Name:

Enrolment No:

UPES

End Semester Examination, May 2023

Course: Stereochemical approach to organic reaction and mechanism **Semester: II**

Program: MSc Chemistry **Time: 03 hrs.**

Course Code: CHEM7024P **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

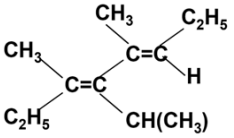
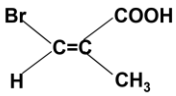
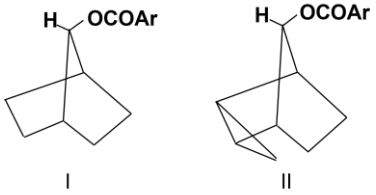
(5Qx4M=20Marks)

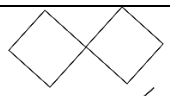
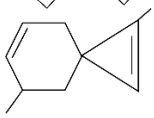
S. No.		Marks	CO
Q 1	During hydrolysis of an ester, which of the two C-O bonds undergoes breaking? Provide scientific support to your answer.	**4**	**CO1**
Q 2	An optically active organic compound is subjected to break in the presence of different solvents. Specify the stereochemistry of the product when reaction is carried out in: i. ethyl alcohol ii. trifluoro acetic acid What is the difference in the mechanism of the reaction operating in two cases?	**4**	**CO2**
Q 3	Write a short note on radical ions. Specify an organic reaction where radical anion is involved as intermediate.	**4**	**CO2**
Q 4	What happens when: a. diazomethane is exposed to sunlight? b. cyclohexene is treated with dibromomethylene carbene?	**2+2**	**CO2**
Q 5	Differentiate singlet and triplet nitrene with example.	**4**	**CO2**

SECTION B

(4Qx10M= 40 Marks)

Question nos. 6, 7 and 8 are compulsory; internal choice is given in Q 9.

Q 6	Distinguish between axis of symmetry and alternating axis of symmetry. Identify all the possible axes of symmetry in the following compounds: a. Benzene b. Trans-dichloroethylene c. Cyclopropane d. Ethylene	**10**	**CO3**
Q 7	a. To which conditions are syn/anti, E/Z and cis/trans isomerism applied? Discuss with examples. b. Specify E/Z nomenclature to the following compounds along all the possible positions: i.  ii. 	**5+5**	**CO3**
Q 8	How do you distinguish between stereocenter and chiral center? Explain with the help of appropriate example.	**10**	**CO4**
Q 9	Which of the conformational isomers of cyclohexane is most stable? Justify your answer with the help of energy profile diagram. **OR** Explain ring flipping in decalins. How does it account for the conformational stability in the molecule?	**10**	**CO3**
SECTION-C **(2Qx20M=40 Marks)** **Internal choice is given in Q 10, while Q 11 is compulsory.**			
Q 10	a. Write short notes on: i. planar chirality ii. allenes. b. What do you understand by solvolysis? Which of the following compounds will undergo solvolysis at a faster rate and why? Which effect is operating here?  I II **OR** a. How do you identify spiranes? Name the following compounds:	**10+10**	**CO3, CO2**

	i.  ii.  b. Explain neighboring group participation. How does it impact the rate of reaction? Discuss the role of lone pair of electrons on heteroatom as neighboring group. Which type of intermediate is formed in such reactions?		
Q 11	a. An organic compound 'A' on treatment with sodamide gives a triply bonded compound 'B' (C_6H_4). 'B' displays following reactions: i. On treatment with ammonia, it gives 'C', which on reaction with sodium nitrite and acid under ice cold conditions gives 'E'. 'E' on treatment with H_3PO_2 produces the first member of aromatic compound 'F' (only carbon containing). ii. On treatment with furan, it gives 'D' ($C_{10}H_6O$). iii. On treatment with phenyl lithium, it gives 'G' ($C_{12}H_9Li$), which on further reaction with carbon dioxide followed by hydrolysis produces 'H' ($C_{13}H_{10}O_2$). Identify the compounds from 'A' to 'H'. b. Identify the intermediate formed in the following cases and write the complete reactions (without mechanism): i. Carbylamine reaction ii. Curtius rearrangement c. Is propionic acid optically active in nature? If yes, justify; if not, how can it be converted to an optically active molecule?	**10+5+5**	**CO2, CO2, CO4**