LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

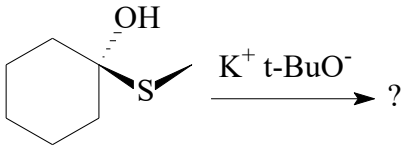
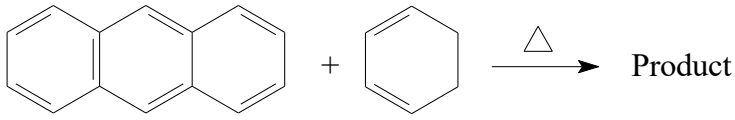
M.Sc. DEGREE EXAMINATION – **CHEMISTRY**

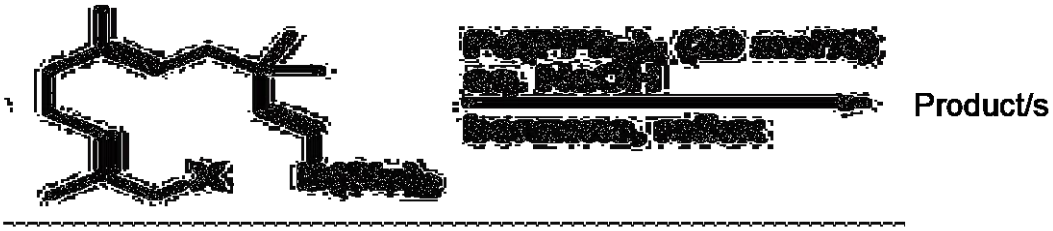
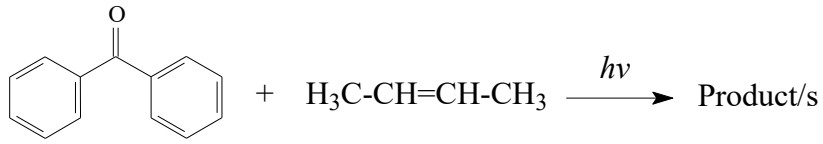
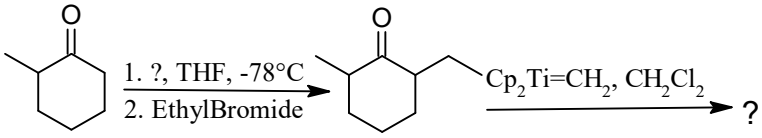
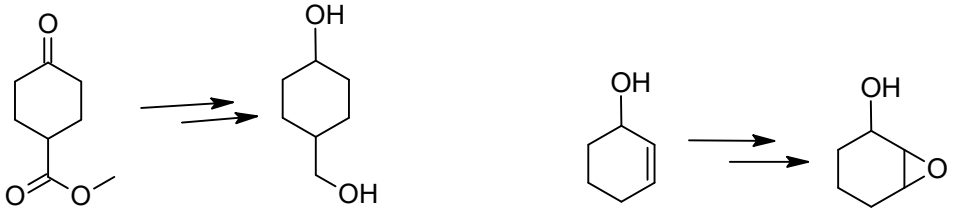
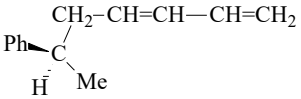
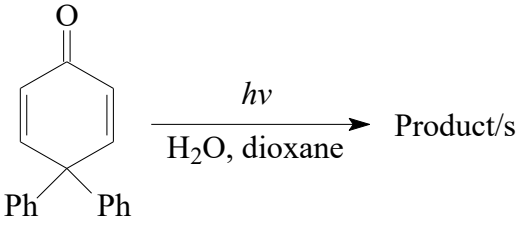
FOURTH SEMESTER – **APRIL 2025**

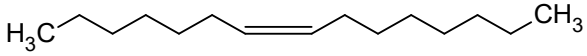
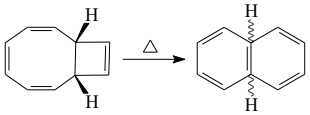
PCH4MC01 – ORGANIC SYNTHESIS AND PHOTOCHEMISTRY

Date: 23-04-2025 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

	SECTION A – K1 (CO1)	
	Answer ALL the questions	**(5 x 1 = 5)**
1	**Answer the following**	
a)	N-Bromosuccinimide is a selective reagent for_____ bromination reaction.	
b)	Ugi reaction is a _____reaction.	
c)	FGT stands for _____.	
d)	Illustrate cheletropic reaction.	
e)	Write the sensitizers processes in photochemistry.	
	SECTION A – K2 (CO1)	
	Answer ALL the questions	**(5 x 1 = 5)**
2	**Answer the following**	
a)	Mention the significance of Meisenheimer complex.	
b)	Predict the product in the given reaction. 	
c)	Differentiate between synthon and synthetic equivalent.	
d)	Predict the product in the following reaction. 	
e)	Mention the types of photoquenching process.	
	SECTION B – K3 (CO2)	
	Answer any THREE of the following	**(3 x 10 = 30)**
3	a) Compare the nature and basicity of Dimethyl aminopyridine (DMAP), Diazobicyclo[5.4.0]undec-7-ene (DBU) and triethyl amine. b) Analyse the chemoselective aspect of $NaBH_3CN$ with respect to $NaBH_4$.	(5 + 5)
4	Exemplify the utility of the following reactions in synthesis. a) Baylis -Hillmann reaction b) Nef reaction	(5 + 5)

5	Identify and justify the product formation with suitable mechanism. (10) 
6	a) Draw correlation diagram for the electrocyclization of 1,3-butadiene by con rotation. Predict whether the reaction is thermally or photochemically allowed. b) Explain ionic sigmatropic rearrangement reaction with suitable example. (5 + 5)
7	Predict the product for the following reaction and justify with suitable mechanism and evidences.(10) 
	SECTION C – K4 (CO3)
	Answer any TWO of the following **(2 x 12.5 = 25)**
8	a) Identify the reagent and product and rationalize the transformations. (6)  b) Discuss the different types of disconnection approaches adopted in retrosynthetic analysis. (6.5)
9	a) Outline the protection and deprotection strategies in the following conversions. (8) i) ii)  b) Exemplify the utility of the umpolung concept. (4.5)
10	a) Apply Huckel-Mobius approach and explain the selection rule for the [1,5] C shift sigmatropic reaction in the given molecule. (6)  b) Draw the FMO orbital diagram of 1,3,5-hexatriene for thermal electrocyclization. (6.5)
11	a) Predict the product and discuss the photochemistry of the following reaction. (8)  b) What is Norrish type-I reaction? Give an example. (4.5)

	SECTION D – K5 (CO4)	
	Answer any ONE of the following	**(1 x 15 = 15)**
12	a) Investigate the mechanism and application of $NaIO_4$, PCC and m-CPBA with examples.	(6)
	b) Demonstrate the application of Buchwald-Hartwig reaction with mechanism.	(9)
13	a) Draw the correlation diagram for the cycloaddition of 1,3-butadiene and ethylene. Predict whether the reaction is feasible thermally or photochemically.	(6)
	b) Explain the reaction between dichlorocarbene with trans-2-butene in gaseous condition.	(5)
	c) Mention the importance of intersystem crossing in the organic photochemistry.	(4)
	SECTION E – K6 (CO5)	
	Answer any ONE of the following	**(1 x 20 = 20)**
14	a) Suggest a linear and Convergent synthesis for the pheromone musculare.	(10)
		
	b) Discuss the electrocyclization reaction of *E,E*-2,4-hexadiene using PMO approach.	(5)
	c) Explain the mechanism of the following reaction and predict the stereochemistry of the mentioned H atoms in the product.	(5)
		
15	a) Highlight the application of control elements in organic synthesis with examples.	(10)
	b) Explain Norrish type III process in photolysis of 2,2-dimethylcyclohexanone in vapour phase.	(5)
	c) Discuss the mechanism of photoreduction reaction of benzophenone in 2-propanol solvent. Justify the mechanism with suitable evidences.	(5)
