

## **Syllabus for Written Test and Interview for Ph.D. Admission in Chemistry:**

Mathematics: Functions, Limit, Continuity, Differentiation, Integration, Vector, Trigonometry, Permutation and Combination.

Thermodynamics: Laws of thermodynamics, Energy, Enthalpy, Entropy, Free energies, Chemical potential, Phase equilibria, colligative properties.

Chemical Kinetics: Complex reactions, Steady state approximation, Enzyme Kinetics, Unimolecular reaction mechanism, Collision theory, Transition state Theory, catalysis.

Quantum Chemistry and Chemical bonding: Schrödinger wave equation, uncertainty principle; particle in a box, harmonic oscillator, hydrogen atom, quantum numbers, orbital shapes, electron spin, perturbation theory, variational principles.

Born-Oppenheimer approximation, LCAO-MO; Bonding and antibonding orbitals; Electronic structure of small molecules and ions, bond order, para and diamagnetism, Formation of bands in solids.

Molecular Spectroscopy: Principles and applications of Rotational and vibrational, UV, IR and Raman and Electronic spectroscopy.

Statistical Thermodynamics: Thermodynamic ensembles, Partition function and its relation with thermodynamics quantities, Concept of entropy.