

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department : Chemistry
Name/s of the Faculty : Dr. Mary
Teresita V
Course Title : Organic Chemistry -I
Course Code : 23CH/MC/OC 24
Shift : I

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Recollect the basic concepts of stereochemistry, types of reactions, and structure of carbonyl compounds. Recognizing the reagents in oxidation and reduction reactions	K1
CO2	Compare the reactivity of substrates in the presence of reagents , solvents and differentiate the types of reactive intermediates in organic reactions	K2
CO3	Apply the concepts of stereochemistry and kinetics in organic reactions to solve problems.	K3
CO4	Analyse the interconversion of different projection of molecules, stability of conformers in acyclic and cyclic compounds. Examine the mechanisms based on organic reagents and reactions.	K4
CO5	Evaluate the effect of stereochemistry in chemical reactivity, and product formation in organic reactions.	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 22 – 23, 2023 (Day Order 1 & 2)	1	Stereochemistry 1.1 Stereoisomerism-Definition and Types, Geometrical Isomerism - <i>E-Z</i> Notation. Optical Isomerism – Definition,	K1 -K2	1	CO1	Lecture, Model representation and discussion	Simple problems
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.1 Conditions for Optical Activity and its Measurement, Specific Rotation, Asymmetric Centre, and Chirality. Enantiomers, Diastereomers, racemic and meso Compounds (Definition and Examples) 1.2 Notations for Optical Isomers with one and two Asymmetric Carbon Atoms. Specification of Configuration - <i>D-L</i> and <i>R-S</i> Notations (Cahn-Ingold-Prelog Rules), Erythro and Threo representations	K1-K3	5	CO1 – CO3	Lecture, Model representation and discussion	Work sheet
Dec 1-7, 2023 (Day Order 1 to 6)	1	1.3 Conformational Isomerism-Interconversion of Newman Projection, Fischer, Flying Wedge and Sawhorse Projections.	K1-K5	5	CO1-CO5	Lecture, Model representation & Discussion	Quiz & Short answer test
Dec 8-9, 2023 (Day Order 1, 3)	1	1.3 Conformational Analysis of Ethane, nButane and Cyclohexane	K1-K5	2	CO1-CO5	Lecture & Discussion	Test

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Dec 11-15, 2023 (Day Order 2 to 6)	1 2	1.4 Stereospecific and Stereoselective Reactions - Addition of hydrogen and bromine to Alkenes-Syn and Anti Addition Electrophilic and Nucleophilic Substitution Reactions 2.1 Aliphatic nucleophilic substitution reaction	K1-K4	4	CO1- CO4	Lecture & Discussion	Test
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	2.1 - S _N 1, S _N 2, S _N i, and S _N cB. Factors governing S _N 1, S _N 2 Reactions - Effects of Structure, Solvent, nature of entering and leaving group. Kinetics, stereochemistry of nucleophilic aliphatic substitution, duality of mechanism, Walden Inversion. S _N 1vs S _N 2	K1-K5	5	CO1-CO5	Lecture & Discussion	Quiz & short test
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.2 Aromatic nucleophilic substitution reaction- S _N Ar Mechanism-Benzyne intermediate formation and evidences. 2.2 Aromatic electrophilic substitution reaction - sulphonation, nitration, halogenation, Friedel Crafts alkylation and acylation	K1-K5	3	CO1-CO5	Lecture & Discussion Group Presentation & Group Assignment	Test Third Component Test (10+20 Marks)

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
	3	<p>reaction, Effect of substituent already present in the ring, ortho / para ratio, orientation in di substituted compounds</p> <p>3.1 Examples of Addition Reaction- Addition of Hydrogen, Halogen, Hydrogen halide, Hypohalous acid, sulphuric acid, water, hydroxylation, epoxidation, hydroboration (with Propene and Propyne as Examples), ozonolysis, mechanism of the peroxide initiated addition of HBr.</p>					

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 8 – 12, 2024	C.A. Test – I Unit -1 , Unit 2 – 2.1 & partly 2.2						
Jan 13, 2024 (Day Order 1)	3	Addition and Elimination Reactions 3.1 Addition: Electrophilic Addition- orientation and reactivity, Markownikoff and Anti- Markownikoff rule.	K1 – K4	1	CO1 -CO4	Lecture & Discussion	Test on mechanism
Jan 18 -20, 2024 (Day Order 4 to 6)	3	3.1 Electrophilic addition to conjugated dienes-1, 2 and 1, 4 addition	K1- K5	2	CO1-CO5	Lecture & Discussion	Test on mechanism
Jan 22-29, 2024 (Day Order 1 to 6)	3	3.2 Elimination: E ₁ , E ₂ and E ₁ cB Mechanisms, orientation and reactivity (Hoffmann and Satyzeff rule) and evidences. Stereochemistry of E ₁ and E ₂ reactions. Syn- and Anti- Elimination and Elimination vs Substitution	K1- K5	5	CO1-CO5	Lecture & Discussion	Test on mechanism
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	4	Aliphatic, Aromatic and Unsaturated Carbonyl Compounds 4.1 Structure of Carbonyl Group, acidity of alpha hydrogen, Keto-Enol tautomerism – evidence for the two forms.	K1- K5	3	CO1-CO5	Lecture & Discussion	Quiz
Feb 3, 2024 (Day Order 2)	-	No Hours marked for this day order	-	-	-	-	-

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 5- 6, 2024 (Day Order 5 to 6)	4	4.1 Relative reactivity of Aldehydes and Ketones. A comparison of reactivity with aromatic carbonyls and its derivatives 4.3 Acrolein, Crotonaldehyde, Cinnamaldehyde – Preparation and reactions.	K1- K5	2	CO1-CO5	Lecture & Discussion Assignment	Quiz Third component Test (10+10 Marks)
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	4.2 Nucleophilic addition reactions: Aldol Condensation, Cannizzaro, Crossed Cannizzaro, Claisen- Schmidt ,	K1- K5	5	CO1-CO5	Lecture & Discussion	Quiz
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	4.2 Houben- Hoesch (Synthesis of Phenolic Ketone), Benzoin Condensation, Haloform, Knoevenagel, Reformatsky and Perkin reactions	K1- K5	5	CO1-CO5	Lecture & Discussion	Test on mechanism
Feb 23 – 24, 2024 (Day Order 1 & 5)	5	Oxidation and Reduction Reactions of Carbonyl Compounds 5.1 Oxidation - Meerwein-Pondorf-Verley, Oppenaur and Baeyer-Villiger	K1-K4	4	CO1-CO4	Lecture & Discussion	Test on mechanism
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	5	5.2 Reduction - Clemmensen, Wolff- Kishner, LiAlH ₄ and NaBH ₄	K1-K4	4	CO1-CO4	Lecture & Discussion	Test on mechanism

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Mar 2, 2024 (Day Order 1)	5	5.2 Examples of LiAlH_4 and NaBH_4 reagent reactions	K1-K4	1	CO1-CO4	Group discussion	Work sheet
Mar 4 –8, 2024	C.A. Test – II Units 3 – 3.1 partly, 3.2, Unit 4- 4.1 , 4.2 & Unit 5						
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	1-4	Revision - Unit 1 – Unit 4	K1- K5	5	CO1-CO5	Group discussion	Work sheet
Mar 18 - 19, 2024 (Day Order 2 to 3)	5	Revision - Unit 5	K1- K5	3	CO1-CO5	Group discussion	Work sheet
Mar 20-22, 2024 (Day Order 4 to 6)	END SEMESTER EXAM REVISION						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department : CHEMISTRY
Name/s of the Faculty : Dr. Shiny John Vairamon and Dr. Janet Sabina X*
Course Title : Analytical Chemistry
Course Code : 23CH/MC/AC23
Shift : I

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Define terms in analytical chemistry, relate to fundamental concepts, list types of analytical techniques	K1
CO2	Discuss the different types of analytical techniques, statistical analysis and factors affecting solvent extraction, chromatography, equivalent point and thermograms	K2
CO3	Prepare various concentrations of solutions and laboratory samples; apply relevant statistical methods to chemical data; and the principles of titrimetric and thermometric analysis	K3
CO4	Classify various analytical techniques and statistical analysis, deduct the significant figures during the mathematical operations; separate simple organic mixtures using basic separation techniques	K4
CO5	Interpret analytical data using statistical techniques and evaluate the importance of analytical techniques used in separation of chemical compounds, titrimetry and thermometry	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 22 – 23, 2023 (Day Order 1 & 2)	1	Stoichiometry 1.1 Important Units of Measurement – S.I Units	K1-K3	1	1-3	Lecture and Discussion	Quiz
	3	Separation Techniques 3.2 Chromatography - Principle	K1-K5	1	1-5		Worksheet
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.1 Distinction between Mass and Weight, Concentration of Solutions – Moles, Millimoles, Milli equivalence	K1-K3	2	1-3	Lecture and Discussion	Worksheet
	3	3.2 Chromatography - Column, TLC, Paper and Principle, Classification, Choice of Adsorbents, Solvents, Preparation of Column, Elution, Development of Chromatogram and Rf Value	K1-K5	2	1-5		Group Discussion
Dec 1-7, 2023 (Day Order 1 to 6)	1	1.1 Molality, Molarity, Normality, Percentage by Weight and Volume, ppm. Ppb. Density and Specific Gravity of Liquids.	K1-K3	2	1-3	Lecture and Discussion	Problem solving
	3	3.2 Chromatography - Column, TLC, Paper and Principle, Classification, Choice of Adsorbents, Solvents, Preparation of Column, Elution, Development of Chromatogram and Rf Value	K1-K5	2	1-5		Other Component – Objective type questions – 15 marks

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Dec 8-9, 2023 (Day Order 1, 3)	1	1.1 Stoichiometry Calculations	K1-K3	1	1-3	Lecture and Discussion	Quiz
	3	3.2 Electrophoresis	K1-K5	1	1-5		Quiz
Dec 11-15, 2023 (Day Order 2 to 6)	2	Sampling and Errors 2.1 Sampling Techniques- Sampling and Sample Handling of Liquids	K1-K5	1	1-5	Lecture and Discussion	Other component: Assignment_ unit 2.1 – Sampling techniques and 3.1- Factors affecting solvent and Soxhlet extractions (10 marks) Class test
	4	Titrimetry 4.1 Calibration of Burette, Pipette, Standard Flask, Titrant, Titrand, Indicators, Equivalence Point, End Point.	K1-K5	2	1-5		
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	2.1 Sampling Techniques- Sampling and Sample Handling of Gases, Particulate Solids, Metals and Alloys	K1-K5	2	1-5	Lecture and Discussion	Quiz
	4	4.1 Primary and Secondary Standards- Criteria and Preparation. Limitations of volumetric analysis 4.2 Neutralisation Titrations- strong acid-strong base	K1-K5	2	1-5		Group discussion
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.1 Preparation of a Laboratory Sample	K1-K5	1	1-5	Lecture and Discussion	Group Discussion
	4	4.2 weak acid strong base titrations, indicators, range of indicator, choice of indicator	K1-K5	2	1-5		Quiz

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 8 – 12, 2024	C.A. Test – I						
Jan 13, 2024 (Day Order 1)	2	2.2 Errors-Types of Errors	K1-K5	1	1-5	Lecture and Discussion	Group discussion
Jan 18 -20, 2024 (Day Order 4 to 6)	2	2.2 Accuracy, Precision, Minimization of Errors	K1-K5	1	1-5	Lecture and Discussion	Quiz
	4	4.2 feasibility of acid base titrations, effect of Ph on equivalence point	K1-K5	1	1-5		Quiz
Jan 22-29, 2024 (Day Order 1 to 6)	2	2.2 Significant Figures. Methods of Expressing Precision: Mean, Median, Average Deviation, Standard Deviation	K1-K5	2	1-5	Lecture and Discussion	Problem solving
	4	4.3 Complexation Titrations- metallochromic indicators, masking and demasking agents	K1-K5	2	1-5		Worksheet
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	2	2.2 Coefficient of Variation, Confidence Limits	K1-K5	1	1-5	Lecture and Discussion	Worksheet
	4	4.3 Factors affecting Equivalence Point	K1-K5	1	1-5		Group Discussion
Feb 3, 2024 (Day Order 2)	4	4.4 Precipitation Titrations- Mohr method	K1-K5	1	1-5	Lecture and Discussion	Quiz

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 5- 6, 2024 (Day Order 5 to 6)	2	2.2 Q-test, F-test	K1-K5	1	1-5	Lecture and Discussion	Other component- Unit 2.2, Problem solving (15 marks) Quiz
	4	4.4 Precipitation Titrations- Fajans method of estimation of halides.	K1-K5	1	1-5		
Feb 7 – 14, 2024 (Day Order 1 to 6)	2	2.2 T-test. The Least Square Method for Deriving Calibration Plots	K1-K5	2	1-5	Lecture and Discussion	Group Discussion Other Component – Assignment on Unit 5.1 – 10 marks
	4	4.4 Redox titrations -Theory of redox indicators (Ferriin and diphenyl amine)	K1-K5	2	1-5		
	5	Thermoanalytical Methods 5.1 TGA/DTG - Principle and Instrumentation					
Feb 15 – 22, 2024 (Day Order 1 to 6)	3	Separation Techniques 3.1 Solvent Extraction - Liquid-Liquid Extraction	K1-K5	2	1-5	Lecture and Discussion, Demonstration of liquid-liquid extraction	Worksheet Quiz
	5	Thermal Analysis of Silver Nitrate, Calcium Oxalate. DTA - Principle	K1-K5	2	1-5		
Feb 23 – 24, 2024 (Day Order 1 & 5)	3	3.1 Factors affecting Solvent Extraction	K1-K5	1	1-5	Lecture and Discussion	Group discussion Group discussion
	5	DTA – Instrumentation.	K1-K5	1	1-5		
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	3	3.1 Factors affecting Solvent Extraction Soxhlet Extraction	K1-K5	2	1-5	Lecture and Discussion	Quiz

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
	5	5.1 Methods of obtaining thermograms, Factors affecting TGA/DTA 5.2 DSC - Principle and Applications	K1-K5	2	1-5		Class test
Mar 2, 2024 (Day Order 1)	3	3.1 Soxhlet Extraction	K1-K5	1	1-5	Lecture and Discussion, YouTube video	Quiz
Mar 4 –8, 2024	C.A. Test – II						
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	3	3.1 Rotavapor Extraction	K1-K5	2	1-5	Lecture and Discussion, YouTube video	Group discussion
	5	Thermometric titrations - Principle, process and applications	K1-K5	2	1-5		Quiz
Mar 18 - 19, 2024 (Day Order 2 to 3)		Revision	-	2	-	Discussion	-
Mar 20-22, 2024 (Day Order 4 to 6)	REVISION						