carbonyls - ESR spectra-application to copper complexes, Mossbauer spectra- application to iron complexes. NMR spectra - Application to diamagnetic complexes.

UNIT- III: **[15 Hours]**

Reaction Mechanisms in Transition Metal Complexes**:** Energy profile of a reaction, inert and labile complexes, kinetics of octahedral substitution and mechanistic aspects. Acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism and evidences in its favor. Anation reactions, reactions without M-L bond cleavage. Substitution reactions in square planar complexes, trans effect, mechanisms of substitution. Substitution reactions in tetrahedral complexes. Isomerization and racemization reactions of coordination compounds. Electron transfer reactions- inner sphere and outer sphere reactions, complimentary and non-complimentary reactions.

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1. D.N.Satyanarayana:Electronic absorption Spectroscopy and Related Techniques, OUP, 2001.
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3. W.W.Porterfield: Inorganic chemistry – A Unified Approach, Elsevier, 2005.
4. R.L.Dutta and A Syamal : Elements of Magnetochemistry, Affiliated east-West, 1993.
5. J.E Huheey, R.L.Keiter and A.L.Keiter: Inorganic Chemistry(4^{th} edn),Addison Wesley, 2000.

CH H 502: ORGANIC REACTION MECHANISM AND HETEROCYCLIC CHEMISTRY

COURSE OUTCOME:

- Students will gain the in-depth knowledge about ten organic name reactions, their mechanisms and synthetic uses with multiple examples.
- Students will learn about the mechanism and synthetic utility of various kinds of thirteen molecular rearrangement reactions with diverse examples.
- Students will gain knowledge on principles of photochemistry and diverse types of photochemical reactions of organic molecules with multiple examples, concepts of pericyclic reactions, diverse types of electrocyclic, cycloaddition and sigmatropic reactions with multiple examples.
- Students will understand the systematic nomenclature of various types of heterocyclic compounds with multiple examples.
- Students will get the sound knowledge on the structure, synthesis and reactions of various three, four, five, six and seven membered simple and fused heterocyclic compounds.

UNIT I: **[15 Hours]**

Organic Name reactions: Reactions, Mechanisms and synthetic uses of Darzen's glycidic ester condensation, Cannizzaro reaction, Benzoin condensation, Claisen-Schmidt condensation, Stork Enamine reactions, Sharpless asymmetric epoxidation, Suzuki coupling, Heck reaction, Woodward and Prevost Hydroxylation and Mitsunobu reaction.

Molecular rearrangements: Mechanism and synthetic utility of Wagner-Meerwein, Dienone-Phenol, Pinacol-Pinacolone, Demyanov, Benzil-Benzilic acid, Fries, Wolff, Favorskii, Benzidine, Baker-Venkatraman, Beckmann, Bayer-Villiger and Amadori rearrangement.

UNIT II: **[15 Hours]**

Organic Photochemistry: Bonding and antibonding orbital, Chemistry of excited states oforganic molecules, Jablonski diagram and quantum yield, Photodissociation, Photoreduction, Photochemical isomerisation, Norrish Type-I and Type-II reactions, Barton reaction and Photo Fries rearrangement, Paterno-Buchi reaction, Yang cyclization, photo oxidation and photocatalysis.

Pericyclic Reactions: Molecular orbital symmetry, Frontier orbitals of ethylene, 1,3-butadiene,1,3,5-hexatriene and allyl systems. Woodward-Hoffmann correlation diagram and FMO approach.

Electrocyclic Reactions: Introduction, Con-rotatory & dis-rotatory Process, 4n & 4n+2 systems. **Cycloaddition reaction:** Suprafacial and Antrafacial addition, 2+2 and 4+2 systems. 1,3-Dipolarcycloaddition reactions.

Sigmatropic reactions: Suprafacial and Antrafacial shift of H, [1,3] & [1,5] -sigmatropic shifts.

UNIT- III: **[15 Hours]**

Heterocyclic Chemistry: Nomenclature of Heterocycles, Hantzsch-Widman system formonocyclic, fused and bridged heterocycles. Structure, synthesis and reactions of three membered heterocycles (aziridines, episulfides, diaziridines, oxazirines), four membered heterocycles (azetidines and thietanes), five membered heterocycles (furan, pyrrole, thiophene, oxazoles, imidazoles, thiazoles), six membered heterocycles (pyridine, Pyrimidine, α- and γ-Pyrones), seven membered heterocycles (Azepines, Oxepines, Thiepines) and fused hetercycles (Indoles, benzofurans, Quinolines, Isoquinolines, Coumarins, Purines).

REFERENCES

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2. Francis A Carey and R. J. Sundberg, Advanced Organic Chemistry-Part A & (Plenum).
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4. Synthetic Organic Chemistry- G.R. Chatwal (Himalaya, Bombay), 1994.
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9. Organic Reactions and their mechanisms- P.S. Kalsi (New Age, New Delhi), 1996.
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11. Heterocyclic Chemistry-J. Joule & G. Smith (Van-Nostrand) 1978.
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