

Satyaniketan's

Adv. M. N. Deshmukh Arts, Science and Commerce College,
Rajur, Tal. Akole, Dist. Ahilyanagar

Department of Chemistry

ANNUAL TEACHING PLANNING

2026-2027

Class- S. Y. B. Sc.

((As Per National Education Policy-2020))

Semester- IV

Subject-

CHE-251-MJ-T: Organic Chemistry

Month	Chapter	Number of Periods
January	Chapter 1 : Structure, Acidity and Basicity Introduction to acidity and basicity, Lowry-Brønsted and Lewis acids and bases, concept of conjugate acids and bases, pKa, simple and substituted aliphatic acids, phenols, aromatic carboxylic acids, bases, pKb, aliphatic and aromatic bases, Introduction to types of organic reactions, concept of Reaction Mechanisms, energetics of reaction	06
February	Chapter 2 : Reactivity and Reactions of halogenated hydrocarbons Introduction and classification, general methods of preparation, reactivity of alkyl, aryl, allyl and vinyl halides, Nucleophilic substitution reactions: SN1 and SN2, Factors affecting SN1 and SN2 reactions, Elimination reactions: E1 and E2, and comparative study of substitution and elimination reactions of alkyl halides, Nucleophilic aromatic substitution (SNAr) reactions	10

March	Chapter 3 : Oxidizing and reducing agents Oxidizing Reagents: Jones oxidation, Potassium permanganate, m-CPBA, Osmium tetroxide, Criegee Oxidation, O ₃ , Selenium dioxide, Reducing Reagents: Catalytic hydrogenation, LAH, SBH, DIBAL, Reduction of alkynes by Lindlar's catalyst and Na/NH ₃ , Clemmensen reduction, Wolff-Kishner reduction	08
April	Chapter 4 : Stereochemistry of mono and di-substituted cyclohexane Stability of chair conformation, ring flipping, Mono and di-substituted cyclohexanes, 1, 3-diaxial and butane-gauche interactions, cis and trans stereochemistry, optical activity, energy profile diagrams and stability	06

Semester- IV

CHE-291-MN-T: Organic and Analytical Chemistry

Month	Chapter	Number of Periods
January	Chapter 1: Structure, Acidity and, Basicity Introduction to acidity and basicity, Lowry-Brønsted and Lewis acids and bases, concept of conjugate acids and bases, pKa, simple and substituted aliphatic acids, phenols, aromatic carboxylic acids, bases, pKb, aliphatic and aromatic bases	08
February	Chapter 2: Reactivity and Reactions of halogenated hydrocarbons Introduction and classification, general methods of preparation, reactivity of alkyl, aryl, allyl and vinyl halides, Nucleophilic substitution reactions: SN1 and SN2, Factors affecting SN1 and SN2 reactions, Elimination reactions: E1 and E2. Nucleophilic aromatic substitution (SNAr) reactions.	07

Class- T. Y. B. Sc.

(As Per National Education Policy-2020)

Semester- V

Subject-

CHE-304-MJ-T: ANALYTICAL CHEMISTRY II

Month	Chapter	Number of Periods
July	Chapter 1: Gravimetric Analysis Introduction to gravimetric analysis; Precipitation methods; The colloidal state; Super saturation and precipitate formation; The purity of the precipitate: Co-precipitation; Conditions of precipitation; Precipitation from homogeneous solution; Washing the precipitate; Ignition of the precipitate: quantitative separations based upon precipitation methods: Fractional precipitation; Organic precipitants (8-hydroxyquinoline, DMG, Cupferron, Nitron, and Benzoin-alfa oxime, Anthranilic acid), Gravimetric Calculations-How Much Analyte is there (Ref-3) Applications of Gravimetry: Determination of Al(III) by 8-hydroxyquinoline, Determination of calcium as oxalate, Numerical	06
August	Chapter 2: Thermal Methods of Analysis General discussion, Thermogravimetry, Experimental factors affecting TG analysis, Instruments for thermogravimetry, Applications: Thermogravimetric analysis of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, Differential Thermal Analysis: Introduction, instrumentation	06

	for DTA and DSC, experimental and instrumental factors, applications: DTA of copper sulphate pentahydrate, Purity of Pharmaceutical by DSC	
September	Chapter 3: Column Chromatography Introduction, HETP, Match Box Model, Principle of Column Chromatography, Ion Exchange Chromatography: Ion exchange resins, action of ion exchange resin (Ion exchange equilibria, Ion exchange capacity), Experimental technique, Application: i) Separation Metal ions / non-metal ions on Ion Exchange Chromatography (Zn(II) and Mg(II), Cl- and Br-), ii) Purification of water, (Ref-5: 186-192, 205-209) Adsorption Chromatography Liquid solid chromatography: Introduction, the technique of conventional chromatography, column packing materials, Selection of solvent for adsorption chromatography, Adsorption column preparation and loading, Application: Purification of anthracene	07
October	Chapter-4: High Performance Liquid Chromatography Introduction, Types of liquid chromatography (liquid-solid, liquid-liquid), Choice of mode of separation, Equipment for HPLC: mobile phase, sample injection and column design (mobile phase, optimization of mobile phase, gradient elution, solvent delivery and sample injection, sample injection system, the column (effect of column length and column diameter), Choosing the Detector, Ultraviolet detector, Luminescence detector, electrochemical detector, Column efficiency, HPLC	07

	chromatogram and its characteristics (retention time, peak height, peak area), Method of quantitative analysis by HPLC, Example: Determination of aspirin, phenacetin and caffeine in a mixture, Numerical	
November	Chapter 5: Gas Chromatography Introduction, Apparatus: A supply of carrier gas from a highpressure cylinder, Sample injection system and derivatization, The column (Packed columns, Open tubular columns), Detectors (TCD, FID, ECD), Quantitative analysis by GC (Area normalization method and internal standard addition method), Elemental analysis, numerical	04

CHE-311-MJ-T: ENVIRONMENTAL CHEMISTRY

Month	Chapter	Number of Periods
July	Chapter 1: Fundamentals of Environmental Chemistry 1.1 Scope, relevance, and interdisciplinary nature of environmental chemistry 1.2 Environmental segments: atmosphere, hydrosphere, lithosphere, biosphere 1.3 Chemical composition of the environment 1.4 Biogeochemical cycles: carbon, nitrogen, sulfur, and phosphorus 1.5 Energy flow in ecosystems 1.6 Role of chemistry in environmental protection 1.7 Case study: Urban air pollution due to vehicular emissions.	04
August	Chapter 2: Atmospheric Chemistry and Air pollution 2.1 Structure and chemical composition of the atmosphere 2.2 Air pollutants: classification, sources, and effects 2.3 Photochemical smog: formation and effects 2.4 Greenhouse gases, global warming, and climate change 2.5 Ozone layer depletion and control strategies 2.6 Case study: Bhopal Gas Tragedy	06
September	Chapter 3: Water Chemistry and Water Pollution 3.8 Sources of water pollution: domestic, industrial, agricultural 3.9 Water quality parameters: pH, DO, BOD, COD, TDS, hardness 3.10 Eutrophication: causes, chemical mechanism and control 3.11 Water treatment methods: Physical processes, Chemical processes, biological processes 3.12 Drinking water standards	06

	(WHO/BIS) 3.13 Case study: River pollution and Sewage Treatment Plant (STP).	
October	Chapter 4: Soil Chemistry & Solid Waste Management 4.1 Soil Composition and Soil Chemistry 4.2 Soil pollution: fertilizers, pesticides, and heavy metals 4.3 Chemistry of pesticides and their degradation 4.3 Solid Waste: classification and chemical composition 4.4 Hazardous waste and e-waste 4.5 Waste minimization and recycling strategies	06
November	Chapter 4: Toxic Chemicals & Green Sustainable Chemistry 5.1 Heavy metals: sources, toxicity, and remediation 5.2 Persistent organic pollutants (POPs) 5.3 Principles of green chemistry 5.4 Green solvents: Water, Supercritical Carbon Dioxide (scCO ₂), Ionic Liquids, Bio-Based Solvents, Glycerol, 2-Methyltetrahydrofuran (2-MeTHF), etc. 5.5 Sustainable development and ethics	05

Semester-VI

CHE-354-MJ-T: ANALYTICAL CHEMISTRY III

Month	Chapter	Number of Periods
December	Chapter 1 : Spectrophotometry Introduction, Wave properties of electromagnetic radiation, Relation between frequency, velocity and wave number, particle properties of electromagnetic radiation, relation between wavelength and particle properties of electromagnetic radiation, electromagnetic spectrum, interaction of electromagnetic radiation with matter, atomic spectroscopy and molecular spectroscopy, types of molecular spectra, Advantages of spectroscopy. Instrumentation, Applications of spectrophotometry, Molar composition of complexes, Spectrophotometric titration	06
January	Chapter 2 : Atomic Absorption Spectroscopy Introduction, Elementary theory, Instrumentation, flames, the nebulizer-burner system, non flame techniques, (graphite furnace, cold vapour technique), resonance line sources, monochromator, detectors, interferences, chemical interferences, background correction methods, Atomic absorption spectrophotometers, Experimental preliminaries (calibration curve methods, standard addition method) Preparation of sample (wet ashing, fusion, Dry ashing, microwave dissolution, concentration procedures), Detection limits, Estimation of Ca and Mg in water	06
February	Chapter 3: Flame Emission Spectroscopy	

	Introduction, emission spectra, flame emission spectroscopy, flame photometers. Evaluation methods, calibration curve procedure, the standard addition technique, Applications: determination of alkali metals by flame photometry, determination of trace elements in contaminated soil. Numerica	06
March	Chapter 4 : Electrochemical Methods- Polarography and Voltammetry Polarography: Introduction, Principles, Electrodes, Instrumentations, Dropping Mercury Electrodes, Factors affecting polarographic current, Oxygen removal, Polarographic analysis, AC Polarography, Pulse Polarography, Differential Pulse Polarography, Square Wave Polarography, Numerical	12
April	Revision	