KRISHNASAMY

College of

SCIENCE, ARTS & MANAGEMENT FOR WOMEN

Empowerment through Perseverance (Affiliated to Annamalai University, Chidambaram/ Recognised by UGC under 2(f) section)

Department of Chemistry

B.Sc CHEMISTRY

Krishnasamy College of Science, Arts and Management for Women, Cuddalore
Department of Chemistry

Program: B.Sc. CHEMISTRY
Program Code: 204

PROGRAMME OUTCOME

PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study

PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation

PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.

PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO13: Moral and ethical awareness/reasoning: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstratingthe ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Krishnasamy College of Science, Arts and Management for Women, Cuddalore
Department of Chemistry
COURSE OBJECTIVES & COURSE OUTCOMES

SEMESTER - I

COURSE CODE : 23UCHEC13
COURSE TITLE : GENERAL CHEMISTRY-I

COURSE OBJECTIVES:

- Various atomic models and atomic structure
- Wave particle duality of matter
- Periodic table, periodicity in properties and its application in explaining the chemical behaviour
- Nature of chemical bonding, and
- Fundamental concepts of organic chemistry

COURSE OUTCOMES:

CO1: Explain the atomic structure, wave particle duality of matter, periodic properties bonding, and properties of compounds.
CO2:Classify the elements in the periodic table, types of bonds, reaction intermediates electronic effects in organic compounds, types of reagents.
CO3: Apply the theories of atomic structure, bonding, to calculate energy of a spectral transition, δx, δp electronegativity, percentage ionic character and bond order.
CO4:Evaluate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions; structure reactivity and electronic effects
CO5:Construct mo diagrams, predict trends in periodic properties, assess the properties of elements, and explain hybridization in molecules, nature of h – bonding and organic reaction mechanisms.

COURSE CODE : 23UCHEP14
COURSE TITLE :QUANTITATIVE INORGANIC ESTIMATION (TITRIMETRY) AND INORGANIC PREPARATIONS

COURSE OBJECTIVES:

- Laboratory safety
- Handling glasswares
- Quantitative estimation
- Preparation of inorganic compounds
- To develop the skill in finding out the end points of various types of indicators

COURSE OUTCOMES:

CO1: Explain the basic principles involved in titrimetric analysis and inorganic preparations.
CO2: Compare the methodologies of different titrimetric analysis.
CO3: Calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution.
CO4. Indetify the end point of various titrations
CO5 acquire knowledge on the systematic analysis of mixture of salts., identify the cations and anions in the unknown substance.
CO5: Handle the common apparatus used in volumetric estimation.

COURSE CODE : 23UCHEF17
COURSE TITLE : INTRODUCTORY CHEMISTRY

COURSE OBJECTIVES:

- Lab safety and Nature of chemicals.
- Types of titrations and Concentration terms.
- Semi micro analysis and precipitation techniques.
- Organic analysis
- Gravimetric Principles

COURSE OUTCOMES:

CO1: To understand laboratory safety and hygiene.
CO2: To understand principle of titrations.
CO3: To understand semi micro analysis.
CO4: To understand basics of organic compound analysis.
CO5: To understand about gravimetric analysis

COURSE CODE : 23UCHEE15
COURSE TITLE : CHEMISTRY FOR PHYSICAL SCIENCES– I

COURSE OBJECTIVES:

- Basics of atomic orbitals, chemical bonds, hybridization
- Concepts of thermodynamics and its applications.
- Concepts of nuclear chemistry
- Importance of chemical industries
- Qualitative and analytical methods.

COURSE OUTCOMES:

CO1: Gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications.
CO2: Evaluate the efficiencies and uses of various fuels and fertilizers
CO3: Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.
CO4: Apply various thermodynamic principles, systems and phase rule.

CO5:Explain various methods to identify anappropriate method for the separation of chemical components

COURSE CODE : 23UCHEEP1
COURSE TITLE :CHEMISTRY FOR PHYSICAL SCIENCE PRACTICAL – I

COURSE OBJECTIVES:

- Basics of preparation of solutions.
- Principles and practical experience of volumetric analysis

COURSE OUTCOMES:

CO 1: Gain an understanding of the use of standard flask and volumetric pipettes, burette.
CO 2: Design, carry out, record and interpret the results of volumetric titration.
CO 3: Apply their skill in the analysis of water/hardness.
CO4: Analyze the chemical constituents in allied chemical products

COURSE CODE : 23UCHEN16
COURSE TITLE : ROLE OF CHEMISTRY IN DAILY LIFE

COURSE OBJECTIVES:

- Importance of chemistry in everyday life
- Chemistry of building materials and food
- Chemistry of drugs and pharmaceuticals

COURSE OUTCOMES:

CO1: Learn about the chemicals used in everyday life as well as air pollution and water pollution.
CO2:Get knowledge on building materials cement, ceramics, glass and plastics, polythene, PVC bakelite, polyesters,
CO3: Acquire information about Food and Nutrition. Carbohydrates, Proteins, Fats Also have an awareness about Cosmetics Tooth pastes, face powder, soaps and detergents.
CO4: Discuss about the fertilizers like urea, NPK fertilizers and super phosphate. Fuel classification solid, liquid and gaseous; nuclear fuel - examples and uses
CO5: Have an idea about the pharmaceutical drugs analgesics and antipyretics like paracetamol and aspirin and also about pigments and dyes and its applications.

SEMESTER - II

COURSE CODE : 23UCHEC23
COURSE TITLE : GENERAL CHEMISTRY-II

COURSE OBJECTIVES:

- Chemistry of acids, bases and ionic equilibrium
- Properties of s and p-block elements
- Chemistry of hydrocarbons
- Applications of acids and bases
- Compounds of main block elements and hydrocarbons

COURSE OUTCOMES:

CO1:Explain the concept of acids, bases and ionic equilibria; periodic properties of s and p-block elements, preparation and properties of aliphatic and aromatic hydrocarbons
CO2:Discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids
CO3:Classify hydrocarbons, types of reactions, acids and bases, examine the properties and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons
CO4:Explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements
CO5:Assess the application of hard and soft acids indicators, buffers, compounds of s and p-block elements and hydrocarbons

COURSE CODE : 23UCHEP24
COURSE TITLE : QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS

COURSE OBJECTIVES:

- Laboratory safety
- Handling glass wares
- Analysis of organic compounds
- Preparation of organic compounds

COURSE OUTCOMES:

CO1: Observe the physical state, odour, colour and solubility of the given organic compound.
CO2: Identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.
CO3: Compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non- reducing sugars and explain the reactions behind it.
CO4: Exhibit a solid derivative with respect to the identified functional group.

COURSE CODE : 23UCHEE25
COURSE TITLE : CHEMISTRY FOR PHYSICAL SCIENCES– II

COURSE OBJECTIVES:

- Co-ordination Chemistry and Water Technology
- Carbohydrates and Amino acids
- basics and applications of electrochemistry
- basics and applications of kinetics and catalysis
- Various photochemical phenomenon

COURSE OUTCOMES:

CO1: Write the IUPAC name for complex, different theories to explain the bonding incoordination compounds and water technology
CO2: Explain the preparation and property of carbohydrate, amino acids and nucleic acids.
CO3: Apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuelcells.
CO4: Identify the reaction rate, order for chemical reaction and explain the purpose of acatalyst.
CO5: Outline the various type of photochemical process.

COURSE CODE : 23UCHEEP2
COURSE TITLE :CHEMISTRY FOR PHYSICAL SCIENCES PRACTICAL – II

COURSE OBJECTIVES:

- Identification of organic functional groups
- Different types of organic compounds with respect to theirproperties.
- Determination of elements in organic compounds..

COURSE OUTCOMES:

CO1:Gain an understanding of the use of standard flask and volumetric pipettes, burette.
CO 2:Design, carry out, record and interpret the results of volumetric titration.
CO 3:Apply their skill in the analysis of water/hardness.
CO4:Analyze the chemical constituents in allied chemical products

COURSE CODE : 23UCHEN26
COURSE TITLE :DAIRY CHEMISTRY

COURSE OBJECTIVES:

- Chemistry of milk and milk products
- Processing of milk
- Preservation and formation of milk products.

SEMESTER - III

COURSE CODE : 23UCHEC33
COURSE TITLE : GENERAL CHEMISTRY-III

COURSE OBJECTIVES:

- The physical properties of gases, liquids, solids and x-ray diffraction of solids.
- Fundamentals of nuclear chemistry and nuclear waste management.
- Applications of nuclear energy
- Basic chemistry of halo-organic compounds,
- Phenol and other aromaticalcohols.
- Preparation and properties of phenols and alcohols.

COURSE OUTCOMES:

CO1: Explain the kinetic properties of gases by using mathematical concepts.
CO2: Describe the physical properties of liquid and solids; identify various types of crystals with respect to its packing and apply the XRD method for crystal structure determinations.
CO3: Investigate the radioactivity, nuclear energy and it's production, also the nuclear wastemanagement.
CO4: Write the nomenclature, physical & chemical properties and basic mechanisms of haloorganic compounds and alcohols.
CO5: Investigate the named organic reactions related to phenol; explain the preparation andproperties of aromatic alcohol including thiol.

COURSE CODE : 23UCHEP34
COURSE TITLE : INORGANIC QUALITATIVE ANALYSIS

COURSE OBJECTIVES:

- To develop the skill on systematic analysis of simple inorganic salts and mixtureof salts.

COURSE OUTCOMES:

CO 1: acquire knowledge on the systematic analysis of Mixture of salts.

CO 2: identify the cations and anions in the unknown substance.

CO 3: identify the cations and anions in the soil and water and to test the quality of water.

CO4: assess the role of common ion effect and solubility product

COURSE CODE : 23UCHEP34
COURSE TITLE :ENTREPRENEURIAL SKILLS IN CHEMISTRY

COURSE OBJECTIVES:

- To learn about food adulterants and food additive
- To detect the adulterants in food items
- To gain knowledge about the preparation of simple food items and useful products of home appliances
- To learn about nutritive values of pulses and cereals

COURSE OUTCOMES:

CO1: Identify adulterated food items by doing simple chemical tests.

CO2: Prepare cleaning products and become entrepreneurs

CO3: Educate others about adulteration and motivate them to become entrepreneurs.

CO4:Explain food preservation

CO5:Gain knowledge about cereals and pulses

COURSE CODE : 23UCHEE35
COURSE TITLE :CHEMISTRY FOR BIOLOGICAL SCIENCES- I

COURSE OBJECTIVES:

- Basics of atomic orbitals, chemical bonds, hybridization and fundamentals of organic chemistry
- Nuclear chemistry and industrial chemistry
- Importance of speciality drugs and
- Separation and purification techniques

COURSE OUTCOMES:

CO1: State the theories of chemical bonding, nuclear reactions and its applications.
CO 2: Evaluate the efficiencies and uses of various fuels and fertilizers.
CO3: Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.
CO4: Demonstrate the structure and uses of antibiotics, anaesthetics, antipyretics and artificial sugars.
CO5: Analyse various methods to identify an appropriate method for the separation of chemical components.

COURSE CODE :23UCHEEP3

COURSE TITLE :CHEMISTRY PRACTICAL FOR BIOLOGICAL SCIENCES I

COURSE OBJECTIVES:

- Basics of preparation of solutions.
- Principles and practical experience of volumetric analysis

COURSE OUTCOMES:

CO1: gain an understanding of the use of standard flask and volumetric pipettes, burette.
CO2: design, carry out, record and interpret the results of volumetric titration.
CO3: apply their skill in the analysis of water/hardness.
CO4: analyze the chemical constituents in allied chemical products

SEMESTER - IV

COURSE CODE : 23UCHEC43
COURSE TITLE : GENERAL CHEMISTRY-IV

COURSE OBJECTIVES:

- Thermodynamic concepts on chemical processes and applied aspects.
- Thermo chemical calculations
- Transition elements with reference to periodic properties and group study of transition metals.
- The organic chemistry of ethers, aldehydes and ketones
- The organic chemistry of carboxylic acids

COURSE OUTCOMES:

CO1: Explain the terms and processes in thermodynamics; discuss the various laws ofthermodynamics and thermo chemical calculations.
CO2: Discuss the second law of thermodynamics and its application to heat engine; discussthird law and its application on heat capacity measurement.
CO3: Investigate the chemistry of transition elements with respect to various periodicproperties and group wise discussions.
CO4: Discuss the fundamental organic chemistry of ethers, epoxides and carbonyl compoundsincluding named organic reactions.
CO5: Discuss the chemistry and named reactions related to carboxylic acids and their derivatives; discuss chemistry of active methylene compounds, halogen substituted acidsand hydroxyl acids

COURSE CODE : 23UCHEP44
COURSE TITLE : PHYSICAL CHEMISTRY PRACTICAL

COURSE OBJECTIVES:

- The laboratory experiments in order to understand the concepts of physical changes in chemistry
- The rates of chemical reactions
- Colligative properties and adsorption isotherm

COURSE OUTCOMES:

CO1: Describe the principles and methodology for the practical work

CO2: Explain the procedure, data and methodology for the practical work.

CO3: Apply the principles of electrochemistry, kinetics for carrying out the practical work.
CO4: Demonstrate laboratory skills for safe handling of the equipment and chemicals

COURSE CODE : 23UCHES46
COURSE TITLE :INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

COURSE OBJECTIVES:

- Operation and troubleshooting of chemical instruments
- Fundamentals of analytical techniques and its application in the characterization of compounds
- Theory of chromatographic separation and theory of thermo / electro analytical techniques
- Stoichiometry and the related concentration terms

COURSE OUTCOMES:

CO1: Apply error analysis in the calibration and use of analytical instruments, explain theory, instrumentation and application of flame photometry and Atomic Absorption spectrometry
CO2: Explain theory, instrumentation and application of UV visible and Infrared spectroscopy.
CO3: Able to discuss instrumentation, theory and applications of thermal and electrochemicaltechniques
CO4: Explain the use of chromatographic techniques in the separation and identification ofmixtures
CO5: Explain preparation of solutions, stoichiometric calculations

COURSE CODE : 23UCHEE45
COURSE TITLE :CHEMISTRY FOR BIOLOGICAL SCIENCES II

COURSE OBJECTIVES:

- Nomenclature of coordination compounds and carbohydrates.
- Amino acids and essential elements of biosystem
- Understand the concepts of kinetics and catalysis
- Provide fundamentals of electrochemistry and photochemistry

COURSE CODE : 23UCHEE45
COURSE TITLE :CHEMISTRY FOR BIOLOGICAL SCIENCES II

COURSE OBJECTIVES:

- Identification of organic functional groups
- Different types of organic compounds with respect to their properties.
- Determination of elements in organic compounds.

COURSE OUTCOMES:

CO 1: Gain an understanding of the use of standard flask and volumetric pipettes, burette.
CO 2: Design, carry out, record and interpret the results of volumetric titration.
CO 3: Apply their skill in the analysis of water/hardness.
CO4: Analyze the chemical constituents in allied chemical products

SEMESTER - V

COURSE CODE : 23UCHEC51
COURSE TITLE :ORGANIC CHEMISTRY – I

COURSE OBJECTIVES:

- Stereoisomerism in chirals and geometric isomerism in olefins,conformations of ethane and butane
- Preparation and properties of aromatic and aliphatic nitro compounds and amines
- Preparation of different dyes, food colour and additives
- Preparation and properties of five membered heterocycles likepyrrole, furan and thiophene
- Preparation and properties of six membered heterocycles like
- Pyridine, quinoline and isoquinoline.

COURSE OUTCOMES:

CO1: Assign RS notations to chirals and EZ notations to olefins and explain conformations ofethane and butane.
CO2: Explain preparation and properties of aromatic and aliphatic nitro compounds andamines
CO3: Explain colour and constitution of dyes and food additives
CO4: Discuss preparation and properties of five membered heterocycles like pyrrole, furanand thiophene
CO5: Discuss preparation and properties of six membered heterocycles like pyridine, quinoline and isoquinoline

COURSE CODE : 23UCHEC52
COURSE TITLE :INORGANIC CHEMISTRY -I

COURSE OBJECTIVES:

- Nomenclature, isomerism and theory of coordination compounds, and chelate complexes
- Crystal field theory, magnetic properties, stability of complexesand jahn teller effect
- Preparation and properties of metal carbonyls
- Lanthanoids and actinoids
- Preparation and properties of inorganic polymers

COURSE OUTCOMES:

CO1: Explain isomerism, Werner's Theory and stability of chelate complexes
CO2: Discuss crystal field theory, magnetic properties and spectral properties of complexes.
CO3: Explain preparation and properties of metal carbonyls
CO4: Give a comparative account of the characteristics of lanthanoids and actinoids
CO5:Explain properties and uses of inorganic polymers of silicon, sulphur, boron andphosphorous

COURSE CODE : 23UCHEC53
COURSE TITLE :PHYSICAL CHEMISTRY -I

COURSE OBJECTIVES:

- Gibbs free energy, helmholtz free energy, ellingham's diagram and partial molar properties
- Chemical kinetics and different types of chemical reactions
- Adsorption, homogeneous and heterogeneous catalysis
- Colloids and macromolecules
- Photochemistry, fluorescence and phosphorescence

COURSE OUTCOMES:

CO1: Explain Gibbs and Helmholtz free energy functions, partial molar quantities andEllinghams
CO2: Apply the concepts of chemical kinetics to predict the rate of the reaction and order of the reaction, demonstrate the effect of temperature on reaction rate, and the significance of free energy and entropy of activation.
CO3: Compare chemical and physical adsorption, Freundlich and Langmuir adsorption isotherms, and differentiate between homogenous and heterogeneous catalysis.
CO4: Demonstrate the types and characteristics of colloids, preparation of sols andemulsions, and determine the molecular weights of macromolecules.
CO5: Utilize the concepts of photochemistry in fluorescence, phosphorescence, chemiluminescence and color perception of vision.

COURSE CODE : 23UCHEE55-3

COURSE TITLE : AGRICULTURAL CHEMISTRY

COURSE OBJECTIVES:

- Importance of agricultural chemistry
- Role of fertilizers
- Effect of fertilizers and manures
- Pesticides
- Fungicides and herbicides

COURSE OUTCOMES:

CO1:Understand the basics of soil.
CO2:Classify and explain plant nutrients and fertilizers
CO3:Differentiate fertilizers and manures.
CO4:Explain the classification of pesticides
CO5:Describe the Fungicides and herbicides

COURSE CODE : 23UCHEE56-3

COURSE TITLE :APPLIED CHEMISTRY

COURSE OBJECTIVES:

- To impart knowledge about petrochemicals.
- To learn about the process involved in paper and pulp technology.
- To instill an interest about the process of sugar industry.
- To enhance the knowledge about explosives.
- To create an interest in leather chemistry.

COURSE OUTCOMES:

CO1: Able to understand the concept of Petrochemicals.
CO2: Prepare alcohol from Molasses.
CO3: Understand the processes involved in paper technology.

CO4: Extensive Knowledge about the Explosives and Leather Chemistry.
CO5: Able to understand the concepts involved in tanning process.

SEMESTER-VI

COURSE CODE : 23UCHEC61
COURSE TITLE :ORGANIC CHEMISTRY – II

COURSE OBJECTIVES:

- Classification, isolation and discussing the properties of alkaloids and terpenes
- Preparation and properties of saccharides
- Biomolecules
- Different molecular rearrangement
- Preparation and properties of organometallic compounds

COURSE OUTCOMES:

CO1: Explain isolation and properties of alkaloids and terpenes
CO2: Explain preparation and reactions of mono and disachharides
CO3:Classify biomolecules and natural products based on their structure, properties,reactions and uses.
CO4: Explain molecular rearrangements like benzidine, Hoffmann etc.,
CO5: Preparation and properties of organolithium compounds

COURSE CODE : 23UCHEC62
COURSE TITLE :INORGANIC CHEMISTRY – II

COURSE OBJECTIVES:

- Tracer elements and their role in the biological system.
- Iron transport and storage
- Metallo enzymes, oxygen transport.
- Silicates and their applications
- Industrial applications of refractories, alloys, paints and pigments

COURSE OUTCOMES:

CO1: Ability to explain the importance of tracer elements on biological system.
CO2: Explain the metal ion transport, Bohr effect, Na, K, Ca pump.
CO3: Explain the function of Vitamin B12, Zn-Cu enzyme, ferredoxin, cluster enzymes.
CO4: Classification and structure of silicates.
CO5: Explain the manufacture of refractories, explosives, paints and pigments

COURSE CODE : 23UCHEC63
COURSE TITLE :PHYSICAL CHEMISTRY-II

COURSE OBJECTIVES:

- Phase diagram of one and two component systems
- Chemical equilibrium,
- Separation techniques for binary liquid mixtures.
- Electrical conductance and transport number.
- Galvanic cells, emf and significance of electrochemicalseries.

COURSE OUTCOMES:

CO1: Construct the phase diagram for one component and two component systems, explain the properties of freezing mixture, component with congruent melting points and solidsolutions.
CO2: Apply the concepts of chemical equilibrium in dissociation of PCl_5, N_2O_4 and formation of HI, NH_3, SO_3 and decomposition of calcium carbonate. Demonstrate important principles such as Le chatelier principle, van't Hoff reaction isotherm andClausius-Clayperon equation.
CO3: Identify an appropriate distillation method for the separation of binary liquid mixtures such as azeotropic mixtures, partially miscible mixtures and immiscible liquids.
CO4: Explain the significance of Arrhenius theory, Debye-Huckel theory, Onsager equationand Kohlrausch's law in conductance.
CO5: Construct electrochemical cell with the help of electrochemical series and calculate cell EMF. Demonstrate the applications of EMF and significance of potentiometric titrations.

COURSE CODE : 23UCHEE64-3
COURSE TITLE : HEALTH CHEMISTRY

COURSE OBJECTIVES:

- To recognize the causes of common diseases, their control and treatment
- To understand the first aid for accidents
- To study the organic pharmaceutical aids
- To know about organic diagnostic agents

COURSE OUTCOMES:

CO1: Describe the causes, control and treatment of common diseases.
CO2: Understand the concepts of first aid for accidents.
CO3: Classify different organic pharmaceutical aids.
CO4: Explain organic diagnostic agents.
CO5: Describe diabetes, cancer and their control and treatment.

COURSE CODE : 23UCHEE65-2

COURSE TITLE :POLYMER SCIENCE

COURSE OBJECTIVES:

- Classification of polymers, preparation of polymers
- Kinetics of polymerization and characterization of polymers
- Analytical techniques used to characterize polymers
- Reactions of polymers
- Speciality polymers like PVC, PMMA

COURSE OUTCOMES:

CO1: Explain classification of polymers, elastomers, fibres and liquid resins
CO2: Explain addition and condensation polymerization, mechanical properties of polymers
CO3:Determine the molecular weight of polymers, and explain the thermal properties of polymers
CO4:Explain reactions of polymers and polymer processing
CO5:Discuss speciality polymers like PVC, PMMA, rubbers, biodegradable polymers

KRISHNASAMY

College of

SCIENCE, ARTS & MANAGEMENT FOR WOMEN

Empowerment through Perseverance (Affiliated to Annamalai University, Chidambaram/ Recognised by UGC under 2(f) section)

Department of Chemistry

M.Sc CHEMISTRY

Krishnasamy College of Science, Arts and Management for Women, Cuddalore
Department of Chemistry

Program: M.Sc. CHEMISTRY
Program Code: 404

PROGRAMME OUTCOME

PO1: Problem Solving Skill
Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.

PO2: Decision Making Skill
Foster analytical and critical thinking abilities for data-based decision-making.

PO3: Ethical Value
Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.

PO4: Communication Skill
Ability to develop communication, managerial and interpersonal skills.

PO5: Individual and Team Leadership Skill
Capability to lead themselves and the team to achieve organizational goals.

PO6: Employability Skill
Inculcate contemporary business practices to enhance employability skills in the competitive environment.

PO7: Entrepreneurial Skill
Equip with skills and competencies to become an entrepreneur.

PO8: Contribution to Society
Succeed in career endeavors and contribute significantly to society.

PO9 Multicultural competence
Possess knowledge of the values and beliefs of multiple cultures and a global perspective.

PO10: Moral and ethical awareness/reasoning
Ability to embrace moral/ethical values in conducting one's life

Krishnasamy College of Science, Arts and Management for Women, Cuddalore
Department of Chemistry
COURSE OBJECTIVES & COURSE OUTCOMES

SEMESTER - I

COURSE CODE : 23PCHEC11
COURSE TITLE : ORGANIC REACTION MECHANISM - I

COURSE OBJECTIVES:

- To understand the feasibility and the mechanism of various organic reactions.
- To comprehend the techniques in the determination of reaction mechanisms.
- To understand the concept of stereochemistry involved in organic compounds.
- To correlate and appreciate the differences involved in the various types of organic reaction mechanisms.
- To design feasible synthetic routes for the preparation of organic compounds.

COURSE OUTCOMES:

CO1: To recall the basic principles of organic chemistry.
CO2: To understand the formation and detection of reaction intermediates of organic reactions.
CO3: To predict the reaction mechanism of organic reactions and stereochemistry of organic compounds.
CO4: To apply the principles of kinetic and non-kinetic methods to determine the mechanism of reactions.
CO5:To design and synthesize new organic compounds by correlating the stereochemistry of organic compounds.

COURSE CODE : 23PCHEC12
COURSE TITLE : STRUCTURE AND BONDING IN INORGANIC COMPOUNDS AND NUCLEAR CHEMISTRY

COURSE OBJECTIVES:

- To determine the structural properties of main group compounds and clusters.
- To gain fundamental knowledge on the structural aspects of ionic crystals.
- To familiarize various diffraction and microscopic techniques.
- To study the effect of point defects and line defects in ionic crystals.
- To evaluate the structural aspects of solids.
- To study about stellar energy, nuclear reactions etc and to equip the students for their future career in nuclear industry.

COURSE OUTCOMES:

CO1: Predict the geometry of main group compounds and clusters.
CO2: Explain about the packing of ions in crystals and apply the radius ratio rule to predict the coordination number of cations.

CO3: Understand the various types of ionic crystal systems and analyze their structural features.
CO4: Explain the crystal growth methods.
CO5:To understand the principles of diffraction techniques and microscopic techniques.

COURSE CODE : 23PCHEP13
COURSE TITLE : ORGANIC CHEMISTRY PRACTICAL

COURSE OBJECTIVES:

- To understand the concept of separation, qualitative analysis and preparation of organiccompounds.
- To develop analytical skill in the handling of chemical reagents for separation of binary and ternaryorganic mixtures.
- To analyze the separated organic components systematically and derivative them suitably.
- To construct suitable experimental setup for the organic preparations involving two stages.
- To experiment different purification and drying techniques for the compound processing.

COURSE OUTCOMES:

CO1: To recall the basic principles of organic separation, qualitative analysis and preparation.
CO2: To explain the method of separation and analysis of separated organic mixtures and convert them as derivatives by suitable preparation method.
CO3: To determine the characteristics of separation of organic compounds by various chemical reactions.
CO4: To develop strategies to separate, analyze and prepare organic compounds.
CO5:To formulate a method of separation, analysis of organic mixtures and design suitable procedure for organic preparations.

COURSE CODE : 23PCHEE14-2
COURSE TITLE : NANO MATERIALS AND NANO TECHNOLOGY

COURSE OBJECTIVES:

- To understand the concept of nano materials and nano technology.
- To understand the various types of nano materials and their properties.
- To understand the applications of synthetically important nano materials.
- To correlate the characteristics of various nano materials synthesized by new technologies.
- To design synthetic routes for synthetically used new nano materials.

COURSE OUTCOMES:

CO1: To explain methods of fabricating nanostructures.
CO2: To relate the unique properties of nanomaterials to reduce dimensionality of the material.
CO3: To describe tools for properties of nanostructures.
CO4: To discuss applications of nanomaterials.
CO5:To understand the health and safety related to nanomaterial.

COURSE CODE : 23PCHEE15-1

COURSE TITLE : ELECTROCHEMISTRY

COURSE OBJECTIVES:

- To understand the behavior of electrolytes in terms of conductance, ionic atmosphere, interactions.
- To familiarize the structure of the electrical double layer of different models.
- To compare electrodes between current density and over potential.
- To discuss the mechanism of electrochemical reactions.
- To highlight the different types of over voltages and its applications in electroanalytical techniques.

COURSE OUTCOMES:

CO1: To understand the behaviour of electrolytes in solution and compare the structures of electrical double layer of different models.
CO2: To predict the kinetics of electrode reactions applying Butler-Volmer and Tafel equations
CO3: To study different thermodynamic mechanism of corrosion,
CO4: To discuss the theories of electrolytes, electrical double layer, electrodics and activity coefficient of electrolytes
CO5:To have knowledge on storage devices and electrochemical reaction mechanism.

SEMESTER-II

COURSE CODE :23PCHEC21
COURSE TITLE : ORGANIC REACTION MECHANISM-II

COURSE OBJECTIVES:

- To understand the concept of aromaticity in benzenoid, non-benzenoid, heterocyclic and annulene compounds.
- To understand the mechanism involved in various types of organic reactions with evidences.
- To understand the applications of synthetically important reagents.
- To correlate the reactivity between aliphatic and aromatic compounds.
- To design synthetic routes for synthetically used organic reactions.

COURSE OUTCOMES:

CO1: To recall the various mechanisms of rearrangements
CO2: To understand the mechanism of various types of organic reactions.
CO3: To predict the suitable reagents for the conversion of selective organic compounds.
CO4: To correlate the principles of substitution, elimination, and addition reactions.
CO5:To design new routes to synthesis organic compounds.

COURSE CODE : 23PCHEC22
COURSE TITLE : PHYSICAL CHEMISTRY-I

COURSE OBJECTIVES:

- To recall the fundamentals of thermodynamics and the composition of partial molar quantities.
- To understand the classical and statistical approach of the functions
- To compare the significance of Maxwell-Boltzman, Fermi-Dirac and Bose-Einstein
- To correlate the theories of reaction rates for the evaluation of thermodynamic parameters.

COURSE OUTCOMES:

CO1: To explain the classical and statistical concepts of thermodynamics.
CO2: To compare and correlate the thermodynamic concepts to study the kinetics of chemical reactions.
CO3: To discuss the various thermodynamic and kinetic determination.
CO4: To evaluate the thermodynamic methods for real gases ad mixtures.
CO5:To compare the theories of reactions rates and fast reactions.

COURSE CODE : 23PCHEP23
COURSE TITLE : INORGANIC CHEMISTRY PRACTICAL

COURSE OBJECTIVES:

- To understand and enhance the visual observation as an analytical tool for the quantitative estimation of ions.
- To recall the principle and theory in preparing standard solutions.
- To train the students for improving their skill in estimating the amount of ion accurately present in the solution
- To estimate metal ions, present in the given solution accurately without using instruments.
- To determinethe amount of ions, present in a binary mixture accurately.

COURSE OUTCOMES:

CO1: To identify the anions and cations present in a mixture of salts.
CO2: To apply the principles of semi micro qualitative analysis to categorize acid radicals and basic radicals.

CO3: To acquire the qualitative analytical skills by selecting suitable confirmatory tests andspot tests.
CO4: To choose the appropriate chemical reagents for the detection of anions and cations.
CO5:To synthesize coordination compounds in good quality.

COURSE CODE :23PCHEE24-2
COURSE TITLE : GREEN CHEMISTRY

COURSE OBJECTIVES:

- To discuss the principles of green chemistry,
- To propose green solutions for chemical energy storage and conversion.
- To propose green solutions for industrial production of Petroleum and Petrochemicals.
- To propose solutions for pollution prevention in Industrial chemical and fuel production, Automotive industry and Shipping industries.
- To propose green solutions for industrial production of Surfactants, Organic and inorganic chemicals.

COURSE OUTCOMES:

CO1: To recall the basic chemical techniques used in conventional industrial preparations and in green innovations.
CO2: To understand the various techniques used in chemical industries and in laboratory.
CO3: To compare the advantages of organic reactions assisted by renewable energy sources and non-renewable energy sources.
CO4: To apply the principles of PTC, ionic liquid, microwave and ultrasonic assisted organic synthesis.
CO5: To design and synthesize new organic compounds by green methods.

COURSE CODE : 23PCHEE25-1
COURSE TITLE : BIO-INORGANIC CHEMISTRY

COURSE OBJECTIVES:

- To understand the role of trace elements.
- To understand the biological significance of iron, sulpur.
- To study the toxicity of metals in medicines.
- To have knowledge on diagnostic agents.
- To discuss on various metalloenzymes properties.

COURSE OUTCOMES:

CO1: The students will be able to analyses trace elements.
CO2: Students will be able to explain the biological redox systems.
CO3: Students will gain skill in analyzing the toxicity in metals.
CO4: Students will have experience in diagnosis.

CO5: Learn about the nitrogen fixation and photosynthetic mechanism.

COURSE CODE : 23PCHES26
COURSE TITLE : INDUSTRIAL CHEMISTRY AND COMPUTATIONAL SOFTWARE IN CHEMISTRY

COURSE OBJECTIVES:

- To gain knowledge about industrial fuels.
- To understand the importance of leather and water industry.
- To study about small scale industries.
- To impart skills on use of various chemistry tools that are essential for any student with chemistry as a major course.
- To learn the techniques of molecular simulations which will enhance the students employability in academia and industry.

COURSE OUTCOMES:

CO1: Students will be able to acquire knowledge of industrial fuels.
CO2: Illustrate the importance of leather and water industries.
CO3: Acquire knowledge about small scale industries.
CO4: Acquire knowledge about chemistry software's .
CO5: Acquire knowledge about techniques of molecular simulations

SEMESTER-III

COURSE CODE : 23PCHEC31
COURSE TITLE : PHYSICAL CHEMISTRY-II

COURSE OBJECTIVES:

- To understand the essential characteristics of wave functions and need for the quantum mechanics.
- To know the importance of quantum mechanical models of particle in a box, rigid rotor and harmonic oscillator.
- To apply the quantum mechanics to hydrogen and polyelectronic systems.
- To familiarize the symmetry in molecules and predict the point groups.
- To predict the vibrational modes, hybridization using he concepts of group theory.

COURSE OUTCOMES:

CO1: To discuss the characteristics of wave functions and symmetry functions.
CO2: To classify the symmetry operation and wave equations.
CO3: To apply the concept of quantum mechanics and group theory to predict the electronic structure.
CO4: To specify the appropriate irreducible representations for theoretical applications.
CO5: To develop skills in evaluating the energies of molecular spectra.

COURSE CODE : 23PCHEC32
COURSE TITLE : COORDINATION CHEMISTRY – I

COURSE OBJECTIVES:

- To gain insights into the modern theories of bonding in coordination compounds.
- To learn various methods to determine the stability constants of complexes.
- To understand and construct correlation diagrams and predict the electronic transitions that are taking place in the complexes.
- To describe various substitution and electron transfer mechanistic pathways of reactions in complexes.
- To evaluate the reactions of octahedral and square planar complexes.

COURSE OUTCOMES:

CO1: Understand and comprehend various theories of coordination compounds.
CO2: Understand the spectroscopic and magnetic properties of coordination complexes.
CO3: Explain the stability of complexes and various experimental methods to determine the stability of complexes.
CO4: Predict the electronic transitions in a complex based on correlation diagrams and UV-visible spectral details.
CO5: Comprehend the kinetics and mechanism of substitution reactions in octahedral and square planar complexes.

COURSE CODE : 23PCHEP33:
COURSE TITLE : PHYSICAL CHEMISTRY PRACTICAL

COURSE OBJECTIVES:

- To understand the principle of conductivity experiments through conductometric titrations.
- To evaluate the order of the reaction, temperature coefficient, and activation energy of the reaction by following pseudo first order kinetics.
- To construct the phase diagram of two component system forming congruent melting solid and find its eutectic temperatures and compositions.
- To determine the kinetics of adsorption of oxalic acid on charcoal.
- To develop the potential energy diagram of hydrogen ion, charge density distribution and Maxwell's speed distribution by computational calculation.

COURSE OUTCOMES:

CO1: To recall the principles associated with various physical chemistry experiments.
CO2: To scientifically plan and perform all the experiments.
CO3: To observe and record systematically the readings in all the experiments.
CO4: To calculate and process the experimentally measured values and compare with graphical data.

CO5: To interpret the experimental data scientifically to improve students' efficiency for societal developments.

COURSE CODE : 23PCHEP34
COURSE TITLE :ANALYTICAL INSTRUMENTATION TECHNIQUES PRACTICALS

COURSE OBJECTIVES:

- To analyze different constituents through instrumental methods of analysis.
- To evaluate different contaminants in materials using turbidimetry and conductivity measurements.
- To design experiments for analysis of inorganic and organic materials.
- To analyze constituents in materials using emission and absorption techniques.

COURSE OUTCOMES:

CO1: To recall the principles associated with various inorganic organic and physical chemistry experiments
CO2: To scientifically plan and perform all the experiments
CO3: To observe and record systematically the readings in all the experiments
CO4: To calculate and process the experimentally measured values and compare with graphical data.
CO5: To interpret the experimental data scientifically to improve students efficiency for societal developments.

COURSE CODE : 23PCHEE35-2
COURSE TITLE : BIOMOLECULES AND HETEROCYCLIC COMPOUNDS

COURSE OBJECTIVES:

- To learn the basic concepts and biological importance of biomolecules and natural products.
- To explain several of functions of carbohydrates, proteins, nucleic acids, steroids and hormones.
- To understand the functions of alkaloids and terpenoids.
- To elucidate the structure determination of biomolecules and natural products.
- To extract and construct the structure of new alkaloids and terpenoids from different methods.

COURSE OUTCOMES:

CO1: To understand the basic concepts of biomolecules and natural products.
CO2: To integrate and assess the different methods of preparation of structurally different biomolecules and natural products.
CO3: To illustrate the applications of biomolecules and their functions in the metabolism of living organisms.
CO4: To analyse and rationalise the structure and synthesis of heterocyclic compounds.

CO5: To develop the structure of biologically important heterocyclic compounds by different methods.

COURSE CODE : 23PCHES36
COURSE TITLE : POLYMER CHEMISTRY

COURSE OBJECTIVES:

- To learn the basic concepts and bonding in polymers.
- To explain various types of polymerization reactions and kinetics.
- To understand the importance of industrial polymers and their synthetic uses.
- To determine the molecular weight of polymers.
- To predict the degradation of polymers and conductivities.

COURSE OUTCOMES:

CO1: To understand the bonding in polymers.
CO2: To scientifically plan and perform the various polymerization reactions.
CO3: To observe and record the processing of polymers.
CO4: To calculate the molecular weight by physical and chemical methods.
CO5: To interpret the experimental data scientifically to improve the quality of synthetic polymers.

SEMESTER-IV

COURSE CODE :23PCHEC41
COURSE TITLE : COORDINATION CHEMISTRY – II

COURSE OBJECTIVES:

- To recognize the fundamental concepts and structural aspects of organo metallic compounds.
- To learn reactions of organometallic compounds and their catalytic behaviour.
- To identify or predict the structure of coordination compounds using spectroscopic tools.
- To understand the structure and bonding in coordination complexes.
- To evaluate the spectral characteristics of selected complexes.

COURSE OUTCOMES:

CO1: Understand and apply 18 and 16 electron rule for organometallic compounds
CO2: Understand the structure and bonding in olefin, allyl, cyclopentadienyl and carbonyl containing organometallic compounds
CO3: Understand the reactions of organometallic compounds and apply them in
CO4: understanding the catalytic cycles
CO5: Identify / predict the structure of coordination complexes using spectroscopic tools such as IR, NMR, ESR, Mossbauer and optical rotatory dispersion studies to interpret the structure of molecules by various spectral techniques.

COURSE CODE: 23PCHEC42
COURSE TITLE : ORGANIC SYNTHESIS AND PHOTOCHEMISTRY

COURSE OBJECTIVES:

- To understand the molecular complexity of carbon skeletons and the presence of functional groups and their relative positions.
- To study various synthetically important reagents for any successful organic synthesis.
- To apply disconnection approach and identifying suitable synthons to effect successful organic synthesis.
- To learn the concepts of pericyclic reaction mechanisms.
- To gain the knowledge of photochemical organic reactions.

COURSE OUTCOMES:

CO1: To recall the basic principles of organic chemistry and to understand the various reactions of organic compounds with reaction mechanisms.
CO2: To understand the versatility of various special reagents and to correlate their reactivity with various reaction conditions.
CO3: To implement the synthetic strategies in the preparation of various organic compounds.
CO4: To predict the suitability of reaction conditions in the preparation of tailor-made organic compounds.
CO5: To design and synthesize novel organic compounds with the methodologies learnt during the course.

COURSE CODE :23PCHEE44
COURSE TITLE : THEORY AND PREPARATION OF CONSUMER PRODUCTS

COURSE OBJECTIVES:

- To provide basic knowledge in consumer products in chemistry and modern trend in Industry.

COURSE OUTCOMES:

COURSE CODE : 23PCHES45
COURSE TITLE :CHEMISTRY FOR ADVANCED RESEARCH STUDIES (PRACTICAL)

COURSE OBJECTIVES:

- To design chromatographic methods for identification of species.
- To analyze different constituents through instrumental methods of analysis.
- To evaluate different contaminants in materials using turbidimetry and conductivity measurements.
- To design experiments for analysis of inorganic and organic materials.
- To analyze constituents in materials using emission and absorption techniques.

COURSE OUTCOMES:

CO1: To recall the principles associated with various inorganic organic and physical chemistry experiments
CO2: To scientifically plan and perform all the experiments
CO3: To observe and record systematically the readings in all the experiments
CO4: To calculate and process the experimentally measured values and compare with graphical data.
CO5: To interpret the experimental data scientifically to improve students efficiency for societal developments.