

J-13/2110
ORGANIC CHEMISTRY
Paper-102
(Semester-I)

Time : Three Hours]

[Maximum Marks : 55

Note : Attempt *five* questions in all, selecting *two* questions from each Section A and B. Section C is compulsory.

SECTION-A

- I. (a) Discuss the NMR of carbocation obtained by treatment of mesitylene with ethyl fluoride in boron trifluoride at -80°C . 4
- (b) Explain the stereochemistry of the product(s) in the reaction of singlet and triplet nitrene with *cis*-2-butene. 4
- II. (a) Write the product(s) and mechanism of bromination of 3-methylcyclopentene using NBS in presence of peroxide. 4
- (b) Write the product(s) and mechanism of reaction between $\text{PhCMe}_2\text{CH}_2\text{CHO}$ and di-*tert*-butyl peroxide. 4

- III. (a) Discuss the bonding in cryptand and cyclodextrin along with their applications. 4
- (b) Giving examples, explain anti-aromaticity and homoaromaticity. 4
- IV. (a) How the cross-over experiments helps in the determination of reaction mechanism ? 4
- (b) Discuss the use of isotopes for determining the benzyne reaction mechanism. 4

SECTION-B

- V. (a) Write the product(s) of reaction (i) between meso-1,2-dibromo-1,2-diphenylethane with HBr and (ii) between meso-1,2-dibromo-1,2-diphenylethane with HBr. 4
- (b) Explain E1cB mechanism with evidence. 4½
- VI. (a) Discuss the effect of substrate in cyclic elimination reaction ? 4
- (b) Explain the product formation in the reaction of alkali-metal halide with 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene. 4½
- VII. (a) Discuss the Claisen rearrangement and explain with PM approach. 4

- (b) Write the product of electrocyclic reaction of 2E, 4Z-hexadiene under thermal and photochemical conditions and explain using FMO approach. 4½

VIII. (a) Draw Woodward-Hoffmann correlation diagram for [4+2] cycloaddition reaction between 1,3-butadiene and acrolein. 4

- (b) Explain the migration of asymmetric carbon moiety in [1,5] sigmatropic rearrangement using FMO approach. 4½

SECTION-C
(Compulsory Question)

IX. Write short notes on the following :

- (a) Discuss the structure of singlet and triplet carbene.
- (b) Define and explain prototropy.
- (c) Write the product(s) of reaction between o-bromoanisole and potassium amide.
- (d) Define and explain auto-oxidation.
- (e) Naphthalene is an alternant and azulene a non-alternant hydrocarbon. Explain.
- (f) How a catalyst is responsible of change in path of a reaction ?

- (g) How to predict product ratio in elimination reaction ?
- (h) What is the effect of protic solvent in elimination reaction ?
- (i) Draw the molecular orbitals of 1,3,5-hexatriene.
- (j) Write the product of photochemical reaction of 1,3-butadiene.
- (k) What is Cope rearrangement ? (2×11=22)
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