Paper I **Second semester**

INORGANIC CHEMISTRY **Marks: 80**

I: Metal ligand equilibria in solution: 8 Hrs

Stepwise and overall formation constant, tends in stepwise constant, factor affecting the stability if metal complex with reference to the nature of metal ion and ligand, chelate effect and its thermodynamic origin.

II: Reaction mechanism of transition metal complexes: 24 Hrs

Energy profile of reaction, reactivity of metal complexes, inert and labile complexes, kinetics of octahedral substitution, substitution of square planar complexes, the trans effect, mechanism of the substitution reaction, redox reaction, electron transfer reaction, outer sphere type reactions, cross reaction and Marcus-Hush theory, inner sphere type reaction.

III: Organometallic Chemistry: 24 Hrs

Organoberyllium and silicon compounds: preparation stability and important reaction of transition metal alkyl and aryls. Metal carbonyls – reactions, structure and bonding, vibrational spectra of metal carbonyls for structural elucidation.

IV: Metal Clusters: 15 Hrs

Higher boranes, carboranes, metalloboranes and metallocarboranes.
Metal carbonyls and halide clusters.
Compounds with metal-metal multiple bonds

V: Microwave spectroscopy: 3 Hrs

Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequency, intensities, non-rigid rotor. Stark effect, nuclear and electron spin interaction and effect of external field. Applications.

VI: Vibrational Spectroscopy: 15 Hrs

A. Infra red spectroscopy:

Review of linear harmonic oscillator, vibrational energies of diatomic molecules, zero point energy, force constant and bond strength, vibration of polyatomic molecules, selection rules, normal modes of vibration, group frequencies, overtones, hot bands, factor affecting the band position and intensities, Far IR region metal ligand vibrations, normal coordinate analysis.

B. Raman spectroscopy:

Classical theories of Raman effect. Pure vibrational, vibrational-rotational Raman spectra, selection rule, mutual exclusion principle. Resonance Raman spectroscopy, Coherent Anti Stocks Raman spectroscopy (CARS).