

SARDAR PATEL UNIVERSITY
Programme: MSC (Applied Science)
Semester: I
Syllabus with effect from: June 2013

Paper Code: PT01CASC02	Total Credits: 4
Title Of Paper: Elements of Chemical Sciences	

Unit	Description in detail	Weightage (%)
1	<p>Inorganic Chemistry: Atomic structure: de Broglie matter waves, Heisenberg Uncertainty principle, atomic orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, electronic configuration of elements: Chemical Bonding: Covalent bond – valence bond theory and its limitations, types of hybridization and shapes of simple inorganic molecules and ions, VSEPR theory to NH₃, H₃O⁺, SF₄ and H₂) etc. bond strength and bond energy, percentage of ionic character</p>	25 %
2	<p>Organic Chemistry: Structure and bonding: Hybridization, bond length and angles, bond energy, localized and delocalized chemical bonds, van der Waals interactions, inclusion compounds, clathrates, charge transfer complexes, resonance, hyper conjugation, aromaticity Mechanism organic reactions: Electrophiles and nucleophiles, types of organic reactions, reactive intermediates – carbocations, carbanions, free radicals, carbenes, arynes and nitriles (with examples), methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic studies)</p>	25 %
3	<p>Physical Chemistry: Gaseous state: Postulates of kinetic theory of gases, van der Waals equation of state, ideal behavior and deviations Liquid state: intermolecular interactions, structure of liquids Solid state: Definition of lattice, unit cell, space lattice, x-ray diffraction by crystals and Bragg's equation Chemical Kinetics: Rate laws and rate equations for first, second and third order equations, Half and mean life, activation energy and Arrhenius equation, determination of order of reaction, characteristics of catalyzed reactions</p>	25 %
4	<p>Thermodynamics: Review of basics of thermodynamics including the laws of thermodynamics, Heats of summation- Hess law, Kirchoff equation, Clausi-Clapeyron – phase diagrams and Carnot cycles, open hydrostatic system and Gibbs- Duhem equation, Statistical thermodynamics – Canonical and grand Canonical ensemble, partition function and derivation of thermodynamics functions, Statistical distribution functions- Maxwell- Boltzmann, Fermi- Dirac and Bose-Einstein and Applications.</p>	25 %

Basic Text & Reference Books:

- Basic Inorganic Chemistry, F. A. Cottons, G. Wilkinson and P. L. Gaus, Wiley
- Concise Inorganic Chemistry, J. D. Lee, ELBS



- Inorganic Chemistry, D. E. Shriver, P. W. Atkins, C. H. Langford, Oxford
- Organic Chemistry, Morrison and Boyd, Prentice – Hall
- Organic Chemistry, Vols. I – III, S. M. Mukherjee, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd.
- Fundamentals of Organic Chemistry, Solomons, John Wiley
- Physical Chemistry, G. M. Barrow, International Student Edition, McGraw Hill
- University General Chemistry, C. N. R. Rao, Macmillan
- Physical Chemistry, R. A. Alberty, Wiley Eastern Ltd.
- The Elements of Physical Chemistry, Atkins, Third Edition, Oxford

