

**SYLLABUS FOR THE SUBJECT OF CHEMISTRY  
PAPER-I**

**Total Marks: 100**

**(A). Physical Chemistry.**

**1. Quantum Theory & Atomic Structure**

Quantum theory. The Schrodinger Wave Equation, particle in one dimensional box and its application for Hydrogen atom. Quantum Numbers. Chemical Bonding. Eigen Values and Eigen functions. Degeneracy. Tunnel Effect.

**2. Chemical Thermodynamics**

First Law of Thermodynamic and Enthalpy changes. Entropy and second Law of Thermodynamics. Standard Free Energy and Chemical equilibrium. Concept of Residual Entropy.

**3. Electrochemistry**

Conductance and its measurement. Activity and Activity coefficients. Measurement of Activity coefficient of strong electrolytes. Debye-Huckel Theory and its applications for strong electrolytes. Electrodes, Electrode Potential and its measurement. Corrosion and its prevention.

**4. Nuclear Chemistry**

Radioactivity, detection and its measurement, Kinetics of Radioactive decay, Nuclear Fission, Nuclear Fusion, Artificial Radioactivity, uses of Radioactive isotopes and Nuclear Reactors.

**(B). Inorganic Chemistry**

**1. Modern Theory of Chemical Bonding**

Modern Theories of Chemical bonding. Valence Bond theory, hybridization of orbital, molecular Orbital theory, comparison of valence Bond and Molecular orbital theories, shapes of inorganic molecules, application of VSEPR concept.

**2. Chemistry d-Block Elements**

General Characteristics of d-Block elements, Chemistry of First Transition Series, Transition metal complexes, structure of coordinate complex compounds, Postulates and applications of Werner's Chelates, Nomenclature and Isomerism in coordinate compounds.

**3. Inorganic Chemical Industries**

Sulphuric acid, Chemical Fertilizers, cements, Ceramics, Soda Ash and Caustic Soda.

4. **Environmental Chemistry**

Concept of Environmental chemistry, Environmental Pollution, green House Effect, Air Pollution, Water Pollution and Chemical Toxicology.

## PAPER-II

TOTAL MARKS: 100

### (A) Organic Chemistry

#### 1. Structure and Reactivity

Inductive effect, delocalized chemical bond, resonance effect, tautomerism, hyper-conjugation, steric effect and hydrogen bonding.

#### 2. UV and IR Spectroscopy

Principle of UV-Visible and IR-Spectroscopy, terms involved in spectroscopy.  $\lambda_{max}$ , bathochromic shift, hypsochromic shift, finger print region, overtones and applications in functional group identification of organic compounds.

#### 3. Chemistry of Carbonyl Group

Preparation and properties of Aldehydes and ketones. Acid and base catalyzed Aldol condensation reactions and nucleophilic additions to carbonyl group.

#### 4. Chemistry of Aromatic Compounds

Mechanism and applications of Electrophilic aromatic substitution reactions, Arenium ion mechanism, orientation and reactivity. Aromaticity and condensed simple aromatics systems.

#### 5. Stereochemistry

Stereoisomerism, conformational analysis of cycloalkanes, chirality and optical activity, racemization, epimerization and geometrical isomerism.

### (B) Selected Topics in Applied Chemistry

#### 1. Bio-molecules

Introduction, classification, structure and metabolism of carbohydrates. Primary, Secondary & Tertiary structure of Proteins. Lipids and their classification.

#### 2. Chromatography

Principle and types of chromatography. Thin layer and column Chromatography with their applications.

#### 3. Material Chemistry

Introduction and applications of Polymers, Semi-conductors, composites and liquid crystals.

4. **Chemicals in Service of Mankind**  
Detergents, Pesticides, Dyes, Cosmetics and Pigments.

#### **RECOMMENDED BOOKS**

1. Physical Chemistry by Ira N. Levine, 5<sup>th</sup> Edition
2. Inorganic Chemistry by James E. Huheey and Richard I. Keiter, 4<sup>th</sup> Edition.
3. Physical Chemistry by Moore, Walter S, 5<sup>th</sup> Edition.
4. Mechanism and Structure of Organic Chemistry by Gould, Edward.
5. Essential of Physical Chemistry by G.D.Tuli, Arun Bahl.
6. Advanced Inorganic Chemistry by Cotton F.A & Wilkinson Geoffrey, 3<sup>rd</sup> Edition
7. Chemistry (Organic & Inorganic) by A.M.H. Shaikh
8. Advanced Chemistry by Philip Matthews.
9. organic Chemistry by Morrison, Robert, Thornton and Boyd. R.N., 2<sup>nd</sup> Edition
10. Text Book of Inorganic Chemistry for B.Sc. by M. Zafar Iqbal (Revised & Enlarged Edition)
11. Selected topics in Inorganic Chemistry by G.D. Tuli.
12. Physical Chemistry by Gordon M.Barrow, 5<sup>th</sup> Edition.