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| **Name:**<br>**Enrolment No:** | UPES<br>UNIVERSITY OF TOMORROW |

**UPES**

**End Semester Examination, December 2024**

**Course: Organic Reaction Mechanism** **Semester: I**

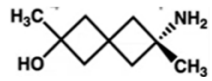
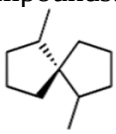
**Program: MSc Chemistry** **Time : 03 hrs.**

**Course Code: CHEM7060** **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 11.

**SECTION A**
**(5Qx4M=20Marks)**

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Write the names of the following compounds:<br>a.  <br><br>b.  | **4** | **CO1** |
| Q 2 | Identify the following compound:<br>  <br>Elaborate the requirements for this compound to exhibit stereoisomerism. | **4** | **CO3** |
| Q 3 | Define atropisomerism. Which compounds respond to this phenomenon? Give two examples of this category with structures. | **4** | **CO1** |
| Q 4 | Identify a real life case where helical chirality is found. Explain it with the help of this example. | **4** | **CO3** |
| Q 5 | Briefly describe:<br>a. Radical ions<br>b. Radical cage effect. | **4** | **CO1** |

**SECTION B**
**(4Qx10M= 40 Marks)**

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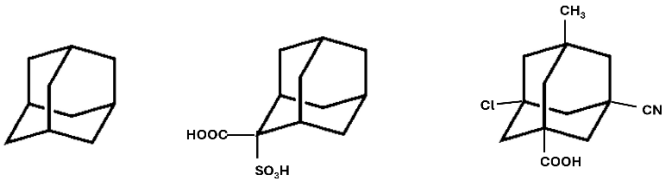
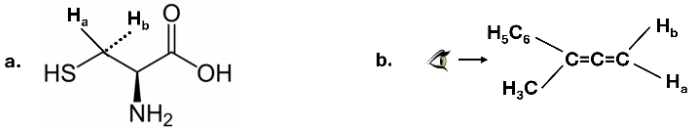
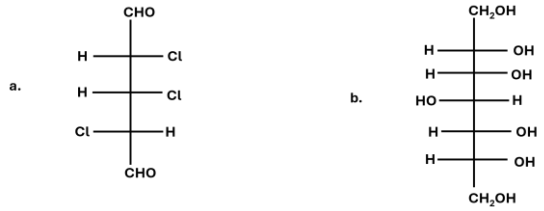
| Q 6 | Differentiate axial and planar chirality. In which compounds do these exist? Illustrate with examples. | **10** | **CO3** |
| Q 7 | Identify the following category of compounds:<br>  <br><br>Which of the above is/ are optically active in nature? Identify the element of chirality and assign R/S configuration to the all the optically active molecules in the above. | **10** | **CO3** |
| Q 8 | An optically inactive form of tartaric acid (A) is heated in the presence of conc. $H_2SO_4$. The product (B) is further reacted with bromine water to produce another compound (C), which can be decarboxylated on heating to give 2,3-dibromo-3-hydroxy propanoic acid. Complete the reaction sequence and comment on the optical activity of compound 'C'. | **10** | **CO2** |
| Q 9 | Describe prochirality. What is its application? Specify pro-R and pro-S atoms in the following examples:<br>  <br><br>**OR**<br>Write short notes on the following:<br>a. Stereogenicity and chirogenicity<br>b. Quasi racemates. | **10** | **CO2** |
| | **SECTION-C**<br>**(2Qx20M=40 Marks)** | | |
| Q 10 | a. Which of the following exhibit pseudochirality:<br>  <br><br>Assign the configuration at all the chiral centres in these molecules, and confirm if the molecule is optically active in nature. | **10+10** | **CO3** |

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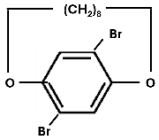
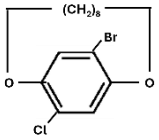
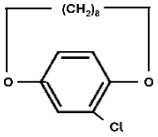
| | b. Differentiate ansa compounds and paracyclophanes. Specify whether following compound possess 'R' or 'S' configuration; also specify if any of these is/ are not optically active:<br>a.  <br>b.  <br>c.  | | |
| Q 11 | a. What happens when benzyne is reacted with anthracene? At which positions will it react and why? To which category of reactions does it belong?<br>b. Explain the conformers in case of (i) cyclohexane and (ii) 1,2-disubstituted cyclohexanes.<br><br>**OR**<br><br>a. How can trapping of intermediates be used as a strategy to investigate the mechanism of an organic reaction? Discuss with example.<br>b. Elaborate two different cases where configuration of the compound can be retained in a nucleophilic substitution reaction. | **10+10** | **CO1, CO3** |