Shree Manibhai Virani and Smt. Navalben Virani Science College (Autonomous), Rajkot

Affiliated to Saurashtra University, Rajkot

17UFTDA01	DSE Allied 1: Chemistry - I	3 hrs./wk	3 credits

Objectives:

To enable the students to

1. Understand elementary concepts of Bonding, and Hybridization
2. Understand elementary concepts of Organic, Physical & Pharma. chemistry
3. Develop skills in the scientific method of planning, conducting, reviewing and reporting experiments of qualitative & quantitative chemical analysis.
4. Develop skills in understanding, planning and performing experiments for Chemical analysis.

Unit 1: Fundamental Inorganic Chemistry (7 hrs)

- Chemical Bonding: Types of Bonds: Covalent, Covalent Coordinate, Ionic, Metallic, Van der Waals Forces
- Hybridization: sp – $BeCl_2$, sP^2 – BF_3, sp^3 – CH_4, sp^3d – PCl_5, sp^3d^2 – SF_6
- Sidgwick Powell rule
- Valence bond theory and its limitations
- VSEPR theory
- Ionization energy, Electron affinity
- Electronegativity and Factors affecting electronegativity

Unit 2: Fundamental Analytical Chemistry (9 hrs)

- Modes of Concentration: Introduction, Theory of Solution, Solvent, Solute, Primary & Secondary standard solutions, Determination of Molecular weight and eq. weight, Different modes of concentration - Normality, Molarity, Molality, Mole fraction,% W/W ,% W/V,% V/V, ppm, ppb, ppt, Numerical.
- Acid- Base & Buffers: Introduction, Definitions – Acids and Bases, Strong and weak electrolytes, Degree of ionization, Ionic product of water, Ionization of weak acid and weak base, pH scale, Common ion effect
- Buffers & types of Buffers, Mechanism of Buffers, Determination of pH of buffer by Henderson equation, Buffer capacity
- Basics of Quantitative Analysis: Introduction, Types of quantitative analysis: Gravimetric analysis, Volumetric analysis: Acid-base titration, Redox titration, Complexometric titration

Unit 3: Fundamental Physical Chemistry (6 hrs)

- Thermodynamics: Introduction, System, surrounding, types of system; Laws of Thermodynamics ; Concept of Heat & work
- Thermo chemistry: Exothermic and endothermic reactions, Heat of reaction: Combustion, Solution, Neutralization, Vaporization, Sublimation, Transition, Hass law, Joule-Thomson Effect, Bond dissociation energy
- Electro Chemistry: Introduction, Reversible and Irreversible cell, Type of electrodes, Measurement of EMF of cells

Unit 4: Fundamental Organic Chemistry (8 hrs)

- Organic compounds: Classification and Functional Groups, Nomenclature, hybridization, shapes of molecules, influence of hybridization on bond properties.
- Heterocyclic Chemistry: Nomenclature, Preparation and Properties of - Pyrrole, Furan, Pyridine, Pyrimidine, Pyrazole, Imidazole, Quinoline, Isoquinoline and Indole
- Types of reaction intermediates -Carbcation, Carbanion, Carbon free radical, Carbene & Nitrene
- Introduction to types of organic reactions and their mechanism: Addition, Elimination (including E1, E2) and Substitution reactions (including SN1, SN2).

Unit 5:Applied Chemistry (06 hrs)

- Pharmaceutical Chemistry: Introduction to pharmaceutical chemistry and pharmacopeia.
- Impurities in pharmaceuticals: Sources of impurities, Tests for purity and identity, Limit tests for iron, arsenic, lead, heavy metals, chloride, sulphate
- Pharmaceutical aids: Anti-oxidants, Preservatives, Adsorbent, Diluents

Text Books:

1. Bansal, Raj K. (2009, Fifth) *A Textbook of Organic Chemistry*. New Delhi: New Age International (ISBN: 978-81-224-2025-8).
2. Bahl, Arun; Bahl, B. S.; Tuli, G. D. (2010) *Essential of Physical Chemistry*. New Delhi : S. Chand (ISBN No. 81-219-2978-4)

Reference Books:

1. Ahluwalia, V. K. (2011, Fourth edition) *Organic Reaction Mechanism*. New Delhi: Narosa (ISBN: 978-81-8487-115-9).
2. T.W. Graham Solomons (2011, 10th edition) *Organic Chemistry*. Hoboken: John Willey & Sons (ISBN: 978-0-470-55659-7).
3. Negi, A. S.; Anand, S. C. (2007, Second edition) *A Textbook of Physical Chemistry*. New Delhi: New age International Publisher (ISBN: 81-224-2005-0).
4. Peter Atkins (2006) *Atkin's Physical Chemistry*. Oxford: Oxford University Press (ISBN: 9780198700722).