

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
AURANGABAD.**



SYLLABUS

M. Sc. Chemistry

(Semester I)

(Bridge Course)

Choice Based Credit and Grading System

Effective from: 2021-22

M.Sc. Chemistry

Bridge Course, Syllabus

2 Credits

30 Hrs

Spectroscopy (Unit I)

06 Hours

UV-Visible Spectroscopy: Types of electronic transitions, λ_{\max} , Chromophores and Auxochromes, Bathochromic and Hypso-chromic shifts, Intensity of absorption;

IR Spectroscopy: Fundamental and non-fundamental molecular vibrations; IR absorption positions of O, N and S containing functional group, Fingerprint region and its significance;

NMR Spectroscopy: Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it; Spin-spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics; Interpretation of NMR spectra of simple compounds.

Mass Spectroscopy-Basic principle, Fragmentation, Rule thirteen, Nitrogen rule, Determination of m/e ratio.

Basics of Organic Chemistry (Unit-II)

08 Hours

Electronic Displacements: Inductive, electrometric, resonance and mesomeric effects, hyper conjugation and their applications; Dipole moment; Organic acids and bases. Homolytic and Heterolytic fission. Curly arrow rules; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of carbocations, carbanions, free radicals and carbenes.

Reaction Mechanisms Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions Elimination reactions, E1, E2 & E1cb reactions. Saytzeff and Hofmann eliminations. Electrophilic additions their mechanisms (Markownikov/Anti-Markownikov addition. Electrophilic substitutions in aromatic system and aliphatic system. Nucleophilic substitutions SN1, SN2 and SNi mechanism. Role of solvent and stereochemistry in reaction mechanism. Lewis structure, sawhorse, Fischer's, Newman's formulae and their interconversions

Inorganic Chemistry (Unit-III)

08 Hours

Periodicity of elements: Periodicity of elements: s, p, d, f block elements, the long form of periodic table. Discussion of the following properties of the elements, with reference to s & p-

block. (a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. (b) Atomic radii (van der Waals) (c) Electronegativity, Paulings / Mullikens electronegativity scales. Ionic bond: General characteristics, Covalent bond: Lewis structure.

Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations

Physical Chemistry (Unit-IV)

08 Hours

Atomic structure: Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrodinger's wave equation,

Chemicals Kinetics: Chemical Kinetics and its scope, rate of reaction, factors influencing the rate of reaction - concentration, temperature, pressure, solvent, light, catalyst concentration dependence of rates. Derivation of rate law and characteristics of simple chemical reactions - zero order, first order, second order, Pseudo order, half life.