Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
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DEPARTMENT OF CHEMISTRY
PROGRAM: M. SC CHEMISTRY
ACADEMIC YEAR: 2024-2025

Course Code	Course Title	CO No	Description of the course Outcome
23CY5101	Symmetry & Molecular Spectroscopy	CO1	Demonstrate symmetry elements, operations, and groups by representing them in matrices
		CO2	Employ the basic principles of Spectroscopic methods
		CO3	Explore the basic principles of Microwave, photoelectron ESR Spectroscopy
		CO4	Illustrate the basic principles of Raman, Mossbauer, X-ray, Laser Spectroscopy
23CY5102	Chemical Bonding & Coordination chemistry	CO1	Predict the shapes of molecules, illustrating the bonding models and applying them to simple molecules
		CO2	Predict the shapes of molecules, illustrating the bonding models and applying them to simple molecules
		CO3	Illustrate the bonding models, structures, reactivities, and applications of coordination complexes
		CO4	Illustrate spectral and magnetic properties, color, and analytical applications of transition metal complexes
		CO5	Perform chemical reactions to prepare inorganic complexes and analyse samples for quantitative determinations.
23CY5103	Structural Organic & Stereochemistry	CO1	Illustrate the aromaticity of organic compounds
		CO2	Apply the reaction intermediates in organic reaction mechanism.
		CO3	Apply the theories of various energy diagrams in the organic reaction mechanism
		CO4	Interpret the symmetry of organic molecules
		CO5	Derive the necessary pathways to identify the chemical composition in the given binary mixture and the synthesis of organic molecules.

23CY5104	Molecular thermodynamics & Chemical kinetics	CO1	Utilize the concepts of Classical thermodynamics & laws of thermodynamics
		CO2	Develop the applications of Surfactants and Macromolecules
		CO3	Apply the concept of rate of change associated with chemical change
		CO4	Utilize the concepts of photo chemistry & luminescence in theoretical methods for treating excited states.
		CO5	An ability to analyze, generate experimental skills towards the industrial applications.
23CY5121	Concepts of Organic Synthesis	CO1	Apply the nucleophilic addition reactions in synthesizing organic compounds
		CO2	Use of various organic reagents to synthesize organic compounds
		CO3	Apply various reaction pathways, addition to Carbon-Hetero Multiple Bonds to develop new and notable organic compounds.
		CO4	Illustrate the synchronous reactions in organic reaction mechanisms.
23CY5122	Separation Techniques	CO1	Describe the theory and principles of chromatographic separation.
		CO2	Discuss principle of paper chromatography, different techniques, and its modification to thin layer chromatography for analytical applications
		CO3	Describe the Ion exchange & Ion chromatography
		CO4	Explain the Liquid-Liquid chromatographic techniques, instrumentation, and Applications.
23IE5201	Essentials of Research Design	CO1	Illustrate Research objects, steps involved in research and articulate appropriate Research Questions
		CO2	Perform Literature Review in a Scholarly style and apply appropriate methods for Data collection
		CO3	Represent the data in tabular/Graphical form and prepare data for analysis
		CO4	Perform statistical modelling and analysis to optimize the data, prepare the data for publishing.

23CY5205	Reaction mechanism and organometallic Chemistry	CO1	Analyse the various reaction mechanisms of coordination complexes.
		CO2	Predict the thermodynamics of complex formation and properties of acids and bases in aqueous medium
		CO3	Demonstrate structure and bonding of d-block organometallic complexes
		CO4	Determine structures of metal clusters and categorize the reactions of d-block organometallic complexes
		CO5	Perform chemical reactions to prepare inorganic complexes and analyse samples for quantitative determinations.
2CY5206	Quantum, Surface & Electrochemistry	CO1	Utilize the tools of quantum chemistry to analyse the structure and dynamics of molecules.
		CO2	Make use of adsorption process and its mechanisms on the *surfaces*
		CO3	Critically evaluate and apply electrochemical theories and models.
		CO4	Analyse the stability of thermodynamic systems and apply theories of phase transitions.
		CO5	An ability to analyse, generate experimental skills towards the industrial applications.
23CY5207	Biomolecules	CO1	Interpret the structure, functions, and chemistry of carbohydrates with respect to their pharmacological activity
		CO2	Demonstrate the structure, function of amino acids and proteins and explain their metabolic pathways.
		CO3	Relate the structure of nucleic acids with their functionality and understand the central dogma of molecular biology.
		CO4	Illustrate the physicochemical properties and characterization of fats and oils.
		CO5	Apply the principles of chromatography, and qualitative analysis to isolate, separate and identify various biomolecules.

23CY52E5	Nano chemistry (Prof. Elective)	CO1	Describe a working knowledge of the basic concept of nano chemistry and changes of chemical and physical properties.
		CO2	Analyse several synthetic methods for the fabrication of nano particles.
		CO3	Apply the links between structure and catalytical activity of the nanomaterials.
		CO4	Illustrate the application and prospects of nano chemistry
23CY52E1	Biosensors and Diagnostic Devices (Prof. Elective)	CO1	Demonstrate the working mechanism and applications of biosensors towards clinical diagnosis
		CO2	Discuss the principle of various structural and morphological techniques and apply them for clinical quantitative analysis
		CO3	Illustrate the working principles and fabrication of different biosensors
		CO4	Discuss the principle of various diagnostic devices and apply them in clinical samples to understand working principles
23UC5201	Professional Communication Skills	CO1	To develop and demonstrate principles of listening, speaking, reading, and writing in various functional contexts
		CO2	To demonstrate different types of personal and professional skills and apply them for growth in professional zone.
		CO3	Apply the concepts of Mathematical Principles to solve problems on Arithmetic, Algebra & Geometry to improve problem solving ability.
		CO4	Apply the concepts and using Logical thinking to solve problems on verbal & Non-Verbal Reasoning to develop Logical thinking skills.
23CY61E2	Instrumental Methods of Chemical Analysis (Prof. Elective)	CO1	Demonstrate the working mechanism and applications of voltametric techniques towards pharmaceutical drug analysis and environmental monitoring
		CO2	Discuss the principle of fluorescence spectroscopy and apply it for clinical quantitative analysis
		CO3	Apply the basic principles of IR and Mass spectroscopy for the interpretation of organic molecules
		CO4	Apply the basic principles of thermal and radiochemical methods of analysis for the determination of stability of compounds and quantitative estimations of radioactive elements

		CO5	Apply the key concepts of instrumentation techniques to set a procedure for the analysis of target species of interest and analyze the obtained results
23CY61E3	Chromatographic techniques and method validation (Prof. Elective)	CO1	Apply the principles and common applications of a Gas chromatographic techniques
		CO2	Apply Liquid-liquid partition chromatography principles to the development and validation of complex chemical methods
		CO3	Apply LC-MS principles to the development and validation of complex biochemical methods.
		CO4	Interpret chromatograms and analyze and interpret retention times, peak shapes, and peak resolution.
23CY61E4	Applied Chemical Analysis (Prof. Elective)	CO1	Understand the principles, methodology and adoptability various procedures for the analysis of Analysis of Iron, Manganese, Chromite, Phosphate and Aluminium Ores
		CO2	Discuss, explain, and illustrate the applications of the general methods of analysis for finished products such as Steel, dolomite, fire clay, four spar and magnesite
		CO3	Finding the adoptability by applying the general methods of analysis for Cement, Soaps, Oils, and paints analysis
		CO4	Explain and apply the various principles involved in the chemical and physicochemical analysis of Organic Functional Groups
		CO5	Analysis of chemicals by instrumental methods
23CY61E6	Organic Synthesis (Prof. Elective)	CO1	Apply appropriate reagents and reaction conditions to achieve selective carbon- carbon bond formation.
		CO2	Use knowledge of reaction conditions, catalysts, and reagents to design and executive selective functionalization reactions of organoboranes and silanes.
		CO3	Employ appropriate oxidizing and reducing agents and reaction conditions to achieve selective transformations.
		CO4	Design synthetic route utilizing phase transfer catalysis, retro synthetic approach, polymerization mechanism to achieve challenging transformations.
		CO5	Execute multi-step synthetic sequences to synthesize target molecules efficiently and demonstrate a deep understanding of reaction mechanisms and reaction optimization.

23CY61E7	Organic spectroscopy (Prof. Elective)	CO1	Demonstrate UV-VISIBLE and Applications towards deduction of the structure of Molecule
		CO2	Explore IR Spectroscopy and Applications towards deduction of the structure of Molecule
		CO3	Depreciate NMR- Spectroscopy and Applications towards deduction of the structure of Molecule
		CO4	Illustrate the Mass Spectroscopy and Applications towards deduction of the structure of Molecule
23CY61E8	Natural Products & Heterocyclic Chemistry (Prof. Elective)	CO1	Illustrate the drug metabolic pathways, adverse effect and therapeutic value of alkaloids and steroids.
		CO2	Interpret the mechanistic pathways and mode of action of different class of medicinal compounds like terpenoids and vitamins.
		CO3	Explore chemical behaviour of aromatic heterocycles, use of heterocycles in functional group and ring transformations.
		CO4	Illustrate the synthesis, reactions of Meso-ionic compounds and interpret the special feature of aliphatic heterocycles.
		CO5	Isolate, analyse independent investigations of natural products, and use classical synthetic methods to synthesize heterocyclic compounds.

Academic Professor I/C

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