	1	1-2	1-2
A10	Define Michael reaction.	2	2-3	2-3
A11	What type of reagent is a Grignard reagent? Give its general formula.	1	1-2	1-2
A12	What is the characteristic feature of a Wittig reaction?	2	2-3	3
A13	Define E_2 elimination reaction.	2	3	2-3
A14	State Saytzeff's rule for elimination reactions.	2	1-2	1-2
A15	What is pyrolytic elimination?	1	1-2	2
SECTION B				
Long Type Questions (Attempt any two out of four):		(10x2=20 marks)		
B1	Derive and explain the Hammett equation to explain the nucleophilic /electrophilic behaviour of a reaction. (b) Differentiate between (i) thermodynamically controlled Vs Kinetically controlled reaction; (ii) Stereospecific and Stereoselective reaction	3	1-3	1-3
B2	Describe the mechanism of free radical halogenation of an alkane (e.g., propane).	4-6	2-6	4-6

	Complete the following reaction: 			
B3	a. Discuss the mechanism and stereochemistry (syn/anti) of addition of Br_2 to (<i>E</i>)-2-butene. b. Draw the structures of reactants, intermediates, and products. c. (c) Explain hydroboration-oxidation, predicting the product for 1-methylcyclohexene.	3-4	3-5	3-5
B4	a. Compare and contrast the E_2 and E_1 mechanisms, focusing on kinetics, stereochemistry (anti-periplanar requirement for E_2), and orientation (Saytzeff vs Hofmann). b. (b) Predict the major product for the E_2 elimination of 2-bromo-3-methylbutane with ethoxide.	4-5	3-6	3-6
SECTION C				
Short Type Questions (Attempt all Questions):		(5x5=25 marks)		
C1	Complete the following reaction and draw the structure of intermediate formed as well 	3-5	4-5	4-5

	Or Suggest the product formed on treating (i) and (ii) with case I: $\text{CeCl}_3/\text{NaBH}_4$ Case II: MeMgBr/CuI, Ether  (i)  (ii)			
C2	Discuss the mechanism and stereochemical aspects of electrophilic addition to alkenes (addition of Br_2). Explain Markovnikov's rule with an example. Or Compare and contrast the E1 and E1cB mechanisms, focusing on kinetics, requirement of leaving group acidity (for E1cB), and substrate structure effects. Provide an example reaction for each mechanism.	3	4	3-4
C3	Define Cram's Rule and Felkin-Ahn model. Which model will be applicable for explaining the stereochemistry of the product formed in the reduction given below:  Or Complete the following reactions (i)  A (ii)  A	4-6	4	4-5
C4	Complete the following reaction:  A Also, suggest an alternative reagent for the conversion of C to D	3-4	2-3	3-5

	Or Complete the following reaction:  Also, suggest the product obtained on treating C under Luche's reduction conditions			
C5	Write a Short note on (a) Mukaiyama aldol (b) Barton decarboxylation Or Write a Short note on (c) Minisci reaction (d) Benzoin Condensation	5-6	3-6	4-6