SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Defence Science)
Semester: I
Syllabus with Effect from: June - 2014

Paper Code: PT01CDSC02	**Total Credit: 4**
Title Of Paper: Elements of Chemical Sciences	

Unit	Description in Detail	Weightage (%)
I	**Inorganic Chemistry** Atomic structure: de Broglie matter waves, Hesienberg Uncertainty principle, atomic orbitals, Aufbau and Puli 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	25%
II	**Organic Chemistry** Structure and bonding: Hybridization, bond length and angles, bond energy, localized and delocalized chemical bonds, van der Waals interactions, inclusion compounds, clatherates, 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)	25%
III	**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 Braggs equation Chemical Kinetics: Rate laws and rate equations for first, second and third order equations, Hal and mean life, activation energy and Arrhenius equation, determination of order of reaction, characteristics of catalyzed reactions	25%
IV	**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- Boltzman, Fermi- Dirac and Bose-Einstein and Applications.	25%

Basic Text & Reference Books:-

- Basic Inorganic Chemistry, F. A. Cottons, G. Wilkinson and P. L. Gauss, Wiley
- Concise Inorganic Chemistry, J. D. lee, ELBS
- Inorganic Chemistry, D. E. Shriver, P. W. Atkins, C. H. Langeford, 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