

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION SP2023)

CLASS: IMSC.
BRANCH: CHEMISTRY
TIME: 03 HOURS

SUBJECT: CH108R1 ORGANIC CHEMISTRY-I

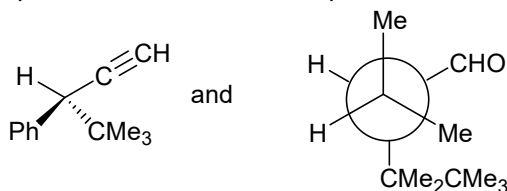
SEMESTER: II
SESSION: SP/2023
FULL MARKS: 50

INSTRUCTIONS:

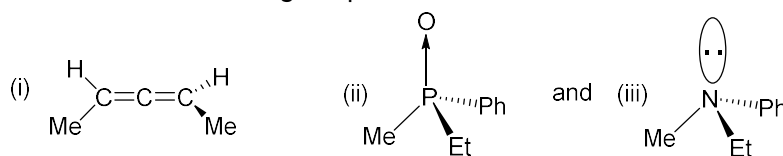
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- | | | CO | BL |
|---|-------|----|----|
| Q.1(a) Explain the types of permanent polarization possible in halogen substituted benzene (C_6H_5X). Arrange the increasing order of withdrawing effect of Fluorine, Chlorine, Bromine and Iodine substituted benzene with respect to benzene. | [2+3] | 2 | 2 |
| Q.1(b) The first deprotonation of maleic acid is easier than that of fumaric acid but for second one the trend is just opposite- Explain. Why is the 2,4,6-trinitro-N,N-dimethyl aniline 40000 times stronger base than 2,4,6-trinitroaniline? | [3+2] | 3 | 3 |
| Q.2(a) Explain the kinetic and thermodynamic control with the HBr addition to 1,3-Butadiene. | [5] | 1 | 3 |
| Q.2(b) Discuss reactive intermediates "carbene & nitrene" for the formation, orbital structure, and relative stability with an example reaction. | [5] | 2 | 4 |

- Q.3(a) (i) Assign R-/S-descriptors for the chiral centers present in the following compounds: [2+3] 1 3

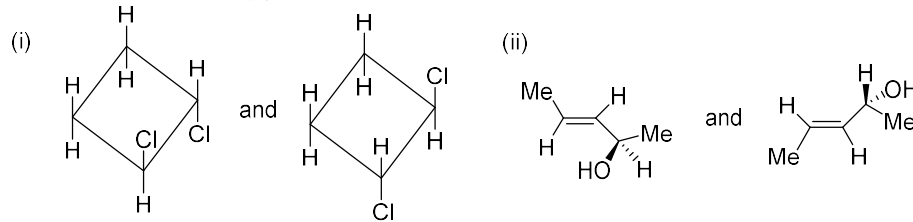


- (ii) Explain whether the following compounds are resolvable or not:



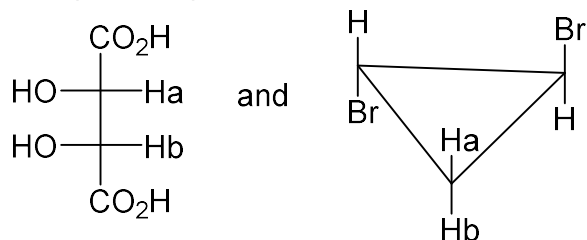
- Q.3(b) What is gauche-butane interaction? Draw the conformers of 2-methyl butane for rotation about C2-C3 bond in Newman projection formula and compare their relative stabilities through energy profile diagram. [1+4] 2 4

- Q.4(a) (i) Label the following pairs of molecules as homomers, enantiomers or diastereomers: [2+2] 1 3



- (ii) Give the principle of a method of resolution of racemic 2-butanol

- Q.4(b) (i) Identify H_a and H_b in each of the following structures as homotopic, enantiotopic or diastereotopic and explain [2+4] 2 4



- (ii) Draw Fisher projection formulas of all the possible stereoisomers of $CH_3CH(OH)CH(OH)CH(OH)CO_2H$ and identify the enantiomers, homomers and diastereomers.
- Q.5(a) (i) *Cis*-4-hydroxycyclohexane carboxylic acid readily forms a lactone, but the *trans* - [2+2] 2 2 isomer fails to do so- Explain.
(ii) *trans*-4-*t*-butyl cyclohexane carboxylic acid stronger acid than its *cis*-isomer- Explain.
- Q.5(b) (i) The *a,a*-conformer of *trans*-1,2-dibromocyclohexane is more stable in gaseous [2+4] 3 3 state, the (*a,a* : *e,e* = 95:5) while the ratio is (52:48) in benzene solution. Explain
(ii) Draw all possible chair conformations of *cis* and *trans* 1, 4 dimethyl cyclohexane. Which one will be the preferred conformation. Explain.

:::::17/07/2023:::::