



## 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: 2018-2019

Course Code	Course Title	CO No	Description of the course Outcome
18CY1101	General Chemistry-I	CO1	Discuss various principles of statistical data treatment to validate analytical results
		CO2	Relate suitable chemical reactions to titrations with its mechanism
		CO3	Understand the basic principles of Visible spectrophotometry and potentiometry to employ them in analytical applications
		CO4	Developing small computer codes to solve basic chemistry problems
18CY1102	Inorganic Chemistry- I	CO1	Explain the bonding fundamentals for both ionic and covalent compounds, including electronegativities, bond distances and bond energies using MO diagrams and thermodynamic data
		CO2	Predicting geometries of simple molecules
		CO3	Explain the uses of group theory to recognize and assign symmetry characteristics to molecules and objects, and to predict the appearance of a molecule's vibrational spectra as a function of symmetry
		CO4	Illustrate the bonding models, structures, reactivities, and applications of coordination complexes, boron hydrides, metal carbonyls, and organometallics
		CO5	The design and application of an analysis related to a question of relevance based on experience in the laboratory and research of the scientific literature.
18CY1103	Organic Chemistry-I	CO1	Describe the structure and reactivity of chemical constituents of various reaction processes.

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		CO2	Apply Nucleophilic Substitution reaction mechanism in the synthesis of desired organic entities.
		CO3	Evaluate the properties of organic chemical constituents with respect to their spatial orientation.
		CO4	Adopt the green synthetic approaches for developing conventional and nano materials.
		CO5	Knowledge in this course will train the students in scientific research approach.
18CY1104	Physical Chemistry-I	CO1	Understand the concepts of Classical thermodynamics & laws of thermodynamics
		CO2	Understand the applications of Surfactants and macromolecules
		CO3	Discuss the different aspects of kinetics of the types of reactions.
		CO4	Understand the concepts of photo chemistry & luminescence
		CO5	An ability to analyze, generate experimental skills towards the industrial applications.
18CY2101	General Chemistry-II	CO1	Describe symmetry elements, operations and groups by representing them in matrices
		CO2	Demonstrate various molecular spectroscopic terms with their theoretical background
		CO3	Apply the basic principles of classical and quantum theory of Raman spectroscopy in analytical applications
		CO4	Employ Nuclear magnetic resonance spectroscopy to interpret organic molecules
18CY2102	Inorganic Chemistry-II	CO1	Understand the principles behind the formation of metal cluster compounds.
		CO2	Explain the synthesis, properties, bonding, and structures of $\pi$ -complexes of transition metals.
		CO3	Illustrate the principles behind the Metal Ligand equilibria in solution with respect to the formation, their Kinetic and thermal stability, and determinations.

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		CO4	Explain the features of Inorganic reaction mechanisms
		CO5	Ability to prepare complex compounds and determine the concentrations
18CY2103	Organic Chemistry - II	CO1	Derive the Electrophilic addition reaction mechanisms of C=C compounds
		CO2	Describe the relationship among aromatic substitution and addition reactions.
		CO3	Apply various reaction pathways to develop new and notable organic compounds.
		CO4	Differentiate the Alkaloids and Terpenoids by their unique properties.
		CO5	An ability to analyze, generate experimental skills towards the industrial applications.
18CY2104	Physical Chemistry- II	CO1	Physical methods of molecular structure determination.
		CO2	Application of Electron Spin Resonance spectroscopy.
		CO3	Discuss fundamental aspect of electrochemistry for energy device application.
		CO4	Electrochemistry of electrode electrolyte interface
		CO5	An ability to analyze, generate experimental skills towards the industrial applications.
18CY2111	Separation Techniques - I	CO1	Apply the theory and principles of chromatographic separation.
		CO2	Categorize and use a suitable adsorption chromatography or electrophoretic techniques for actual analytical problems
		CO3	Suggest and justify most suitable and efficient separation technique to be employed for an analysis based on strengths and limitations of GC and HPLC.
		CO4	Categorise zeolites and apply them in various chromatographic techniques, understand Liquid Chromatography – Principle, methods, applications with examples
		CO5	Apply the key concepts of instrumentation techniques to set a procedure for the analysis of target species of interest.

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18CY 2112	Quality Control & Traditional Methods of Analysis-I	CO1	Explain and apply the principles of Quality control in Analytical Chemistry
		CO2	Explain and apply the various concepts of decomposition techniques in analysis
		CO3	Illustrate, discuss, and apply the various principles behind the various Red-ox systems involved in the classical Volumetric methods of Analysis.
		CO4	Explain and apply the various principles involved in the analysis of Organic Functional Groups.
		CO5	Expertising the student in the analyses of ores, oils, fats and soaps and also to assess the quality of water.
18CY2113	Applied Analysis	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.
18 CY 2114	Instrumental Methods of Analysis	CO1	Understand the basic concepts of UV-Visible Spectroscopy.
		CO2	Demonstrate the instrumentations and applications of Spetrofluorimetry and chemiluminescence.
		CO3	Apply the basic principles of IR and Mass spectroscopy in analytical applications.
		CO4	Understand the basic principles of X-ray spectroscopy and surface characterization techniques.
18CY2115	Applications of Chemical Spectroscopy	CO1	Discuss the fundamental principles of basic characterization techniques
		CO2	Apply NMR techniques in the elucidation of complex molecules

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		CO3	Determination of elemental or isotopic signature of sample
		CO4	Identification of chemical structure of a molecule by spectroscopy
18 CY 2116	Bio analytical Chemistry	CO1	Understand the basic principles of bioanalysis
		CO2	Explain the basic concept of Radiochemical Manometric and Calorimetric
		CO3	Apply electrophoretic method in bioassay
		CO4	Explain and apply biosensors in biomolecule analysis
18 CY 2117	Environmental Chemistry	CO1	Understand greenhouse effect concept
		CO2	Employ various sampling techniques for air sampling
		CO3	Understand various pollution monitoring techniques
		CO4	Explain environmental Impact Assessment process
18 CY 2117	Environmental Chemistry	CO1	Understand greenhouse effect concept
		CO2	Employ various sampling techniques for air sampling
		CO3	Understand various pollution monitoring techniques
		CO4	Explain environmental Impact Assessment process
18 CY 2118	Surface Analytical Techniques	CO1	Understand the basic principles of Electron Spectroscopy for Chemical Analysis
		CO2	Employ Surface enhanced Raman Spectroscopy (SERS) in mapping and imaging
		CO3	Describe Electron Energy Loss Spectroscopy
		CO4	Apply Low Energy Ion Scattering Spectroscopy for Surface structural analysis
18 CY 2119	Analysis of Foods and Drugs	CO1	Understand the importance of food analysis
		CO2	Determination of various nutrients in food samples
		CO3	Identification of food adulterants

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		CO4	Employ quantitative methods of analysis in food samples
18CY2211	Separation Methods – II	CO1	Apply the theory and principles of chromatographic separation.
		CO2	Categorize and use a suitable adsorption chromatography or electrophoretic techniques for actual analytical problems
		CO3	Suggest and justify most suitable and efficient separation technique to be employed for an analysis based on strengths and limitations of GC and HPLC.
		CO4	Categorise zeolites and apply them in various chromatographic techniques, understand Liquid Chromatography – Principle, methods, applications with examples
		CO5	Apply the key concepts of instrumentation techniques to set a procedure for the analysis of target species of interest.
18 CY 2212	Traditional Methods of Analysis- II	CO1	Explain and apply the principles of Quality control in Analytical Chemistry
		CO2	Explain and apply the various concepts of decomposition techniques in analysis
		CO3	Illustrate, discuss and apply the various principles behind the various Red-ox systems involved in the classical Volumetric methods of Analysis.
		CO4	Explain and apply the various principles involved in the analysis of Organic Functional Groups.
		CO5	Apply the key concepts of instrumentation techniques to set a procedure for the analysis of target species of interest.
18 CY 2213	Dissertation with Research Publication	CO5	Project
18 CY2214	Advanced Applied Analysis	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

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18 CY2215	Advanced Instrumental Methods of Analysis	CO1	Discuss and understand the principles and instrumentation involved in the Flame photometry. Atomic Absorption Spectrometer, inductively coupled plasma spectrometer and Arc and Spark spectrographic Direct analysis.
		CO2	Discuss and apply the various principles and methodology in TGA, DTA and DSC
		CO3	Discuss and apply the principles and methodology involved in Voltammetry, polarography, Anode stripping voltammetry and Coulometry.
		CO4	Discuss the principles and methodology in assaying the analytes using Ion Selective Electrodes and Radio chemical methods
18 CY2216	Classical Methods of Analysis	CO1	Understand the principles of Quality control in Analytical Chemistry
		CO2	Explain the various concepts of decomposition techniques in analysis
		CO3	Illustrate, discuss and apply the various principles behind the various Redox systems involved in the classical Volumetric methods of Analysis.
		CO4	Explain the various principles involved in the analysis of Organic Functional Groups
18 CY 2101	Photo Chemistry and pericyclic reactions	CO1	Adopt addition and elimination mechanism in order to understand selected named reactions
		CO2	Conclude classification and mechanistic treatment of nucleophilic, electrophilic and free radical rearrangements.
		CO3	Summarize basic concepts behind organic photo chemistry
		CO4	Select and photo chemical concepts to generate enone and aromatic compounds.
		CO5	To analyze organic molecules from binary mixtures
18 CY 2102	Organic Synthesis-I	CO1	Apply organo silanes and phase transfer catalyst in organic synthesis
		CO2	Choose appropriate oxidizing agents in oxidative coupling reactions
		CO3	Choose appropriate reducing agents in reducing coupling reactions
		CO4	Develop convergent and linear synthetic methods using disconnection approach
		CO5	To analyze organic molecules from binary mixtures

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18 CY2104	Techniques for modern industrial applications	CO1	Apply the theory and principles of chromatographic separation.
		CO2	Categorize and use a suitable adsorption chromatography or electrophoretic techniques for actual analytical problems
		CO3	Suggest and justify most suitable and efficient separation technique to be employed for an analysis based on strengths and limitations of GC and HPLC.
		CO4	Illustrate the properties, significance and use of biopolymers and coumarins as tools in molecular research based on their structure
18 CY2105	Advanced Heterocyclic chemistry	CO1	To classify, synthesis and reactivity of simple heterocyclic aromatic and non-aromatic compounds as electron deficient or electron rich and explain their reactivity based on these properties
		CO2	Apply the aromaticity, reactivity and synthesis of Five, six membered heterocyclic compounds with two hetero atoms
		CO3	Apply the aromaticity, reactivity and synthesis of heterocyclic compounds with more than hetero atoms
		CO4	Apply the synthesis, structure, reactivity and stability of larger ring heterocyclics
18 CY2106	Bio Organic Chemistry	CO1	Recognize the structure and function of Carbohydrates, Lipids, Amino acids, proteins, nucleotides and nucleic acids.
		CO2	Understand the reactions of the major catabolic and anabolic pathways of carbohydrates, Lipids, Amino acids, metabolism.
		CO3	Understand the signalling pathways of Lipids and Amino acids.
		CO4	Demonstrate the chemistry and kinetics of enzymes.
18 CY2107	Green Chemistry	CO1	Explain basic principles of green and sustainable chemistry.
		CO2	Understand the Stoichiometric calculations and relate them to green process metrics.
		CO3	Review the principles of catalysis, photochemistry and other interesting processes from the viewpoint of Green Chemistry.
		CO4	Apply alternative solvent media and energy sources for chemical processes.
18 CY2108	Food Chemistry	CO1	Explain properties and reactions of carbohydrates, lipids and proteins during storage and processing of food.

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		CO2	Identify the important sources of vitamins and minerals in food and their affect in quality aspects of food.
		CO3	Explain the importance of water for stability and quality of food.
		CO4	Understand the sources of important classes of undesirables in food and the HACCP term.
18 CY2109	Medicinal chemistry	CO1	To understand the drug metabolic pathways adverse effects and the therapeutic value of drugs.
		CO2	To know the structure activity relationship of the different class of drugs.
		CO3	To describe the mechanisms pathways of different class of medicinal compounds.
		CO4	To understand the chemistry of drugs with respect to their pharmacological activity
18 CY 2201	Organic Reaction Mechanisms and Named Reactions	CO1	Explain the mechanism molecular rearrangement reactions
		CO2	Illustrate reaction mechanisms for some named reactions
		CO3	Explain the theory and principles involved in Photochemical reactions
		CO4	Explain about Concerted reactions with cyclic transition state reactions
		CO5	To Carry out synthesis of various heterocyclic compounds.
18 CY 2202	Organic Synthesis-2	CO1	Explain the properties of Oxidising agents and reducing agents
		CO2	Illustrate reaction mechanisms for some Organosilane related compounds
		CO3	Explain theory and principles involved in Disconnection approach and principals of Phase transfer catalysis
		CO4	Explain about the Retrosynthesis and applied to various cyclic organic molecules
		CO5	To carryout multistep synthesis of organic molecules

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18 CY2203	Dissertation with Research Publication	CO5	Project
18 CY2204	Advanced Organic Spectroscopy	CO1	Outline optical rotatory dispersion and circular dichroism.
		CO2	Examine the separation of chemical shifts and coupling on 2D axis
		CO3	Take part in fragmentation of organic molecules associated with functional groups
		CO4	Elucidate organic structures using mass fragmentation ORD&CD
18 CY2205	Natural Products and Biomolecules	CO1	Illustrate the synthesis and significance of microbial metabolites
		CO2	Outline the origin & chemical nature of Terpenes
		CO3	Outline the origin & chemistry of Alkaloids
		CO4	Demonstrate properties & synthetic methods of peptides
18 CY2206	Organometallic Chemistry	CO1	To explain the structure, synthesis, bonding, properties of the transition metal organo compounds.
		CO2	To describe the industrial significant processes through the application of organo metallic principles.
		CO3	To utilize the professional level skills in a chemical synthetic laboratories safety especially in the areas of air sensitive reagents.
		CO4	Demonstrate affective report writing, experimental design and data analysis.

  
Academic Professor I/C

  
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