

First Year (I Semester)

Year	Semester	Course Code	Course Name	Theory/ Practical	Credit	Total Credit	Min. Counce lling hrs
GENERIC ELECTIVE							
I	I	GECH-01	Elemetary Chemistry	Theory	3	3	9

SEMESTER-I

GENERIC ELECTIVE: THEORY

Programme:	Year: I	Semester-I
Course Code: GECH-01		
Course Name: Elemetary Chemistry		
Credit: 3		
Max. Marks: 70+30 =100		

Course Objective and Outcomes:

Learnes will gain an understanding of

- Molecular geometries, physical and chemical properties of the molecules.
- Current bonding models for simple inorganic and organic molecules in order to predict structures and important bonding parameters.
- This course gives a broader theoretical picture in multiple stages in an overall chemical reaction.
- It describes reactive intermediates, transition states and states of all the bonds broken and formed.
- It enables to understand the reactants, stereochemistry and major and minor products of any organic reaction. It describes the types of reactions and the kinetic and thermodynamic aspects one should know for carrying out any reaction and the ways how the reaction mechanism can be determined.
- The course will also strengthen the knowledge of students regarding complete picture of states of matter that includes gaseous, liquid and solid states.

Syllabus Details

Block-1: Basics of Inorganic Chemistry

Unit 1: Atomic structure

Dual nature of matter; de Broglie concept. Heisenberg uncertainty principle, Quantum numbers, shapes of s, p and d orbitals. Aufbau energy diagram, Pauli's exclusion principle. Hund's rule of maximum multiplicity. Electronic configuration of elements (s block, p block and first series of d-block elements).

Unit 2: Periodic properties

Periodic table and periodic law, Periodic relationship among the elements, periodic properties-atomic size, ionization energy, electron affinity, electronegativity

Unit 3: Chemical bonding

Ionic and covalent bonding, sigma and pi bond, Valence bond theory, hybridization, valence shell electron pair repulsion (VSEPR) theory to NH_3 and H_2O , Resonance, inductive, mesomeric, electromeric effect.

Unit 4: Coordination compound

Coordination compound: Werners theory and IUPAC nomenclature of coordination compounds valence bond theory and discussion of inner and outer orbit complexes.

Unit 5: Acids and bases

Acids and bases: elementary ideas of Arrhenius concept, Bronsted – Lowry and Lewis concept of acid and bases. SHAB (soft and hard acid and base), symbiosis

Block-2: Basics of Organic Chemistry

Unit 6: Basic stereochemistry

Introduction, Newman projection and Sawhorse formula, Fischer and flying wedge formula, Difference between configuration and conformation, types of isomerism, E,Z; D,L and R, S nomenclature, optical activity, chiral and achiral molecules, enantiomer, distereoisomer.

Unit 7: Reaction mechanism

Homolytic and heterolytic fission, nucleophile and electrophiles, Type of organic reactions, reaction intermediates, SN^1 and SN^2 reactions

Unit 8: Aliphatic and aromatic organic compounds

Alkanes, alkenes, alkynes, aromatic hydrocarbons, Preparation and properties of ethene and ethyne. Functional groups in organic compounds-alcohols, ethers, aldehydes, ketones and carboxylic acids.

Unit 9: Biomolecules

Classification and nomenclature of Carbohydrates, Nucleic acids; Nitrogen bases, purines, pyrimidines, nucleosides, nucleotides, structure of DNA molecule

Block-3: Basics of Physical Chemistry

Unit 10: States of matter

Postulates of kinetic theory of gases. van der Waal equation, Intermolecular forces, structure of liquid (a qualitative description). Structural differences between solid, liquid and gases. Definition of space lattice, unit cell.

Unit 11: Colloidal system

Colloidal solutions: properties of collides, Tyndel effect, flocculation, Hardy –Sultze rule, Gold number

Unit 12: Chemical kinetics

Molecularity and order of reaction, rate of reaction, factors affecting the rate of reaction, 1^{st} , 2^{nd} and 3^{rd} order reactions, Energy of activation, catalyst

Unit 13: Thermodynamics and thermochemistry

Introduction, Definition of thermodynamics terms, System surrounds, Types of systems Intensive and extensive properties, States and path functions, law of thermodynamics, Entropy and Enthalpy, Internal energy, Bond dissociation energy

Unit 14: Electrochemistry

Introduction, Type of electrodes, weak and strong electrolyte, reference electrodes, electrochemical series, Galvanic cells.