

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI 600 086

M.Sc. DEGREE : BRANCH IV-CHEMISTRY

COURSE SCHEDULE

SEMESTER I

Subject Code	Title of Course
23CH/PC/OC14	Organic Chemistry I
23CH/PC/PC14	Advanced Physical Chemistry
23CH/PC/SI14	Structural Inorganic Chemistry
23CH/PE/AI15	Analytical Instrumentation
23CH/PC/P114	Inorganic Qualitative and Quantitative Analysis Practical

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI**COURSE PLAN June - November 2024**

Department : CHEMISTRY
Name/s of the Faculty : Dr.R. Sripriya
Course Title : Organic Chemistry I
Course Code : 23CH/PC/OC14
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Recall the rules of IUPAC nomenclature, concepts of aromaticity, stereochemistry, conformational analysis and methods of determining mechanisms	K1
CO2	Determine absolute configuration and prochirality of organic compounds with multiple stereocenters and identify the conformations of cyclic systems	K2
CO3	Compare the stability of the conformations of different cyclic systems and apply electronic effects to study reaction rates	K3
CO4	Correlate structures of compounds with their stereochemistry and reactivity and interpret them quantitatively	K4
CO5	Predict products of organic reactions with stereochemical descriptors by examining the reaction mechanism and conformations of reagents and precursors	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	Nomenclature of Organic Compounds and Aromaticity 1.1 Modern Nomenclature - Cyclic, acyclic, aliphatic, aromatic, bridged and heterocyclic compounds 1.2 Benzenoid and non-benzenoid aromatic compounds	K1-K3	3	CO1-CO2	Presentation, Lecture and Discussion	Short test
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	1.3 Hückel's rule of aromaticity, anti-aromaticity, homo-aromaticity, Frost circles, Craig's rule. Aromaticity in Annulenes and Heteroannulenes. 1.4 Diatropic and paratropic behaviour (in NMR).	K1-K2	5	CO1-CO2	Presentation, Lecture and Discussion	Work sheet
July 5 – 12, 2024 (Day Order 1 - 6)	2	Geometrical and Optical Isomerism 2.1 Geometrical Isomerism - E-Z Nomenclature of olefins, cyclic systems and oximes.	K1 -K5	5	CO1-CO5	Presentation, Lecture and Discussion	Group Discussion & work Sheet

<p>July 15 – 23, 2024 (Day Order 1 - 6)</p>	<p>2</p>	<p>2.2 Concept of optical activity, chirality, asymmetry and dissymmetry. Optical activity in molecules with C, N, S and P based chiral centres - Axial, planar and helical chirality – substituted adamantanes.</p> <p>2.3 Absolute and Relative Configuration - D/L and R/S nomenclature, Cahn-Ingold-Prelog rules.</p>	<p>K1-K5</p>	<p>5</p>	<p>CO1-CO5</p>	<p>Lecture and Discussion</p>	<p>Assignment</p>
<p>July 24 – 31, 2024 (Day Order 1 - 6)</p>	<p>2</p>	<p>2.3 R/S nomenclature of acyclic and cyclic compounds, biphenyls, allenes, spiranes, helicene and heteroatom chiral centres.</p> <p>2.4 Erythro and Threo nomenclature. Interconversion of wedge, zig-zag, Fischer, Sawhorse and Newman Projection. Criteria for optical purity – Enantiomeric excess</p>	<p>K1-K5</p>	<p>5</p>	<p>CO1-CO5</p>	<p>Presentation, Lecture and Discussion</p>	<p>Short test</p>

Aug 1 – 5, 2024 (Day Order 1 - 3)	3	Stereochemistry 3.1 Racemic Modification - Racemisation by Thermal, Anion, Cation, Reversible formation; Epimerisation, Asymmetric transformation – Mutarotation.	K1-K5	3	CO1-CO5	Lecture and Discussion	Group Discussion
Aug 6 – 10, 2024	C.A. Test - I						
Aug 12 – 14, 2024 (Day Order 4-6)	3	3.2 Resolution of Racemic Mixtures - through the formation of diastereomers.	K1 -K5	2	CO1-CO5	Lecture and Discussion	(COMPONENT TEST Max. Marks =25) unit 1.4 , 2.3 and 2.4
Aug 16 – 23, 2024 (Day Order 1-6)	3	3.3 Topicity and Prochirality - Identification of homotopic, enantiotopic, diastereotopic ligands and faces. Prochirality – pro R, pro S, Re and Si faces. 3.4 Asymmetric synthesis - Cram's and Prelog's rules, Felkin Ahn modification, chiral auxiliaries – Evan Aldol reaction, chiral reagents - epoxidation (Sharpless' Reaction)	K1 -K5	5	CO1-CO5	Presentation, Lecture and Discussion	Work sheet
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	3.5 Stereospecific and Stereoselective reactions - Syn and Anti (Addition of X ₂ to alkenes and β -Elimination)	K1- K5	5	CO1-CO5	Lecture and Discussion	Group Discussion

Sep 4 – 11, 2024 (Day Order 1-6)	4	Conformations and Conformational Analysis 4.1 Conformation and reactivity in cyclic systems - cyclobutane, cyclopentane, cyclohexane and piperidine. 4.2 Conformational analysis of disubstituted cyclohexanes and their stereochemical features. Conformation and reactivity of cyclohexanols (Oxidation and Acylation),	K1-K5	5	CO1-CO5	Presentation, Lecture and Discussion	Short test
Sep 12 - 20, 2024 (Day Order 1-6)	4	cyclohexanones (Reduction) and cyclohexane carboxylic acid derivatives (Hydrolysis) 4.3 Conformation and stereochemistry of fused ring systems Decalins (9-methyl decalin)	K1-K5	5	CO1-CO5	Presentation, Lecture and Discussion	Quiz COMPONENT TEST Max. Marks : 25 Unit 3.3 and 4.1
Sep 23 - 26, 2024 (Day Order 1-4)	5	Study of Reaction Mechanisms and Structural Effects Thermodynamic and kinetic requirements of reactions	K1-K5	3	CO1-CO5	Lecture and Discussion	Discussion
Sep 27 – Oct 3, 2024	C.A. Test - II						
Oct 4 – 5, 2024 (Day 5 & 6)	5	5.1 Baldwin rules for ring closure, Hammond postulates. Curtin-Hammett principle	K1-K5	2	CO1-CO5	Lecture and Discussion	Short test

Oct 7 - 15, 2024 (Day Order 1 to 6)	5	5.2 Methods of determining reaction mechanisms - Identification of products and intermediates, cross-over experiments, trapping of intermediates, isotopic labeling, stereochemical studies, kinetic isotopic effects, salt effects and solvent isotopic effects	K1-K5	5	CO1-CO5	Presentation, Lecture and Discussion	Worksheet
Oct 16 - 22, 2024 (Day Order 1 to 6)	5	5.3 Quantitative relationships between molecular structure and chemical reactivity - Linear free energy relationship - Hammett equation, Taft equation	K1-K5	5	CO1-CO5	Presentation, Lecture and Discussion	Group Discussion
Oct 23 - 24, 2024 (Day Order 1 to 2)	REVISION						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN

June - November 2024

Department : Chemistry
Name of the Faculty : Dr. K Vidya
Course Title : Advanced Physical Chemistry
Course Code : 23CH/PC/PC14
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Recall the laws of statistical thermodynamics and kinetics, theories of electrochemistry and surface phenomena	K1, K2
CO2	Calculate molecular energies, reaction rates, surface potentials and predict reaction mechanisms	K3, K4
CO3	Derive different partition functions for various systems, approximation methods for simple and consecutive reactions, models for electrode systems and adsorption isotherms to explain surface phenomena	K4
CO4	Solve numerical problems by applying the principles of statistical thermodynamics, irreversible processes, kinetics, electrochemistry and surface chemistry	K5
CO5	Integrate the principles of quantum statistics, thermodynamics and kinetics into the framework of electrochemistry	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)		Statistical Thermodynamics 1.1 Introduction to Statistical Mechanics (Permutation, Probability)	K3-K5	2	CO 1-5	Lecture and Discussion	Problem Solving
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	Statistical Thermodynamics (Permutation, Probability), Microstates, Macrostates, Probability, Ensemble 1.2 Distributions and the most probable distribution, evaluation of Boltzmann parameters using Lagrange's method of undetermined multipliers,	K3-K5	5	CO 1-5	Lecture and Discussion	Problem Solving
July 5 – 12, 2024 (Day Order 1 - 6)	1	1.2 Stirling approximation 1.3 Bose-Einstein and Fermi-Dirac Statistics	K4-K6	5	CO 1-5	Lecture and Discussion	Quiz
July 15 – 23, 2024 (Day Order 1 - 6)	1	1.3 Comparison between Bose-Einstein, Fermi-Dirac and Boltzmann Statistics, application to radiation and electron gas in metals	K3- K5	3	CO 1-5	Lecture and Discussion	Assignment
	2	Partition function and Irreversible processes 2.1 Evaluation of Translational, Rotational, Partition Functions for ideal gases, n particles	K2- K5	2	CO 1-5	Lecture and Discussion	Worksheet

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
July 24 – 31, 2024 (Day Order 1 - 6)	2	2.1 Evaluation of Vibrational and Electronic Partition Functions for ideal gases, n particles 2.2 Applications: Calculation of thermodynamic properties in terms of partition function,	K2- K5 K4- K6	5	CO 1-5	Lecture and Discussion	Quiz
Aug 1 – 5, 2024 (Day Order 1 - 3)	2	partition function, 2.2 SackurTetrode Equation	K4	2	CO 1-5	Lecture and Discussion	Test
Aug 6 – 10, 2024	C.A. Test - I						
Aug 12 – 14, 2024 (Day Order 4-6)	2	2.2 Heat Capacities of ideal gases, Heat Capacity of solids, residual entropies, equilibrium constant 2.3 Introduction to Irreversible Processes - Phenomenological Equations and Onsager Reciprocity relation	K2-K5	5	CO 1-5	Lecture and Discussion	Worksheet

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Aug 16 – 23, 2024 (Day Order 1-6)	3	Molecules in Motion 3.1 Simple Reactions, Consecutive Reactions (Rate determining step approximation and steady state approximation), Pre-Equilibria and Unimolecular Reactions, Lindemann-Hinshelwood Mechanism,	K1-K4	5	CO 1-5	Lecture and Discussion	III component test (Unit 2.3 and Consecutive reaction) 20 marks
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	3.1 Rice–Ramsperger–Kassel and Rice–Ramsperger–Kassel–Marcus theories (derivation not required). Kinetics of complex reactions - chain reactions, explosions and photochemical reactions	K3-K6	5	CO 1-5	Lecture and Discussion	Problem Solving

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Sep 4 – 11, 2024 (Day Order 1-6)	3	3.2 Molecular Reaction Dynamics: Collision Theory, steric factor, diffusion controlled reactions, Activated Complex Theory, Eyring Equation, reaction coordinates and transition state, thermodynamic aspects, reaction between ions, effect of solvent on reaction rates, effect of ionic strength on reaction rates (salt effects), dynamics of molecular collisions (Molecular Beams), potential energy surfaces	K3-K5	5	CO 1-5	Lecture and Discussion	Test

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Sep 12 - 20, 2024 (Day Order 1-6)	4	Theories of Electrochemistry 4.1 Electrodes and Electrochemical Cells - Evaluation of thermodynamic quantities 4.2 The Electrical Double Layer at the Electrode – Electrolyte Interface, Models: Helmholtz Perrin Model, Gouy - Chapman model and Stern model, Potentials (Galvanic and Voltaic) – Theory of Multiple Layer Capacity – Electrocapillarity, Lippmann Potential, Structure of double layers	K1- K4	5	CO 1-5	Lecture and Discussion	Quiz
Sep 23 - 26, 2024 (Day Order 1-4)	4	4.3 Diffusion – Electrokinetic phenomena (Electroosmosis, sedimentation potential, electrophoresis, Dorn effect), membrane potential. IE Variation, different types of overpotentials,	K2-K5	3	CO 1-5	Lecture and Discussion	III component test (Unit 4.1 and electrokinetic phenomena) 20 marks
Sep 27 – Oct 3, 2024	C.A. Test - II						

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Oct 4 – 5, 2024 (Day 5 & 6)		Butler – Volmer equation for one electron transfer, Tafel plots, exchange current density, standard rate constants, transfer coefficient, Tafel and Nernst Equations, Polarisation. Rate determining step in Electrode Kinetics, Hydrogen overvoltage, Oxygen overvoltage, anodic and cathodic processes, redox reactions, Hydrogen-Oxygen fuel cells	K3-K6	2	CO 1-5	Lecture and Discussion	Worksheet
Oct 7 - 15, 2024 (Day Order 1 to 6)	5	Surface Chemistry 5.1 Adsorption Isotherms - Types of Adsorption Isotherms, Gibb's Adsorption Isotherm, BET Isotherm (Only Equation) - Determination of surface area 5.2 Heterogeneous Catalysis - Catalytic activity at surfaces, adsorption and catalysis - The Eley-Rideal mechanism	K1-K4	5	CO 1-5	Lecture and Discussion	Test
Oct 16 - 22, 2024 (Day Order 1 to 6)		5.2 Langmuir-Hinshelwood mechanism. Examples of Catalysis - Hydrogenation, Oxidation, Cracking /Pyrolysis and Reforming	K1- K4	5	CO 1-5	Lecture and Discussion	Assignment (Examples of Catalysis)10 marks

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Oct 23 - 24, 2024 (Day Order 1 to 2)						REVISION	

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN

June - November 2024

Department : CHEMISTRY
Name of the Faculty : DR.U.ANTO MARIA JERALDIN
Course Title : STRUCTURAL INORGANIC CHEMISTRY
Course Code : 23CH/PC/SI14
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Discuss the structure and bonding of inorganic solids, their applications and the methods used to characterise them	K1
CO2	Compare and classify inorganic materials based on their structure, properties, applications and characterisation technique	K2
CO3	Extract structural information about crystalline and amorphous materials using x-ray, electron and neutron diffraction techniques	K3
CO4	Investigate the role of important inorganic materials in catalysis and other applications	K4
CO5	Apply the knowledge of structure and bonding obtained from characterisation techniques to study the stability and reactivity of inorganic materials	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	Indexing of crystal planes Pauling's rules	K1&K2	2	CO1& CO2	Lecture & discussion	Quiz
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	Lattice Energy, factors affecting lattice energy Structures of inorganic solids of various types.	K3	5	CO3	Lecture & discussion,	III Component Assignment (Unit 1.3) 10 marks
July 5 – 12, 2024 (Day Order 1 - 6)	1	Bonding in Metals - Super Conductivity	K4	5	CO4	Lecture & discussion	Short question answer
July 15 – 23, 2024 (Day Order 1 - 6)	1 & 2	Electrical properties of solids - Magnetic properties of Solids. X-Ray Diffraction Studies - Principle, powder XRD technique principle, instrumentation and applications	K2&K5	5	CO2& CO5	Power Point Presentation	Short question answer
July 24 – 31, 2024 (Day Order 1 - 6)	2	Debye-Scherrer method, selection rules for lattices, structure determination of NaCl using Powder Method.	K3	5	CO3	Demonstration model making	Model making
Aug 1 – 5, 2024 (Day Order 1 - 3)	2	Electron and Neutron Diffraction Studies – Principle and Applications	K4&K5	3	CO4& CO5	Presentation	Quiz
Aug 6 – 10, 2024	C.A. Test – I						

Aug 12 – 14, 2024 (Day Order 4-6)	2&3	Comparison of X-Ray, Electron and Neutron diffraction. Preparation, Bonding and Structure of Metal Carbonyls	K2&K5	2	CO2&CO5	Lecture & Discussion	quiz
Aug 16 – 23, 2024 (Day Order 1-6)	3	Carbonyl Hydride Complexes, Metal Nitrosyls, Metal Hydride Complexes, Alkyl Complexes.	K3	5	CO3	Power Point Presentation	Short question answer
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	Carbenes, Carbynes, Carbides, Non-aromatic Alkene, Alkyne complexes, Allyl and Pentadienyl Complexes and Aryl Complexes.	K3	5	CO3	Power Point Presentation	Test
Sep 4 – 11, 2024 (Day Order 1-6)	3	Application of IR spectroscopic technique to the study of the structures of metal carbonyls and nitrosyls	K4&K5	5	CO4&CO5	Presentation	III Component Test Work sheet (unit 3.2) 20 Marks
Sep 12 - 20, 2024 (Day Order 1-6)	4	Olefins - Wilkinson's catalyst, Oxo process, Ziegler - Natta Catalysis, Wacker Process,	K4	5	CO4	Lecture & discussion	Presentation
Sep 23 - 26, 2024 (Day Order 1-4)	4	Role of Catalyst in Monsanto Acetic Acid Process and in the Synthesis of Gasoline	K4&K5	4	CO4&CO5	Lecture & discussion,	quiz
Sep 27 – Oct 3, 2024	C.A. Test – II						

Oct 4 – 5, 2024 (Day 5 & 6)	4	Cyclo-oligomerisation	K4	1	CO4	Lecture & discussion	Quiz
Oct 7 - 15, 2024 (Day Order 1 to 6)	5	Preparation, properties and structures of Boranes, Phosphazenes, Carboranes, Metallocarboranes, Supramolecular assembly- Zeolites	K2&K3&K4 &K5	5	CO2&CO3&CO4&CO5	Lecture & discussion	III Component Test MCQ (unit 5.1) 20 marks
Oct 16 - 22, 2024 (Day Order 1 to 6)	5	Preparation, properties and structures of iso and hetero polyacids of Molybdenum and Tungsten. Iso polyacids: Molybdenum - Tungsten –Hetero polyacids: Tetrahedral and Octahedral	K3& K4 &K5	5	CO3&CO4&CO5	ICT enabled teaching which includes Biorender and chemdraw	Open book Test
Oct 23 - 24, 2024 (Day Order 1 to 2)	REVISION						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN

June - November 2024

Department : Chemistry
Name of the Faculty : Dr. K Vidya
Course Title : ANALYTICAL INSTRUMENTATION
Course Code : 23CH/PE/AI15
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Recollect the principles involved in analytical techniques	K1, K2
CO2	Describe the instrumentation and working of various instruments	K3, K4
CO3	Examine material characteristics based on data obtained from different techniques	K4
CO4	Apply the principles of various characterization techniques to interpret the results for the sample under study	K5
CO5	Evaluate the appropriate techniques to completely characterize a given sample	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	Spectroscopic Techniques Introduction	K2	2	CO 1-5	Discussion	Group Discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	Spectroscopic Techniques 1.1 Spectropolarimeter (Optical Rotatory Dispersion) and Spectrophotometer (Circular Dichroism)	K3-K5	5	CO 1-5	Lecture and Discussion	Problem Solving
July 5 – 12, 2024 (Day Order 1 - 6)	1	1.2 Atomic Absorption and Emission Spectroscopy - introduction, principle and instrumentation 1.3 Inductively Coupled Plasma Atomic Emission Spectroscopy (ICPAES) - Principle, instrumentation and applications	K4-K6	5	CO 1-5	Lecture and Discussion	Demonstration (H Block)
July 15 – 23, 2024 (Day Order 1 - 6)	1	Infrared Spectroscopy - Comparison of Dispersive and Fourier Transform Spectroscopy 1.5 Raman Spectroscopy- Principle and instrumentation, theory of Resonance Raman and Surface enhanced Raman Techniques 1.6 Mossbauer effect and Mossbauer Spectroscopy	K3- K5	5	CO 1-5	Lecture and Discussion	Demonstration at CRIST lab

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
July 24 – 31, 2024 (Day Order 1 - 6)	1	Mossbauer energy levels with isomer shift, quadrupole splitting and hyperfine interaction	K2- K5	1	CO 1-5	Lecture and Discussion	Quiz
	2	Surface Characterisation Techniques Principle, Instrumentation and Applications of - 2.1 Photoelectron Spectroscopy Ultraviolet and X-Ray Photoelectron Spectroscopy (UPS and XPS), Auger Electron Spectroscopy (AES).	K4- K6	4	CO 1-5		
Aug 1 – 5, 2024 (Day Order 1 - 3)	2	Electron Microscopy Scanning Electron Microscope (SEM),	K4	1	CO 1-5	Lecture and Discussion	Test
Aug 6 – 10, 2024	C.A. Test - I						
Aug 12 – 14, 2024 (Day Order 4-6)	2	Transmission Electron Microscopy (TEM), 2.3 Probing Microscopy: Scanning Tunnelling Microscopy (STM),	K2-K5	2	CO 1-5	Lecture and Discussion	Worksheet

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Aug 16 – 23, 2024 (Day Order 1-6)	3	Atomic Force Microscopy (AFM) 2.4 Low Energy Electron Diffraction	K1-K4	3	CO 1-5	Lecture and Discussion	III component Test (Unit 1.6 and 2.4) 20 marks
	4	Electrochemical Techniques I Principle, Instrumentation and Applications	K1-K4	2			
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	Principle, Instrumentation and Applications of - 3.1 Cyclic Voltammetry, Anodic and Cathodic 3.2 Stripping Voltammetry Coulometry - Current-Voltage relationship during electrolysis	K3-K6	5	CO 1-5	Lecture and Discussion	Demonstration at H block
Sep 4 – 11, 2024 (Day Order 1-6)	3	Coulometric methods of analysis, Potentiostatic Coulometry, Coulometric Titrations (Amperostatic Coulometry)	K3-K5	2	CO 1-5	Lecture and Discussion	Demonstration at H block
	4	Electrochemical Techniques II 4.1 Amperometry, Amperometric Titrations, Biamperometry	K3-K5	3			

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Sep 12 - 20, 2024 (Day Order 1-6)	4	4.2 Chronomethods - Chronoamperometry, Chronopotentiometry and Chronocoulometry 4.3 Impedance Spectroscopy: Fundamentals of Electrochemical Impedance Spectroscopy	K1- K4	5	CO 1-5	Lecture and Discussion	III component Test (Units 4.1 and 4.2) 20 marks
Sep 23 - 26, 2024 (Day Order 1-4)	4	Concept of complex impedance, complex dielectric, modulus and impedance data representations.	K2-K5	3	CO 1-5	Lecture and Discussion	MCQ Visit to CLRI Chennai or CIPET for hands on experience on Instrumentation
Sep 27 – Oct 3, 2024	C.A. Test - II						
Oct 4 – 5, 2024 (Day 5 & 6)	5	Thermoanalytical and Radiochemical Techniques 5.1 Thermogravimetry (TG),	K3-K6	2	CO 1-5	Lecture and Discussion	Worksheet

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Oct 7 - 15, 2024 (Day Order 1 to 6)	5	Differential thermal analysis. Differential scanning calorimetry - Principle, instrumentation, factors affecting Thermogram and applications, evolved gas analysis 5.2 Thermometric Titrations - Principle, working and applications	K1-K4	5	CO 1-5	Lecture and Discussion	III Component assignment on TGA, DTA, DSC (10 marks)
Oct 16 - 22, 2024 (Day Order 1 to 6)	5	Radiochemical Methods - Hot Atom Chemistry, the Szilard-Chalmers Process, Neutron Activation Analysis - Principle, instrumentation and applications	K1- K4	5	CO 1-5	Lecture and Discussion	Assignment
Oct 23 - 24, 2024 (Day Order 1 to 2)	REVISION						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN

June - November 2024

Department : CHEMISTRY
Name/s of the Faculty : DR.U.ANTO MARIA JERALDIN
Course Title : INORGANIC QUALITATIVE AND QUANTITATIVE ANALYSIS PRACTICAL
Course Code : 23CH/PC/P114
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Describe the principles and concepts of inorganic qualitative and volumetric analyses and complex preparation	K1, K2
CO2	Choose the appropriate chemical reagents for the preparation, detection and estimation of inorganic compounds	K3
CO3	Prepare various complexes by understanding the principle involved	K4
CO4	Estimate the amount of a metal ion present in the whole of the given solution	K5
CO5	Identify the presence of rare and common cations in an inorganic salt mixture	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)				-			
Jun 27 – July 4, 2024 (Day Order 1 - 6)		Titrimetry - Complexometry: Estimation of Mg^{2+} & Preparation of Tetrammine nickel(II)chloride	K1, 2, 3,5	5	CO1- 4	Practicals	Volumetric analysis - (40 marks) Error 1% - 40 Marks 2% - 35 Marks 3% - 25 Marks & Inorganic complex preparation (10 marks) Preparation – quantity and quality- 10 marks Viva -10 Marks
July 5 – 12, 2024 (Day Order 1 - 6)		Analysis of four cations - two rare cations and two common cations in a salt mixture -1	K1, 2, 6	5	CO1, 2, 5	Practicals	Semi micro qualitative analysis (40 marks) General Procedure - 10 marks Rare cations (2 x 10) - 20 marks Common cations (2 x 5) - 20 marks Viva -10 Marks

July 15 – 23, 2024 (Day Order 1 - 6)		Titrimetry - Complexometry: Estimation of Zn^{2+} & Preparation of Potassium tris(oxalate) iron(III) hydrate	K1, 2, 3,5	5	CO1- 4	Practicals	Volumetric analysis - (40 marks) Error 1% - 40 Marks 2% - 35 Marks 3% - 25 Marks & Inorganic complex preparation (10 marks) Preparation – quantity and quality- 10 marks Viva -10 Marks
July 24 – 31, 2024 (Day Order 1 - 6)		Analysis of four cations - two rare cations and two common cations in a salt mixture -2	K1, 2, 6	5	CO1, 2, 5	Practicals	Semi micro qualitative analysis (40 marks) General Procedure - 10 marks Rare cations (2 x 10) - 20 marks Common cations (2 x 5) - 20 marks Viva -10 Marks
Aug 1 – 5, 2024 (Day Order 1 - 3)		Analysis of four cations - two rare cations and two common cations in a salt mixture -3	K1, 2, 6	5	CO1, 2, 5	Practicals	Semi micro qualitative analysis (40 marks) General Procedure - 10 marks Rare cations (2 x 10) - 20 marks Common cations (2 x 5) - 20 marks Viva -10 Marks
Aug 6 – 10, 2024	C.A. Test – I						
Aug 12 – 14, 2024 (Day Order 4-6)				-			

Aug 16 – 23, 2024 (Day Order 1-6)		Titrimetry Complexometry: Estimation of Ca^{2+} & Preparation of Bis(acetylacetonato) copper (II)	K1,2,3, 5	5	CO1-4	Practicals	Volumetric analysis - (40 marks) Error 1% - 40 Marks 2% - 35 Marks 3% - 25 Marks & Inorganic complex preparation (10 marks) Preparation – quantity and quality- 10 marks Viva -10 Marks
Aug 27 – Sep 3, 2024 (Day Order 1-6)		CA PRACTICAL EXAM- 1		5			
Sep 4 – 11, 2024 (Day Order 1-6)		Analysis of four cations - two rare cations and two common cations in a salt mixture -4	K1, 2, 6	5	CO1, 2, 5	Practicals	Semi micro qualitative analysis (40 marks) General Procedure - 10 marks Rare cations (2 x 10) - 20 marks Common cations (2 x 5) - 20 marks Viva -10 Marks

Sep 12 - 20, 2024 (Day Order 1-6)		Titrimetry Cerimetry: Estimation of Fe ²⁺ /Oxalic acid & Preparation of Trans dichlorobis(ethylenediamine) cobalt (III) chloride	K1,2,3, 5	5	CO1-4	Practicals	Volumetric analysis - (40 marks) Error 1% - 40 Marks 2% - 35 Marks 3% - 25 Marks & Inorganic complex preparation (10 marks) Preparation – quantity and quality- 10 marks Viva -10 Marks
Sep 23 - 26, 2024 (Day Order 1-4)		Analysis of four cations - two rare cations and two common cations in a salt mixture -5	K1, 2, 6	5	CO1, 2, 5	Practicals	Semi micro qualitative analysis (40 marks) General Procedure - 10 marks Rare cations (2 x 10) - 20 marks Common cations (2 x 5) - 20 marks Viva -10 Marks
Sep 27 – Oct 3, 2024	C.A. Test – II						
Oct 4 – 5, 2024 (Day 5 & 6)				-			
Oct 7 - 15, 2024 (Day Order 1 to 6)		Analysis of four cations - two rare cations and two common cations in a salt mixture -6	K1, 2, 6	5	CO1, 2, 5	Practicals	Semi micro qualitative analysis (40 marks) General Procedure - 10 marks Rare cations (2 x 10) - 20 marks Common cations (2 x 5) - 20 marks Viva -10 Marks
Oct 16 - 22, 2024 (Day Order 1 to 6)		CA PRACTICAL EXAM-2		5			
Oct 23 - 24, 2024 (Day Order 1 to 2)	REVISION						

