

B.Sc. (CHEMISTRY)

UGCHE- 01

Atoms and Molecules

Block -01

Structure of Matter-I

Unit-01- Old Quantum Theory- Discovery of sub Atomic Particles, Earlier, Earlier Atom Models, Light as Electromagnetic Wave, Failures of Classical Physics, Plank Quantum Theory, Black Body Radiation, Heat Capacity Variation Einstein's Theory of Photoelectric Effect, Bohr Atom Model, Radius of Bohr's Theory, Critical Analysis of Bohr's Theory Refinements in the Atomic Spectra Spectra Theory.

Unit-02- Wave Mechanics- Nature of Radiation and Matter, Heisenberg Uncertainty Principle the Schrodinger Equation and its Application Hydrogen and Hydrogen- like Atom, Electron Configuration of Multi Electron Atoms.

Unit-03- Electronic Theory of Valence- Basic Theory- Electrovalent or Ionic Bond, Covalent Bond- Bond Polarity, VSEPR Theory

Unit-04- Valence Bond Theory- Origin of Valence, Bond and Molecular Orbital Theories, principles of Valence Bond Theory, Valence Bond theory of Hydrogen Molecules, Resonance or Electron Delocalization, Valence Bond Description of Some more Molecules, Hybridization of Orbital, Valence Bond Description of Benzene.

Unit-05- Molecular Orbital Theory- LACO Theory, Homonuclear. Diatomic Molecules, Heteronuclear Diatomic Molecules, Comparison of Valence Bond and Molecular Orbital Theories.

Block-II

Structure of Matter-II

Unit-06- Molecular Properties- Polar and Non Polar Molecular, Dielectric

Constant, Dipole Moment, Magnetic Properties of matter

Unit-07- Molecular Spectroscopy-I

Unit-08- Molecular Spectroscopy-II

Unit-09- Nuclear Chemistry

UGCHE -03

Inorganic Chemistry-I

Block-I Periodicity and S-Block Elements

- Unit-01 Periodic Table
- Unit-02 Periodicity
- Unit-03 Hydrogen
- Unit-04 Alkali Metals
- Unit-05 Alkali Earth Metals

Block-II

P Block Elements –I

- Unit-06 Elements of Group- 13
- Unit-07 Elements of Group- 14
- Unit-08 Elements of Group- 15

Inorganic Chemistry-II

Block-III P Block Elements –II

- Unit-09 Elements of Group- 16
- Unit-10 Elements of Group- 17
- Unit-11 Elements of Group- 18

Block-III d and f Block Elements

- Unit-12 Transition Elements
- Unit-13 Inner Transition Elements
- Unit-14 Coordination Group
- Unit -15 Isolation and participation of Metals

UGCHE -04

Physical Chemistry-I

Block-I Chemical Equilibria and Electro Chemistry

- Unit-1 Chemical Equilibria
- Unit-2 Ionic Equilibria
- Unit-3 Electrolytic Conductance of Solutions
- Unit-4 Electro Chemical Cells

Block-II Dynamics and Macro Molecules

- Unit-5 Chemical Kinetics
- Unit-6 Photo Chemistry
- Unit-7 Colloids and Macro Molecules
- Unit-8 Surface Chemistry and Catalysis

Physical Chemistry-II

Block-IV Chemical Equilibria and Electro Chemistry

- Unit-9 Chemical Equilibria
- Unit-10 Ionic Equilibria
- Unit-11 Electrolytic Conductance of Solutions
- Unit-12 Electro Chemical Cells

Block-V Dynamics and Macro Molecules

- Unit-13 Chemical Kinetics
- Unit-14 Photo Chemistry
- Unit-15 Colloids and Macro Molecules
- Unit-16 Surface Chemistry and Catalysis

UGCHE -05
Organic Chemistry-I

Block-I	Fundamental Concept
Unit-1	Bonding, Functional Group Classification and Nomenclature
Unit-2	Stereochemistry-I- Isomerism, Geometrical & Optical Isomerism
Unit-3	Stereochemistry-II Configuration and Fischer Projection Formulas, Asymmetric Synthesis, Walden Inversion, Conformational Isomers, Ethane, Butane, and Cyclic Systems
Unit-4	Effect of Molecular Architecture on Physical Properties- General Ideas about the Spectroscopy, Ultraviolet Spectroscopy, Nuclear Magnetic Resonance Spectroscopy Mass Spectrometry
Unit-5	Structure Reactivity Relationships
Block-II	Basic Skeleton: Hydrocarbons and Heterocyclics
Unit-6	Alkanes
Unit-7	Alkenes
Unit-8	Alkynes
Unit-9	Aromatic Hydrocarbons and Polynuclear Aromatics
Unit-10	Heterocyclic Compounds
	Organic Chemistry-II
Block-III	Derivatives of Hydrocarbons-I
Unit-11	Halogen Derivatives
Unit-12	Alcohols and Phenols
Unit-13	Ethers and Sulphur Analogues of Alcohols and Ethers
Unit-14	Aldehydes and Ketones
Block-IV	Derivatives of Hydrocarbons-II
Unit-15	Monocarboxylic and Sulphonic Acids
Unit-16	Substituted Carboxylic Acids
Unit-17	Functional Derivatives of Monocarboxylic Acids
Unit-18	Nitro Compounds
Unit-19	Amino Compounds and Diazonium Salts
Unit-20	Natural Products

UGCHE -09
Biochemistry

Block-I

- Unit-01 Biomolecules-I
- Unit-02 Cell Structure and Function
- Unit-03 Carbohydrates
- Unit-04 Lipids
- Unit-05 Nucleic Acids

Block-II

- Unit- 01 Biomolecules-II
- Unit-02 Proteins
- Unit-03 Enzymes
- Unit-04 Vitamins Coenzymes and Miwralls

Block-III

- Unit-01 Bioenergetics and Metabolism
- Unit-02 Bioenergetics
- Unit-03 Metabolism Regulation
- Unit-04 Photosynthesis

Block-IV

- Unit-01 Gene Expression
- Unit-02 Replication and Transcription
- Unit-03 Protein Biosynthes is
- Unit-04 Biotechnology
- Unit-05 Immunology

UGCHE -10

Spectroscopy

Block-I Basic Concept and Rotational Spectra

- Unit-01 Spectra of Atoms
- Unit-02 Symmetry of Molecules
- Unit-03 Rotational Spectra

Block-II IR and Raman Spectra

- Unit-04 Vibrational Spectra of Diatomic Molecules
- Unit-05 Infrared Spectra of Polyatomic Molecules
- Unit-06 Raman Spectroscopy

Block-III Electronic Spectra and Instrumentation

- Unit-07 Electronic Spectra-I Born-Oppenheimer Approximation, Electronic States of Diatomic Molecules, Franck-Condon Principle, Electronic Spectra, Polyatomic Molecules, Carbonyl Chromophore
- Unit-08 Electronic Spectra-II Models for Metal, ligand and Interactions, Crystal field theory, Deexcitation Processes in electronic Spectroscopy
- Unit-09 Optical Spectroscopy: Instrumentation and Sampling

Block-IV Resonance Spectroscopy and Mass Spectrometry

- Unit-10 Nuclear Magnetic Resonance Spectroscopy
- Unit-11 Electron Spin Resonance Spectroscopy
- Unit-12 Mass Spectrometry
- Unit-13 Exercises in Problem Solving using IR, UV, NMR and Mass Spectral Techniques

UGCHE-11

Mathematical Methods

Block-I Algebra and Geometry

Unit-01 Sets and Functions

Unit-02 Graphs and Functions

Unit-03 Elementary Algebra

Unit-04 Coordinate Geometry

Unit-05 Vectors

Block-II Calculus

Unit-06 Differential Calculus

Unit-07 Applications of Differential Calculus

Unit-08 The Integral

Unit-09 Integration of Elementary Functions

Unit-10 Differential Equations

Block-III Probability Distributions

Unit-11 Statistics

Unit-12 Probability

Unit-13 Discrete Probability Distributions

Unit-14 Continuous Probability Distributions

Block-IV Statistical Inference

Unit-15 Sampling (Statistical data Sampling)

Unit-16 Hypothesis Tests

Unit-17 Correlation and Regression

UGCHE (L)-1
Chemistry Lab-I

Block-I Quantitative Analysis-I

Unit-1 Laboratory Lechniques and Procedures

Unit-02 Acid Base Titrations-I

Unit-03 Acid Base Titrations-II

Block-II Quantitative Analysis-II

Unit-01 Estimation of Iron

Unit-02 Estimation of Copper

Unit-03 Analysis of Water

UGCHE (L)-2
Chemistry Lab-II

Block-I Inorganic Preparations and Gravimetry

Unit-01 Apparatus and Experimental Gravimetry

Unit-02 Inorganic Preparations

Unit-03 Gravimetric Analysis

Block-II Qualitative Inorganic

Unit-01 Detection of the Anions

Unit-02 Detection of the Cations-I

Unit-03 Detection of the Cations-II

UGCHE(L)-3

Block-1 Preparation Organic Chemistry

Unit-01 Techniques and Apparatus

Unit-02 Organic Preparations

Block-2 Qualitative Organic Analysis

Unit-03 Preliminary Qualitative Analysis

Unit-04 Qualitative Classification Test and Preparation of Derivatives-I

Unit-05 Qualitative Classification Test and Preparation of Derivatives-II

UGCHE(L)-4

Block-1 Laboratory Skills and Techniques

Unit-01 Basic Laboratory Skills

Unit-02 Handling of Data

Unit-03 Low-Cost Instruments

Block-2 Properties of Liquids and Thermo-chemistry

Unit-04 Surface Tension

Unit-05 Viscosity of Liquids

Unit-06 Thermo-chemistry

Unit-07 Determination of Enthalpy of Neutralization and Ionisation

Block-3 Applications of Thermodynamics

Unit-08 Depression of Freezing Point

Unit-09 Applications of Emf Measurements

Unit-10 Adsorption

Unit-11 Phase Equilibria-I

Unit-12 Phase Equilibria-II

Block-4 Chemical Kinetics

Unit-13 Basic Concepts

Unit-14 Initial Rate Method

Unit-15 Integrated Rate Equation Method

UGCHE(L)-5**List of Experiments**

1. Separation of a Mixture of Benzole Acid,-Naphtol and 1,4-Dimethoxyvezene by Solvent Extraction and Identification of their functional groups.
2. Separation of a Mixture of p-Toluidine and Naphthalene by Solvent Extraction and Identification of their functional groups.
3. Extraction of Caffeine from Tea- Leaves
4. Paper Chromatographic Separation and Identification of Metal Ions.
5. Paper Chromatographic Separation and Identification of Sugar.
6. Thin Layer Chromatographic Separation and Identification of Amino Acids.
7. Column Chromatographic Separation of Pigments from Green Leaves.
8. Column Chromatographic Separation and Estimation of Inorganic Substances.
9. Estimation of Amino Groups
10. Estimation of Phenols
11. Estimation of Sugars
12. Estimation of Amino Acids
13. Estimation of formaldehyde
14. Analysis of Oils and Fats
15. Estimation of Magnesium and Calcium in Mixture by Complexometry
16. Estimation of Copper and Zinc in a Mixture by Gravimetry
17. Estimation of Copper and Nickel in a Mixture by Gravimetry
18. Preparation of Aspirin and Analysis of a Commercial Sample of Aspirin
19. Preparation and Use of Methyl Orange – an Azo Dye
20. Preparation of Nylon 66-a Condensation Polymer
21. Preparation of Face Cream.