Name:

Enrolment No:

UPES

End Semester Examination, December 2023

Course: Organic reaction mechanism **Semester: VII**

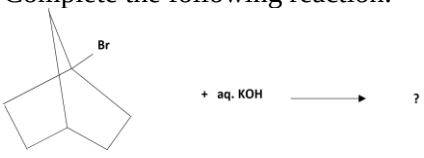
Program: BSc (H) Chemistry with research **Time: 03 hrs.**

Course Code: CHEM4013 **Max. Marks: 100**

Instructions: Read all the below mentioned instructions carefully and follow them strictly:

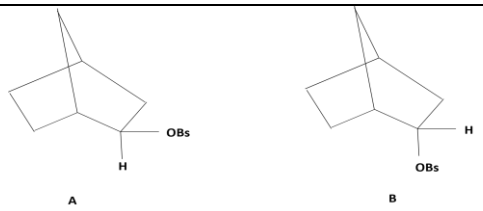
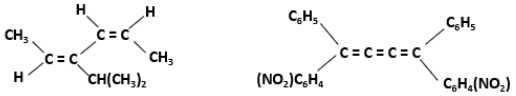
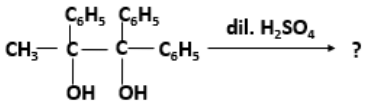
1) Mention Roll No. at the top of the question paper.
2) Do not write anything on the question paper except roll number.
3) Attempt all the parts of a question at one place only.
4) Internal choice is given only in Q 9 and 10.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Suggest a mechanism for the following reaction: $(CH_3)_2C=CH-CH_2Cl + KOH \rightarrow (CH_3)_2C=CH-CH_2OH + (CH_3)_2C(OH)CH=CH_2$ (15 %) (85 %)	**4**	**CO3**
Q 2	Which intermediate is formed during the hydrolysis of mustard gas? How does it impact the rate of reaction?	**4**	**CO2**
Q 3	Carry out following conversions: a. Pyrrole to 3-chloropyridine. b. Phenol to o-hydroxy benzaldehyde.	**4**	**CO1**
Q 4	If dissociation constants of two substituted benzoic acids are $3.1x10^{-3}$ and $4.3x10^{-2}$. Predict which of the two is substituted with electron donating group in it.	**4**	**CO3**
Q 5	Complete the following reaction: 	**4**	**CO2**

SECTION B
(4Qx10M= 40 Marks)
Question nos. 6, 7 and 8 are compulsory; internal choice is given in Q 9.

Q 6	a. Compare the rates of solvolysis of the following compounds:	**5+5**	**CO3, CO2**

	 b. What are long-lived free radicals? The dissociation percentage of central bond of few compounds is given below: **Compound** **Dissociation** 1,2-(diphenyl-p-anisyl) ethane 20 – 25 % 1,2-(tri-o-anisyl) ethane 95 – 100 % 1,2-(phenyl-di-p-biphenyl) ethane 18 % 1,2-(tri-p-biphenyl) ethane 10 % Arrange these compounds in the increasing order of the stabilities of the free radicals generated from them.		
Q 7	a. Which reactive intermediate is analogous to carbenes? Write two reactions where this intermediate is applied, and also name these reactions. b. Write the product of the reaction when o-bromoanisole and m-bromoanisole are individually treated with sodamide. Provide a suitable explanation to your answer.	**5+5**	**CO1**
Q 8	a. Define plane of symmetry. Mention the number of vertical and horizontal planes of symmetry in benzene, cyclopropane and naphthalene. b. Which type of stereoisomerism applies in the following compounds:  Specify in both the compounds at possible positions.	**5+5**	**CO1**
Q 9	Complete the following reaction with mechanism:  Name the reaction and mention its important features also. O**R** What happens when: a. Acetamide is treated with bromine in alkaline medium? b. 2-chloro cyclopentanone is treated with sodium ethoxide? c. Benzyl trimethyl ammonium chloride is treated with sodamide? d. Neo-pentyl alcohol is treated in the presence of concentrated sulfuric acid?	**10**	**CO3**

SECTION-C (2Qx20M=40 Marks) Internal choice is given in Q 10, while Q 11 is compulsory.			
Q 10	a. Discuss the order of stability of various cycloalkane rings. Why is cyclohexane extraordinarily stable despite of the ring strain in it? b. Differentiate decalols and decalones. Compare them on the basis of their stabilities. **OR** Elaborate conformation in following category of molecules: i. Cyclohexanones ii. Substituted cyclohexenes	**10+10**	**CO3**
Q 11	a. Assign D/L and R/S configurations to the following compounds:  b. Write short notes on the following: i. Axial chirality ii. Spiranes	**10+10**	**CO2**