10. Preparation of colloidal solutions.

11. Verification of F & L adsorption isotherms for acetic acid on activated charcoal.

12. To study the adsorption of iodine on charcoal from alcoholic solution.

13. To study the effects of gelatin solution on the precipitation values.

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

CH H 501: COORDINATION CHEMISTRY

COURSE OUTCOME:

- The students will learn spectral properties of complexes, interpretation of spectra
- Photochemistry of metal complexes, Magnetic behavior of metal complexes,
- Spectral applications of coordination compounds,
- Reactions mechanisms in Transition metal complexes, Electron transfer reactions.

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

Spectral properties of complexes: Term symbols for d^n ions, spectroscopic ground states, selection rules, nature of spectral bands- band shapes, band intensities, band widths, spin-orbit coupling, vibrational structures.

Orgel diagrams, Tanabe-Sugano diagrams, interpretation of spectra of octahedral, distorted octahedral, tetrahedral and square planar complexes, Determination of o from spectra. Charge transfer bands – origin, types, and characteristics. Photochemistry of metal complexes- photosubstitution and photoredox reactions, ligand photoredox reactions, photoreactions and solar energy conversion.

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

Type of magnetic behaviour, orbital contribution, spin orbit coupling, spin cross-over systems. Measurement of magnetic susceptibility – Gouy and Faraday methods, diamagnetic corrections, ferro- and antiferromagnetic coupling, super paramagnetism. High and low spin equilibria. Magnetic properties of lanthanides and actinides. Infrared spectra of metal complexes, Group frequency concept. Changes in ligand vibrations on coordination- metal ligand vibrations. Spectral applications of coordination compounds - IR spectra of metal

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.

REFERENCES:

1. D.N.Satyanarayana:Electronic absorption Spectroscopy and Related Techniques, OUP, 2001.
2. F.Basolo and R.G.Pearson: Inorganic Reaction Mechanisms, Wiley Eastern, 1979.
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.