14. Comparison of detergent action of detergents and determination of interfacial tension.

15. Thermodynamic prediction and measurement of the solubility of naphthalene in benzene.

Study of association of benzoic acid in benzene/toluene. Any other relevant experiments of interest.

**REFERENCES:-**

1. Practical Physical Chemistry- B Viswanathan & P.S Raghavan,(ViVa Books, Delhi) 2005.
2. Findlay's Practical Physical Chemistry- B. P. Levitt ( Longman, London).
3. Experiments in Physical Chemistry– James and Prichard.
4. Experimental Physical Chemistry - Daniels et al.
4. Experimental Physical Chemistry-Das & Behera (Tata McGraw Hill, New Delhi)1983.
5. Advanced Practical Physical Chemistry–Yadav (1989).
6. Experiments in Physical Chemistry–J. C. Ghosh ( Bharathi Bhavan)1974.

**3rd SEMESTER**

## OC H 501: Organic Reaction Mechanism

**COURSE OUTCOME:**

- Students will gain the in-depth knowledge about twenty organic name reactions, their mechanisms and synthetic uses with multiple examples.
- Students will learn about the mechanism and synthetic utility of various kinds of nineteen molecular rearrangement reactions with diverse examples.
- Students will understand the synthetic design with diverse chemical reactions planning of organic synthesis and functionality

**UNIT I:** **[15 Hours]**

**Organic Name Reactions:** Reactions, Mechanisms and synthetic uses of the following:Stobbe condensation, Darzen condensation, Gattermann-Koch reaction, Cannizzaro reaction,Duff reaction Chichibabin reaction, Benzoin condensation, Claisen-Schmidt condensation, Claisen reaction, Simon-Smith reaction, Stork Enamine reactions, Sharpless asymmetric epoxidation, Hofmann-Loffler-Freytag reaction, Suzuki coupling, Heck reaction, Woodward and Prevost Hydroxylation, Bucherer reaction, Ullmann reaction. Wittig reaction-Mitsunobu reaction, Stephen reaction.

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

**Molecular Rearrangements:** Classification and general mechanistic treatment ofnucleophilic, electrophilic and free radical rearrangements. Intermolecular and Intramolecular migration, nature of migration and migratory aptitudes. Mechanism of Wagner-Meerwein, Dienone-Phenol, Pinacol-Pinacolone, Demyanov, Benzil-Benzilic acid, Fries, Wolff, Favorskii, Neber, Benzidine, Baeyer-Villiger, Beckmann, Lossen, Curtius, Schmidt, Stevens, Shapiro, Baker-Venkatraman and Amadori rearrangement.

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

**Synthetic Design:** Carbon skeleton frame work, Classification of carbon-carbon single bondand double bond forming reaction and their use in carbon skeleton ring formation. Ring forming and ring cleaving reactions, use of Thorpe condensation, Carbene insertion reaction,

Friedel-Crafts reaction, 1,3-dipolar addition and Ene reaction in ring formation, Oxidative cleavage of rings and Retro Diel's-Alder reactions.

**Planning of Organic Synthesis:** Selection of starting materials and key intermediates duringthe synthesis. Synthesis of Cubane and Iswarane. Use of Robinson annulation, Dieckmann cyclisation, Arndt-Eistert synthesis, Diel's- Alder reaction in organic synthesis.

**Functionality:** Synthesis of 6- and 7- methoxy tetralones, biotin and penicillin-V withspecial reference to the introduction of functional groups. Stereo chemical consideration and stereo selectivity during organic synthesis.

**References:**


1. Advanced Organic Chemistry- Part A & B-Francis A Carey and R. J. Sundberg (Plenum)
3. Organic Chemistry, Vol 1-3 Mukherji Singh and Kapoor (Wiley Eastern, New Delhi)
4. Synthetic Organic Chemistry- G.R.Chatwal (Himalaya, Bombay), 1994.
5. Organic Reaction Mechanisms-V.K.Ahluw alia & R.K.Parashar (Narovasa publishing house), 2006
6. Organic Chemistry, Vol I-II, I.L.Finar (Longmann ELBS, London), 1973.
7. Advanced Organic Chemistry:Reaction Mechanisms- Reinhard Bruckner (Academic), 2005.
8. Organic Reactions and their mechanisms-P.S.Kalsi (New Age, New Delhi), 1996.
9. Organic Synthesis- R. E. Ireland (Prentice Hall India), 1969.
10. Art in Organic Synthesis- Anand, Bindra & Ranganath-(Wiley New Delhi), 1970.
11. Modern Methods of Organic Synthesis-N.Carruthers (Cambridge University), 1996.


## OC H 502: Synthetic Reagents and Spectroscopic Techniques

**COURSE OUTCOME:**

- Students will learn the preparation, properties, reactions and uses of organometallic reagents in organic synthesis.
- Students will know the uses of Gillman's reagent, LDA, DCC, 1,3-dithiane, TMSI, DDQ, $SeO_2$, Wikinson's catalyst, PTCs, Baker's yeast, PPA, TMS-CN, hydrosilane, chloramines-T, Woodward-Prevost hydroxylation, Zeigler-Natta catalyst, and crown ethers in organic synthesis and functional group transformation.
- Students will acquire the knowledge of utilization of principles of green chemistry by the use of crown ethers and ionic liquids in organic synthesis and microwave induced reactions.
- Students will demonstrate an understanding advanced aspects of IR, $^{1}H$ and $^{13}C$ NMR and Mass spectroscopy.
- Students will develop the ability to solve the composite problems involving the application of UV-Visible, IR, NMR ($^{1}H$ &$^{13}C$) and Mass spectroscopic data, interpret the spectra to elucidate the structure of organic molecules.

**UNIT- I: Reagents in Organic Synthesis-I [15 Hours]**

**Organometallic Reagents:** Preparation and properties of Organolithium andorganomagnesium compounds. Their uses in organic synthesis and in the preparation of Organometallic compounds.

Methods of preparation, properties, reactivity and reactions of Organozinc, Organocadmium, Organomercury Organoindium, Organoaluminium and Organotellurium reagents.

**Silicon containing Reagents:** Introduction, preparation reactions & stereochemistry, Petersonreaction.

**Boron containing Reagents:** Introduction, preparations, Hydroborations, reactions ofOrganoboranes- Isomerization, oxidation, protonolysis, carbonylation, cyanidation. Synthesis of esters, E and Z alkenes, conjugated dienes and alkynes.