DEPARTMENT OF CHEMISTRY

SYLLABUS 2022- 2025

(OUTCOME BASED EDUCATION)

BOARD OF STUDIES 2022

I - VI SEMESTERS

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE

(AUTONOMOUS)

Re-Accredited by NAAC

An ISO 9001: 2015 Certified Institution

POLLACHI – 642 001

NGM College

Vision

Our dream is to make the college an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

Department of Chemistry

Vision

The Department of Chemistry aspires to be among the top in the nation by preparing the students in such a way that they are self-reliant, highly informed and a better choice in the demanding and ever-changing world.

Mission

The teaching of Chemistry aims to: gear the students to be liberative, transformative and empowering the Learner and the Learned (Teacher).

Program Educational Objectives:

The graduates of B.Sc. Chemistry are expected to attain the following PEOs within five to seven years of their graduation. The main objectives of the programme are

PEO1	To prepare the students to have in depth knowledge and skills in the core areas of chemical science
PEO2	To develop the students to have multi-disciplinary subject knowledge both in the diverse fields of chemical science such as analytical chemistry, pharmaceutical chemistry, leather chemistry and also its allied subjects like mathematics, physics and biology
PEO3	To provide knowledge and skills in the frontier areas of chemical research
PEO4	To develop critical thinking, problem solving ability and analytical reasoning in solving the problems pertaining to the environment, sustainable development, their chosen career and higher studies
PEO5	To develop professional, practical, leadership and entrepreneurial skills in their chosen field and practice it with moral and ethical virtues

Program Outcomes:

PO1	***Ethics and social responsibilities*** Commitment to sustainability and rich ethical standards in social and professional practices
PO2	***Communicative and writing skills*** Understand the language usage with development of communicative and written skills
PO3	***Inter and trans disciplinary development*** Understand principles and theories of organic, inorganic, physical, analytical, pharmaceutical, leather and environmental chemistry with cross cutting approach
PO4	***Problem solving analysis*** Solve complex scientific problems by conducting scientific derivation or chemical analysis
PO5	***Individual and team work*** Function effectively as member or leaders in diverse teams, and in multi-disciplinary environment
PO6	***Chemicals and tools usage*** Acquire skills pertaining to safe handling of chemicals, apparatus, instruments and modern tools with proper functionality
PO7	***Disciplinary knowledge development*** Apply possessed knowledge of fundamentals in chemistry to solve associated problems
PO8	***Professional skill development*** To impart professional skill sets in chemistry and meet out the current chemical industries needs

Program Specific Outcomes:

PSO - 01	***Life long learning*** Develop the practices of lifelong learning in laboratory, analytical/pharmaceutical/leather chemistry skills and interpret knowledge in the working environment
PSO - 02	***Education and Employment*** Ability to pursue higher studies of specialization and take of employment in analytical/pharmaceutical/leather industry

N.G.M College - Curriculum Development Cell
Scheme of Examination For 2022 – 2025
Choice Based Credit System & OBES

SEMESTER – I

Part	Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	22UTL101 / 22UHN101 / 22UFR101 /	Tamil Paper - I /	6	-	-	3	50	50	100	3
		Hindi Paper - I /	6	-	-					
		French Paper – I	6	-	-					
II	22UEN101	Communication Skills – I (Level I)	5	-	-	3	50	50	100	3
	22UEN102	Communication Skills – I (Level II)	5	-	-					
III	22UCY101	Core - I : Inorganic and Organic Chemistry	6	-	1	3	50	50	100	5
	22UCY203	Core Practical - I : Inorganic Qualitative Analysis	-	3	-	-	-	-	-	-
	22UCY1A1	Allied - I : Mathematics for Chemistry – I	6	-	-	3	50	50	100	4
	22UCY2A3	Allied Practical I: Programming lab for chemistry using MATLAB		2	-	-	-	-	-	-
IV	22UHR101	Human Rights	1		-	2	-	50	50	2
	22HEC101	Human Excellence - Personal Values & SKY Yoga Practice - I	1		-	2	25	25	50	1
V		Extension Activities: Annexure – I	-		-	-	-	-	-	-
CC	22CFE101	Fluency in English – I	-	-	-	-	-	-	-	
		Online Course (Optional) (MOOC/NPTEL/SWAYAM)	-	-	-	-	-	-	-	Grade
Total									**500**	**18**

SEMESTER – II										
Part	**Subject Code**	**Title of the Paper**	**Hrs / Week**		**Hrs / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
I	22UTL202/ 22UHN202/ 22UFR202	Tamil Paper - II /	6	-	-	3	50	50	100	3
		Hindi Paper - II /	6	-	-					
		French Paper – II	6	-	-					
II	22UEN202	Communication Skills - II (Level I)	5	-	-	3	50	50	100	3
	22UEN203	Communication Skills - II (Level II)	5	-	-					
III	22UCY202	Core - II : Organic and Physical Chemistry	5	-	1	3	50	50	100	4
	22UCY203	Core Practical I : Inorganic Qualitative Analysis	-	3	-	3	50	50	100	3
	22UCY2A2	Allied – II : Mathematics for Chemistry – II	6	-	-	3	50	50	100	4
	22UCY2A3	Allied Practical I: Programming lab for chemistry using MATLAB	-	2	-	3	50	50	100	2
IV	22EVS201	Environmental Studies	2		-	2	-	50	50	2
	22HEC202	Human Excellence - Family Values & SKY Yoga Practice – II	1		-	2	25	25	50	1
V		Extension Activities - Annexure – I	-		-	-	-	-	-	-
CC	22CFE202	Fluency in English – II	-	-	-	-	-	-	-	
	22CMM201	Manaiyiyal Mahathuvam - I	1	-	-	2	-	50	50	Grade
	22CUB201	Uzhavu Bharatham – I	1	-	-	2	-	50	50	Grade
		Online Course (Optional) (MOOC/NPTEL/SWAYAM)	-	-	-	-	-	-	-	Grade
Total									**700**	**22**

SEMESTER – III										
Part	**Subject Code**	**Title of the Paper**	**Hrs / Week**		**Hrs / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
I	22UTL303/ 22UHN303/ 22UFR303	Tamil Paper - III /	5	-	-	3	50	50	100	3
		Hindi Paper - III /	5	-	-					
		French Paper – III	5	-	-					
II	22UEN303	Communication Skills - III (Level I)	6	-	-	3	50	50	100	3
	22UEN304	Communication Skills - III (Level II)	6	-	-					
III	22UCY304	Core - III : Inorganic and Physical Chemistry	6	-	2	3	50	50	100	4
	22UCY406	Core Practical II : Volumetric and Organic Qualitative Analysis	-	3	-	-	-	-	-	-
	22UCY3A4	Allied III : Physics for Mathematics & Chemistry I	5	-	-	3	50	50	100	4
	22UCY4A6	Allied Practical II : Physics Lab for Mathematics & Chemistry	-	3	-	-	-	-	-	-
IV	22UCY3N1 / 22UCY3N2	Non Major Elective - I : Introduction to Nanotechnology/ Non Major Elective - I : Chemistry of Consumer Products	1		-	2	-	50	50	2
	22HEC303	Human Excellence - Professional Values & Ethics – III	1		-	2	25	25	50	1
V		Extension Activities - Annexure – I	-		-	-	-	-	-	-
CC	22CFE303	Fluency in English – III	-	-	-	-	-	-	-	
	22CMM302	Manaiyiyal Mahathuvam - II	1	-	-	2	-	50	50	Grade
	22CUB302	Uzhavu Bharatham – II	1	-	-	2	-	50	50	Grade
Total									**500**	**17**

SEMESTER – IV										
Part	**Subject Code**	**Title of the Paper**	**Hrs /Week**		**Hrs / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
I	22UTL404/ 22UHN404/ 22UFR404	Tamil Paper – IV /	5	-	-	3	50	50	100	3
		Hindi Paper – IV/	5	-	-					
		French Paper – IV	5	-	-					
II	22UEN404	Communication Skills - IV (Level I)	6	-	-	3	50	50	100	3
	22UEN405	Communication Skills - IV (Level II)	6	-	-					
III	22UCY405	Core - IV : General Chemistry	6	-	1	3	50	50	100	4
	22UCY406	Core Practical II: Volumetric, Organic Qualitative Analysis and Organic Preparations	-	3	-	6	50	50	100	5
	22UCY4A5	Allied - IV: Physics for Mathematics & Chemistry II	5	-	-	3	50	50	100	4
	22UCY4A6	Allied Practical II: Physics Lab for Mathematics & Chemistry	-	3	-	3	50	50	100	2
IV	22UCY4N1/ 22UCY4N2	Non Major Elective - II : Textile Chemistry / Non Major Elective - II : Food Science and Technology	1	-	-	2	-	50	50	2
	22HEC404	Human Excellence - Social Values & SKY Yoga Practice – IV	1		-	2	25	25	50	1
V		Extension Activities - Annexure – I	-		-	-	-	50	50	1
CC	22CFE404	Fluency in English – IV	-	-	-	-	-	-	-	
	22CMM403	Manaiyiyal Mahathuvam – III	1	-	-	2	-	50	50	Grade
	22CUB403	Uzhavu Bharatham – III	1	-	-	2	-	50	50	Grade
Total									**750**	**25**

SEMESTER – V										
Part	**Subject Code**	**Title of the Paper**	**Hrs / Week**		**Hrs / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
III	22UCY507	Core - V : Coordination and Bioinorganic Chemistry	4	-	1	3	50	50	100	4
	22UCY508	Core - VI : Organic Chemistry – I	4	-	1	3	50	50	100	4
	22UCY509	Core - VII : Electrochemistry	4	-	1	3	50	50	100	4
	22UCY510	Core - VIII : Dye Chemistry	4	-	1	3	50	50	100	4
	22UCY5E1/ 22UCY5E2/ 22UCY5E3	Core Elective - I : / Analytical Chemistry – I Core Elective - I : / Pharmaceutical Chemistry - I Core Elective - I : Leather Chemistry	4	-	-	3	50	50	100	5
	22UCY615	Core Lab - III : Gravimetric Analysis and Physical Chemistry Experiments	-	6	-	-	-	-	-	-
	22UCY5AL	Advanced Learner Course – I: Environmental Chemistry (Optional) Self Study	-	-	-	2	50	50	100	4*
IV	22UCY5VA	Biofertilizers (Optional)	30 Hrs		-	2	-	50	50	2*
	22UCY5S1 / 22UCY5S2	Skill Based Elective - I : Network and Information Security / Skill Based Elective - I : Cyber security and Ethical Hacking	2		-	2	-	50	50	2
	22HEC505	Human Excellence - National Values & SKY Yoga Practice – V	1		-	2	25	25	50	1
	22GKL501	General Awareness - Self Study	SS		-	2	-	50	50	2
CC	22CFE505	Fluency in English – V	-	-	-	-	-	-	-	-
	22CSD501	Soft Skills Development – I	-	-	-	-	-	-	-	Grade
Total									**650**	**26**

SEMESTER – VI										
Part	**Subject Code**	**Title of the Paper**	**Hrs / Week**		**Hrs / Sem.**	**Exam Hrs.**	**Maximum Marks**		**Total Marks**	**Credits**
			L	**P**	**T**		**Internal**	**External**		
III	22UCY611	Core - IX : Physical Methods and Chemical Structure	4	-	1	3	50	50	100	4
	22UCY612	Core - X : Organic Chemistry – II	4	-	1	3	50	50	100	4
	22UCY613	Core - XI : Chemical Kinetics and Quantum Mechanics	4	-	1	3	50	50	100	4
	22UCY614	Core - XII : Polymer Chemistry	4	-	1	3	50	50	100	4
	22UCY6E1 / 22UCY6E2 / 22UCY6E3	Core Elective - II : / Analytical Chemistry – II Core Elective - II : / Pharmaceutical Chemistry II Core Elective - II : Agricultural Chemistry and Analytical Techniques for Agrochemicals	4	-	-	3	50	50	100	5
	22UCY615	Core Lab - III : Gravimetric Analysis and Physical Chemistry Experiments	-	6	-	6	50	50	100	6
	22UCY616	Summer Internship	-	-	-	-	-	100	100	2
	22UCY6AL	Advanced Learner Course - II: Applications of Spectroscopy (Optional) Self Study	-	-	-	**3**	50	50	100	4*
IV	22UCY6VA	Chemistry in Every Day Life	30 Hrs		-	2	-	50	50	2*
	22UCY6S1 / 22UCY6S2	Skill Based Elective - II : Green Chemistry / Skill Based Elective - II : Clean energy	2		-	2	-	50	50	2
	22HEC606	Human Excellence - Global Values & SKY Yoga Practice – VI	2		-	2	25	25	50	1
CC	22CFE606	Fluency in English – VI	-		-	-	-	-	-	-
	22CSD602	Soft Skills Development – II	-		-	-	-	-	-	Grade
Total									**800**	**32**

AL - Advanced Learner Course (Optional); VA - Department Specific Value Added Course *Extra Credits

*Credits – Based on course content maximum, of 4 credits. **Grand Total = 3900; Total Credits = 140**

Question Paper Pattern

(Based on Bloom's Taxonomy)

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Theory Examinations: 70 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q 1 -10)	A (Q 1 – 5 MCQ) (Q 6–10 Define/Short Answer)	10 x 1 = 10	MCQ Define	70 **(Reduced to 50 for ESE)**
K3 (Q 11-15)	B (Either or pattern)	5 x 4 = 20	Short Answers	
K4 & K5 (Q 16 – 20)	C (Questions in Either or Pattern from each unit)	5 x 8 = 40	Descriptive/ Detailed	

2. Theory Examinations: 50 Marks (Part IV except Self-study)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q 1 -10)	A (Q 1 – 5 MCQ) (Q 6–10 Define / Short Answer)	10 x 1 = 10	MCQ Define	50 **(Reduced to 25 for ESE)**
K3, K4 & K5 (Q 11-18)	B (Answer 5 out of 8)	5 x 8 = 40	Short Answers	

3. Practical Examinations: 100/50 Marks

Knowledge Level	Criterion	External/Internal Marks	Total
K3	Record work & Practical	50/50	100
K4			
K5		25/25	50

***** In Theory ESE, Students will write Examination Maximum Marks as 70 and it will be reduced to 50 for Total Mark calculation.

Components of Continuous Assessment

THEORY

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Test 1	(70 / 4.67) = 15	15+15+10+05+05	50
Test 2 / Model	(70 / 4.67) = 15		
Assignment / Digital Assignment	10		
Seminar / Socratic Seminar	05		
Group Task : GD, Role Play, APS	05		

Maximum Marks: 50; CIA Mark: 25

Components		Calculation	CIA Total
Test / Model	10	10+5+5+5	25
Assignment / Digital Assignment	05		
Seminar / Socratic Seminar	05		
Group Task : GD, Role Play, APS	05		

PRACTICAL

Maximum Marks: 50; CIA Mark: 25

Components		Calculation	CIA Total
Test / Model	15	15+5+5	25
Observation Note	05		
Record	05		

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Test / Model	30	30+5+15	50
Observation Note	05		
Record	15		

Maximum Marks: 200; CIA Mark: 100

Components		Calculation	CIA Total
Test / Model	60	60+10+30	100
Observation Note	10		
Record	30		

PROJECT

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Review I	10	10+10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

Maximum Marks: 200; CIA Mark: 100

Components		Calculation	CIA Total
Review I	20	20+20+20+40	100
Review II	20		
Review III	20		
Report Submission	40		

** Components for 'Review' may include the following:*

Originality of Idea, Relevance to Current Trend, Problem Analysis, Data Collection and Data Analysis, Candidate Involvement and Presentation of Report

STUDENT SEMINAR EVALUATION RUBRIC

Grading Scale:

A	B	C	D
5	4	2 - 3	0 - 1

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as interesting story in logical, easy to follow sequence	Information presented in logical sequence; easy to follow	Most of information presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of subject & References	Demonstrated full knowledge; answered all questions with elaboration **&** Material sufficient for clear understanding **AND** exceptionally presented	At ease; answered all questions **but** failed to elaborate **&** Material sufficient for clear understanding **AND** effectively presented	At ease with information; answered most questions **&** Material sufficient for clear understanding **but** not clearly presented	Does not have grasp of information; answered only rudimentary Questions **&** Material not clearly related to topic **OR** background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation
Eye Contact	Refers to slides to make points; engaged with audience	Refers to slides to make points; eye contact majority of time	Refers to slides to make points; occasional eye contact	Reads most slides; no or just occasional eye contact
Elocution – (Ability to speak English language)	Correct, precise pronunciation of all terms Voice is clear and steady; audience can hear well at all times	Incorrectly pronounces few terms Voice is clear with few fluctuations; audience can hear well most of the time	Incorrectly pronounces some terms Voice fluctuates from low to clear; difficult to hear at times	Mumbles and/or Incorrectly pronounces some terms Voice is low; difficult to hear

WRITTEN ASSIGNMENT RUBRIC

Grading Scale:

A	B	C	D	F
09 - 10	07- 08	05 - 06	03 - 04	01 - 02

CRITERION	A - Excellent	B - Good	C - Average	D - Below Average	F - Inadequate
Content & Focus	Hits on almost all content exceptionally clear	Hits on most key points and writing is interesting	Hits in basic content and writing is understandable	Hits on a portion of content and/or digressions and errors	Completely off track or did not submit
Sentence Structure & Style	* Word choice is rich and varies * Writing style is consistently strong * Students own formal language	* Word choice is clear and reasonably precise * Writing language is appropriate to topic * Words convey intended message	* Word choice is basic * Most writing language is appropriate to topic * Informal language	* Word choice is vague * Writing language is not appropriate to topic * Message is unclear	* Not adequate
Sources	Sources are cited and are used critically	Sources are cited and some are used critically	Some sources are missing	Sources are not cited	Sources are not at all cited
Neatness	Typed; Clean; Neatly bound in a report cover; illustrations provided	Legible writing, well-formed characters; Clean and neatly bound in a report cover	Legible writing, some ill-formed letters, print too small or too large; papers stapled together	Illegible writing; loose pages	Same as below standard
Timeliness	Report on time	Report one class period late	Report two class periods late	Report more than one week late	Report more than 10 days late

Continuous Internal Assessment for Project / Internship

The second year students should undergo a project work at the end of IV semester

- The minimum period of study is for 4 weeks.
- Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- Students are divided into groups and each group is guided by a Mentor.
- The group should not exceed eight students, also interested student can undergo individually.
- A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- Project work constitutes 100 marks, out of which 50 is Internal and 50 is External Marks.

Mark Split UP

Internal	External	Total
50	50	100

S. No	Internal Components	Marks
1	Review – I	10
2	Review – II	10
3	Review – III	10
4	Rough Draft Submission	20
Total		**50**

Review I:

- Problem Analysis

Review II:

- Data collection

Review III:

- Data Analysis

FIRST SEMESTER

Programme Code:	B.Sc			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY101			Title	Batch:	2022 – 2025
				Core Paper – I	Semester:	I
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	1	Inorganic and Organic Chemistry	Credits:	5

Course Objective

To understand basic theoretical concepts on chemical bonding and hybridization, acquire knowledge on aromaticity, mechanistic pathway of aliphatic nucleophilic substitutions and aromatic electrophilic substitutions in organic reactions.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect the types of chemical bonding	**K1,K2**
CO2	Deduce the geometry of the molecules and apply MOT to Homonuclear and Heteronuclear molecules and understand the basic theoretical concepts in inorganic qualitative analysis.	**K2, K3**
CO3	Write the nomenclature of organic compounds and analyze the reactions of alkenes and examine the relevant name reaction	**K2, K4**
CO4	Apply the concepts in determining the mechanisms of aliphatic nucleophilic substitution reactions	**K3**
CO5	Interpret the factors affecting in determining the orientation and reactivity of the aromatic compounds	**K2, K5**

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	M	-	-
CO2	H	H	H	M	M	M	H	H	-	-
CO3	H	H	H	H	M	H	M	M	-	-
CO4	H	H	H	M	M	M	M	M	-	-
CO5	H	H	H	M	M	M	M	M	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Periodic Properties and Theory of Bonding:** Long form of Periodic Table - Main features, advantages and defects. Division of elements into s, p, d and f block elements. Periodic properties of elements. Chemical bonding: Variable electrovalency - Pseudo inert gas configuration-Inert pair effect. Ionic Bonding - Conditions for the formation of an ionic compound, Characteristics of Ionic compounds. Crystal lattice energy and its determination by Born-Haber Cycle. Covalent Bonding: Lewis – Langmuir concept and Octet rule, Characteristics of covalent compounds- Polarizing power and Polarizability. Partial ionic character in covalent bond. Fajan's rules and their applications in explaining melting points and solubility properties. Co-ordinate covalent bonding: Characteristics. Comparison between ionic, covalent and coordinate bonding. ***Hydrogen bonding-concept, types and applications - melting and boiling points of hydrides of nitrogen, Oxygen, Fluoride and Lesser density of ice.*** Intermolecular forces – London forces and van der Waals forces – ion dipole-dipole interactions.	19
Unit II	**Molecular Orbital Theory:** Concept of Hybridization- sp, sp^2 and sp^3 with reference to C_2H_2, C_2H_4, CH_4 and C_6H_6 molecules. Applications of VSEPR Theory to $BeCl_2$, BCl_3, H_2O, NH_3, CH_4, PCl_5 and SF_6 molecules. Molecular Orbital Theory: Symmetry of molecular orbitals. Application to simple Homonuclear and Heteronuclear molecules - H_2, He_2, O_2, F_2, N_2, CO and NO. Bond order and magnetic properties. **Theoretical Principles in Qualitative Analysis:** Basic principles involved in analysis of cations and anions, solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II.	18
Unit III	**Polar Effects and Reactions of Alkanes, Alkenes:** Nomenclature of organic compounds - IUPAC naming of simple and substituted aliphatic, aromatic and alicyclic compounds - priorities of functional groups in polyfunctional compounds. Polar Effects: Inductive, mesomeric, electromeric and hyperconjugative effects. Steric inhibition of resonance Homolytic and Heterolytic fission: Free radicals, carbocation, carbanion and their stability. Electrophiles and nucleophiles with examples.	18

	Alkanes:Structure – source – Methods of preparation and properties. Alkenes: Preparations involving dehydrohalogenation, dehydration, reduction of alkynes and Wittig reaction. Mechanism of Elimination reactions: E1 and E2 .Saytzeff and Hofmann rules. Reactions of Alkenes: Addition of hydrogen halide, Markovnikov rule, peroxide effect, hypohalous acid, sulphuricacid, hydroboration. Oxidation by alkaline $KMnO_4$ and Ozonolysis.	
Unit IV	**Reactions of Dienes and Alkynes**: Dienes-Nomenclature, Classification and stability. 1,2 and 1,4 addition of Butadiene. Diels-Alder reaction. Alkynes: Preparation of alkynes by dehydrohalgenation, dehalogenation and electrolysis. Reactions: Hydroboration, addition of hydrogen halides, water, formation of acetylides and Ozonolysis. Grignard reagent - Preparation and synthetic utility of Ethyl magnesium iodide. Aliphatic Nucleophilic Substitution: S_N^1 and S_N2 mechanisms. Effect of structure of substrate, nucleophile and solvent.	18
Unit V	**Electrophilic Substitution:** Benzene: Resonance, Resonance energy and structure. Aromaticity: Huckel's rule. Non-benzenoid aromatic compound – Furan, Cyclopropenyl cation, cyclopentadienyl anion and Tropylium cation. Aromatic Electrophilic Substitution: Arenium ion mechanism, mechanism of nitration, sulphonation, halogenation, Friedel-Crafts alkylation and acylation in benzene. Orientation and reactivity of Monosubstituted benzene: ortho, para and meta directing. Role of inductive and mesomeric effects in electrophilic aromatic substitution in phenol and nitrobenzene.	17
	Total Contact Hrs	**90**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Soni. P.L	Text book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	2012
2	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	2009
3	Soni. P.L.	Text book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2012
4	Madan. R.D.	Advanced Inorganic Chemistry	S.Chand & Company Ltd., New Delhi	2011

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Finar I.L.	Organic Chemistry	Longmans	2006
2	Morrision. R.T. and Boyd. R.N.	Organic Chemistry	7^{th} Edition. Pearson Hall Prentice.	2011
3	Wahid U.Malik, G.D, Tuli, and Madan. R.D.	Selected Topics in Inorganic Chemistry	S.Chand & Company, New Delhi	2006

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. T.Gowrani Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

SECOND SEMESTER

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Chemistry	
Course Code:	22UCY202			**Title**	**Batch:**	2022 – 2025
				Core Paper – II	**Semester:**	II
Lecture Hrs./Week	5	**Tutorial Hrs./Sem.**	1	**Organic and Physical Chemistry**	**Credits:**	4

Course Objective

To acquire knowledge on the mechanisms of reactions in carbonyl compounds, understand basics concepts on quantum chemistry and important laws of thermodynamics.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Discuss the preparation, properties of alcohols, dicarboxylic acids, hydroxy acids and esters	**K2**
CO2	Analyse the reactions of aldehydes / ketones and examine the relevant reactions and understand the basic principles involved in volumetric analysis	**K4, K3**
CO3	Apply quantum chemical treatment to sub-atomic particles of atom	**K3**
CO4	State and apply first law of thermodynamics, perform calculations for physical process	**K3, K4**
CO5	Analyse the feasibility of the reaction	**K4**

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	-	-
CO2	H	H	H	M	M	H	H	H	H	-
CO3	H	H	H	M	M	M	M	M	-	-
CO4	H	M	H	M	M	M	M	M	-	-
CO5	H	H	H	M	M	M	M	H	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Alcohols**: General methods of Preparation and its chemical properties. Distinction among primary, secondary and tertiary alcohols. **Ethers:** General methods of preparation and its chemical properties. Preparation and properties of diethyl ether. **Dicaboxylic acids**: Preparation and properties of oxalic, malonic, succinic and phthalicacids. **Hydroxy acids: Tartaric** acid, citric acid - Preparation and properties. **Acetoacetic ester:** Preparation and its applications in the synthesis of acetone, adipic acid, crotonic acid and 4-methyl uracil. Keto-enol tautomerism. **Malonic ester**: Preparation and its applications in the synthesis of crotonic acid, barbutric acid, succinic acid and dimethyl acetic acid. **Acid derivatives:** Acetyl chloride and acetic anhydride- Preparation, properties and uses. ***Manufacture of ethanol from molasses. Absolute alcohol, methylated spirit and power alcohol.***	15
Unit II	**Carbonyl compounds**: Preparation by Rosenmund reduction, Stephen reaction and dry distillation of calcium salts of fatty acids. Mechanism of Nucleophilic addition reaction in aldehydes and ketones: Addition of Grignard reagent, HCN, $NaHSO_3$and NH_3. Addition with NH_2-NH_2, $C_6H_5NHNH_2$and ROH. Mechanism of Aldol, Perkin, Benzoin condensation, Cannizzaro,Reimer-Tiemann, Gattermann and Reformatsky reactions. Reduction: Wolff-Kishner, Clemmensen, MPV reductions. Reduction with reagents: Lithium Aluminium Hydride and Sodium Borohydride. Oxidation of aldehydes and ketones using Tollen's reagent, Fehling's solution, $SeO_2$and Oppenauer oxidation. **Volumetric analysis:** Principle, Preparation of standard solutions, primary and secondary standard substances, Types of titration and Principles of different types of titrations.	15
Unit III	**Quantum Theory:** Black body radiation - Limitations of classical theory. Planck's radiation theory, Quantisation of energy. Einstein's theory of Photoelectric effect. Rutherford atomic model- Bohr theory of hydrogen atom - Sommerfield theory -	15

	Particle and wave character of electrons. De-Broglie's equation. Davison and Germer experiment. Heisenberg's uncertainty principle - Compton effect. Schrodinger wave equation (Equation only/ Derivation not required). Applications to particle in one-dimensional box, Orbit and Orbitals, significance of Ψ and Ψ^2 .	
Unit IV	**Thermodynamics:** Importance, Limitations and Thermodynamic terms. Types of Thermodynamic equilibrium and processes. First law of Thermodynamics: Law of conservation of energy, internal energy. Enthalpy and Heat capacity: Relation between Cp and Cv. Work done in an isothermal reversible expansion of an ideal gas. Reversible adiabatic expansion of an ideal gas: Relation between temperature and volume and temperature and pressure. Comparision of isothermal and adiabatic expansions. Joule- Thomson Experiment: Joule-Thomson Effect, Joule – Thomson coefficient for an ideal gas, Inversion Temperature. Zeroth law of thermodynamics. Absolute zero of temperature.	15
Unit V	**Thermochemistry**: Definition – Standard Enthalpy of formation and Enthalpy of neutralization. Hess's law, Measurement of enthalpy of reactions by Bomb Calorimeter. Bond energy and its applications. **Second law of thermodynamics:** Limitations of First law. Need for Second law of thermodynamics. Various statements of Second law of thermodynamics. **Entropy:** Definition, Entropy changes in reversible and irreversible spontaneous processes. Entropy change accompanying change of phase, isothermal expansion of an ideal gas with change in pressure, volume and temperature. Entropy of mixing of ideal gases. Carnot's cycle, Physical significance of entropy. Helmholtz and Gibbs free energy functions: Variation of free energy with temperature or pressure, Gibbs Helmholtz equation. Third law of Thermodynamics (statement only).	15
	Total Contact Hrs	**75**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Soni. P.L	Text book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	2012
2.	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	2016
3.	Puri B.R., Sharma L.R. and Pathania M. S.	Principles of Physical Chemistry	Vishal Publishing House.	2018
4.	Negi. A.S., and Anand S.C.	A text book of Physical chemistry	New Age International PVT Ltd	2009

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Finar I.L.	Organic Chemistry. Vol.I and II	Pearson Education: Singapore	2003
2	Morrision. R.T. and Boyd. R.N.	Organic Chemistry	17 th Edition. Pearson Hall Prentice.	2011
3	Soni. P.L. and Dharmarha O.P.	Text book of Physical Chemistry	S.Chand & Company, New Delhi	2005

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc	**Programme Title:**	Bachelor of Chemistry	
Course Code:	22UCY203	**Title**	**Batch:**	2022 – 2025
		Core Practical-I Inorganic Qualitative Analysis	**Semester:**	II
Lecture Hrs./Week	3		**Credits:**	3

Course Objective

To know about the skills of using glassware's and apparatus used in qualitative analysis, develop the analytical skills in inorganic qualitative analysis and know the chemistry principles applied in qualitative analysis.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	**CO Statement**	**Knowledge Level**
CO1	Remember the procedure for the analysis	**K1, K2**
CO2	Understand and apply the theoretical knowledge to chemical reactions responsible for the reactions leading to identification of the given radicals	**K2, K3**
CO3	Separate the cations into groups and to identify them	**K1, K4**
CO4	apply the theoretical knowledge in the preparation of inorganic metal complexes	**K3**

Mapping with PO / PSO Vs CO

PO /PSO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**
CO1	H	H	H	H	H	H	M	M	H	M
CO2	H	H	H	H	H	H	M	M	H	M
CO3	H	H	H	H	H	H	M	M	H	M
CO4	H	H	H	H	H	H	M	M	H	M

H – High; M – Medium; L – Low

Units	Content	Hrs
	1. Inorganic mixture analysis: Analysis of mixture containing two anions one of which is interfering in nature and two cations: The following radicals may be given-: Carbonate, Nitrate, Fluoride, Sulphate, Chloride, Oxalate, Phosphate, Borate, Lead, Copper, Nickel, Bismuth, Cadmium, Manganese, Zinc, Calcium, Strontium, Barium, Magnesium and Ammonium. **2. Inorganic Preparations** i) Preparation of Tetrammine copper (II) complex. ii) Preparation of Hexammine cobalt (II) Chloride. iii) Preparation of Potassium trioxalato chromate (III).	
	Total Contact Hrs	**45**

Pedagogy

Demonstration and individual hands on practical.

Assessment Methods

Performance of laboratory work, Report, Recording the report, Submission of the record

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Venkateswaran,V., Veeraswamy. R and Kulandaivelu. A.R	Basic Principles of Practical Chemistry	S.Chand Publications.	2004
2	Svehla G. and Sivasankari.B	Vogel's Qualitative Inorganic Analysis	7thEdn.Pearson India education services.	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Thomas, A.O	Practical Chemistry	Cannanore: Scientific Book Center	2003
2	RamanujamV.V.	Inorganic semi micro qualitative analysis	3rd Edn.The National Publishing Co.	2004

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. Indumathy Ramasamy Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

THIRD SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY304			Title	Batch:	2022 – 2025
				Core Paper- III Inorganic and Physical Chemistry	Semester:	III
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	2		Credits:	4

Course Objective

To impart knowledge on basic metallurgical process, alloys, fuels and fertilizers and to expound conceptions on thermodynamics of solutions, phase equlibria and colligative properties to succeed at an entry-level position in chemical industry or a chemistry graduate program.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic metallurgical operations and understand the preparation and properties of alloys.	K1& K2
CO2	Understand the classification and properties of fuels and fertilizers	K2
CO3	Apply the concept of law of mass action to various equilibria	K3
CO4	Understand the concepts of thermodynamics of solution and construct and analyse the phase diagram.	K2 &K5
CO5	Correlate the relationship between colligative properties of dilute solutions and molecular mass of solute.	K5

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	M	M	H	H	M	H	-	M
CO2	H	H	H	M	M	M	H	H	-	M
CO3	M	H	H	M	H	M	M	M	-	M
CO4	H	H	M	H	H	M	M	H	-	M
CO5	H	H	M	M	H	M	M	M	-	M

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Metallurgy**: Basic Metallurgical operations - Concentration, Calcination, Roasting, Reduction and Refining. Extraction and uses of Ti, V and W. Platinum Metals – Metallurgy of Platinum. Platinum black, Platinised asbestos, colloidal platinum - Preparation and uses. Group Discussions: (i) Cr, Mo and W (ii) Fe, Co and Ni. Alloy steels. Heat treatment of steel. Iron and steel industry in India. Preparation and uses of the following compounds. TiO_2, $TiCl_4$, CrO_2Cl_2, $ZrOCl_2$, V_2O_5, $FeSO_4$ and $(NH)_4MoO_4$. **Alloys**: Preparation, properties, composition and uses of some important alloys of Al, Ni, Sn and Pb.	19
Unit II	**Fuels**: Classification of fuels, calorific value and characteristics of goodfuel. Gaseous Fuels: Advantages, Composition and uses of natural gas, watergas, producer gas, oil gas, LPG, CNG and Gobar gas. Liquid fuels: Petroleum-composition and classification. Refining of crude petroleum and uses of various fractions. Anti-Knocking agents, Octane and Cetane numbers. Synthetic Petrol – Catalytic Cracking of Petroleum. **Fertilizers**: Important nutrients and their functions. Primary and secondary nutrients. Manufacture of urea, ammonium sulphate, super phosphate of lime, triple super phosphate and calcium ammonium nitrate.	17
Unit III	**Thermodynamics**: Chemical potential -Gibbs – Duhem equation, variation of chemicalpotential with temperature and pressure. Chemical potential of ideal gases. Clapeyron-Clausius equation-application to various equilibria. Concept of fugacity physical significance of fugacity. Concept of activity and activity coefficient. Standard states. **Chemical equilibrium**: Law of mass action - relationship between Kp and Kc. van't Hoff's reaction isotherm and isochore. De-Donder's concept of chemical equilibria. Formation of HI, dissociation of PCl_5 and N_2O_4. Thermodynamic relations for chemical affinity. Le Chatelier's principle: Application to synthesis of ammonia.	18
Unit IV	**Thermodynamics of Solutions**: Types of solutions: Solution of liquids in liquids. Ideal solution. Raoult's law, Henry's law (Statement only). Non-ideal solution-deviation from Raoults law. Duhem – Margules equation. Fractional distillation and azeotropes. Phase equilibria between condensed phases: Partially miscible liquid	18

	system-phenol-water triethylamine–water and nicotine–water system. Completely immiscible liquids: steam distillation. Nernst distribution law thermodynamic derivation, application to association of benzoic acid and study of $I_2+I^-=I_3^-$.	
Unit V	**Colligative properties of solutions**: Lowering of vapour pressure: Determination of lowering of vapour pressure by static method and dynamic method. Elevation of Boiling point: Definition, Calculation of molecular weight, Determination of elevation of boiling point by Cottrell's method. Depression of freezing point: Definition, Calculation of molecular weight, Determination of freezing point depression by Beckmann's method. Osmotic pressure: Laws of Osmotic pressure, van't Hoff's equation for osmotic pressure of dilute solution. Berkely and Hartley method of determination of osmotic pressure. Abnormal molecular weight and van't Hoff factor.	18
	Total Contact Hrs	**90**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Mandeep Dalal	Textbook of Physical Chemistry	Volume 1. 1st Edition. Dalal Institute	2018
2	Soni. P.L., Soni.	Text book of Inorganic Chemistry	20th revised Edition. New Delhi: Sultan Chand & Sons.	2017

3	P.L. and Dharmarha. O.P.,	Text book of Physical Chemistry	23rd revised Edition. New Delhi: Sultan Chand & Sons	2016
4	Moudgil. H.K.,	Text Book of Physical Chemistry.	2nd Edition. New Delhi: PHI learning Pvt. Ltd	2015
5.	A.S.Negi and S.C. Anand	A Text Book of Physical Chemistry.	Reptint New Age International Publisher (P) Ltd.	2004

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Puri, Sharma and Pathania	Principles of Physical Chemistry.	47thEdition.Jalandhar: Vishal Publishing Co.	2020
2	Puri and Sharma and Kalia. K.C.,	Principles of Inorganic Chemistry	33rd Edition. Milestone Publishers and Distributors.	2016
3	Jain. P.C and Monika Jain,	Engineering Chemistry	17thEdition.DhanpatRai Publishing Company (P) Ltd.	2015

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. M. Amutha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY3N1	Title	Batch:	2022 – 2025
		Non Major Elective - I	Semester:	III
Lecture Hrs./Week	1	Introduction to Nanotechnology	Credits:	2

Course Objective

To create basic awareness about Nanoscience and Technology and its current applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect the basics of nanoscience and nanomaterials	K1
CO2	Understand the various types of nanomaterials and the approaches towards the preparation of nanomaterials	K2
CO3	Sketch the specific properties of nanomaterials	K3
CO4	Illustrate the properties and uses of carbon nanomaterials	K3
CO5	Explain the applications of nanomaterials based on their properties	K3

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	-	-	-	L
CO2	H	H	H	-	-	-	-	-	-	L
CO3	H	H	H	-	-	-	-	-	-	L
CO4	H	H	H	-	-	-	-	M	-	L
CO5	H	H	H	-	-	-	-	M	-	L

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	General concepts in Nanotechnology – Nanotechnology – Definition, History of nanotechnology, Nature nanotechnology.	3
Unit II	Top-down approach and Bottom-up approach for the preparation of nanomaterials, Classification of nanostructures.	3
Unit III	Properties of Nanomaterials – High surface – volume ratio, Size dependent properties of nanomaterials.	3
Unit IV	Carbon Nanomaterials – Graphite, Graphene, SWCNT, MWCNT – Properties and uses.	3
Unit V	Applications of Nanomaterials – Energy Storage Devices, Nanosensors, Drug Delivery & Environmental Protection.	3
	Total Contact Hrs	**15**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sulbha Kulkarni	Nanotechnology: Principles And Practice	3rd Edn., Capital Publishing Company	2017
2	T. Pradeep	Nano: The Essentials: Understanding Nanoscience and Nanotechnology	McGraw Hill India.	2009
3	Daniel Ratner and Mark Ratner	Nanotechnology: A Gentle Introduction to the Next Big Idea	5th Edn., Pearson.	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	C.N.R. Rao, A. Muller, A. K. Cheetham	The Chemistry of Nanomaterials: Synthesis, Properties and Applications	1stEdn (4thRepr), Wiley-VCH Verlag	2011
2	G. Cao	Nanostructures and nanomaterials: Synthesis, properties and applications	Imperial College Press.	2006
3	Qing Zhang	Carbon Nanotubes and Their Applications	CRC Press	2012
4	Rajendra Kumar Goyal	Nanomaterials and Nanocomposites: Synthesis, Properties, Characterization Techniques, and Applications	1stEdn., CRC Press	2020

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY3N2	Title	Batch:	2022 – 2025
		Non Major Elective – I Chemistry of Consumer Products	Semester:	III
Lecture Hrs./Week	1		Credits:	2

Course Objective

To acquire the basic knowledge in consumer product chemistry

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Label the ingredients present in consumer products	K1
CO2	Understand the action of soaps and detergents	K2
CO3	Demonstrate the formultion and uses of consumer products.	K3
CO4	Identify the required characteristics of cosmetics	K1
CO5	Describe the quality control and health hazards in cosmetics	K2

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	-	M	-	-
CO2	H	H	H	-	-	-	-	M	-	-
CO3	H	H	H	-	-	-	-	M	-	-
CO4	H	H	H	-	-	-	-	M	-	-
CO5	H	H	H	-	-	-	-	M	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Soaps:** Saponification of oils and fats. Manufacture of soaps. Formulation of toilet soaps. Different ingredients used and their functions. Mechanism of cleansing action of soap, Medicated soaps, Herbal soaps. Soft soaps, Shaving soaps and Creams.	**3**
Unit II	**Detergents:** Different ingredients in the formulation of detergent powders and soaps. Liquid detergents. AOS (alpha olefin sulphonates. cationic detergents: examples. Manufacture and applications. Non-ionic detergents: examples. Mechanism of action of detergents. Comparison of soaps and detergents.	**3**
Unit III	**Cosmetics:** Introduction and classificationFace creams: cold cream, vanishing cream, cleansing and bleaching cream-ingredients, formulation and uses. **Face powder: Requirements and ingredients.** Hand cream: Formulations, Ingredients and uses. Nail preparations: Nail bleach, nail lacquers, nail lacquers and nail removers – requirements ingredients and formulations.	**3**
Unit IV	**Make Up Preparations :** Lipstick, Rouge, Mascara – characteristics and ingredients Dentifrices: Tooth paste and tooth powder -Essential and special ingredients and their functions.	**3**
Unit V	**Hair preparations**: Hair oils and hair tonics. Ingredients and their functions. Hair cream: Formulations. Shampoos: constituents and functions. Hair Dyes: Primary requirements of a dye. Vegetable colorings, metal salts and dye used in hairdyes. Hair removers: Temporary and permanent removal of hair. Quality control of cosmetics in India. Health hazards of cosmetics.	**3**
	Total Contact Hrs	**15**

***Italics denotes self study topics**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Swarnlata Saraf, Shailendra Saraf	Cosmetics: A Practical Manual	3rdEdn., Bsp Books Pvt. Ltd.	2015
2	P. K. Chattopadhyay	Soaps, Detergents and Disinfectants Technology Handbook	2ndEdn., NPCS Publication Division.	2019
3	Ajay Kumar Gupta	Soaps, Detergents and Disinfectants Technology Handbook	3rd Edn., NIIR Project Consultancy Services.	2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Mitchell Schlossman	Chemistry and Manufacture of Cosmetics: Science	4th Edn, Allured Pub Corp.	2008
2	B. K. Sharma	Industrial Chemistry	19th Edn., Krishna Prakashan Media P. Ltd	2016
3	Amol A Kulkarni, Vikram Gharge, Indrajeet D Gonjari	Cosmetic Science	1st Edn., Nirali Prakashan.	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

FOURTH SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY405			Title	Batch:	2022 – 2025
				Core Paper – IV General Chemistry - I	Semester:	IV
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	1		Credits:	4

Course Objective

To explain the periodic properties of elements, various reactions and stereoisomerism of organic compounds phase rule, radioactivity and nuclear reactions

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect the properties of transition and inner transition elements	K1
CO2	Understand the preparation, properties and various reactions of phenols, aliphatic and aromatic nitro compounds	K2
CO3	Analyse the classification of amines, separation, basic nature and optical and geometrical isomerism of certain organic compounds.	K4
CO4	Apply the concepts of phase rule, phase equilibria and its applications to various systems.	K3
CO5	Explain the radioactivity, types of nuclear reactions and the applications of isotopes.	K2, K5

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	H	M	H	H	-	-
CO2	H	H	H	H	H	H	H	H	-	-
CO3	H	H	H	H	H	M	H	H	-	-
CO4	H	H	H	M	H	M	H	H	-	-
CO5	H	H	H	H	H	M	H	H	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Chemistry of d- and f-block elements:** General comparison of 3d, 4d and 5d elements in term of electronic configuration, metallic nature, oxidation states, ionization energies, redox properties, formation of complexes, spectral and magnetic properties. f-block elements: electronic configuration, oxidation states, variation in atomic and ionic (3+) radii, lanthanide contraction and its consequence, magnetic and spectral properties of lanthanides, comparison between lanthanide and actinides, separation of lanthanides (by ion-exchange method). Extraction of Uranium from Pitch blende.	18
Unit II	**Phenol:** Preparation of phenol from aryl halide**,** cumene and grignard reagent. Reactions of Phenol: Nitration. sulphonation, halogenation, Kolbe's Schmidt reaction, Friedel Crafts reaction, Reimer Tiemann reaction, Lederer - Manasse reaction, Schotten – Bauman reaction and Gattermann aldehydes synthesis. **Nitro Compounds:** Aliphatic nitro compounds: Nitromethane and Nitroethane - preparation and properties. Nitro-Acinitro tautomerism. Aromatic nitro compounds: Preparation and reduction of Nitrobenzene in neutral, acidic and alkaline media and electrolytic reduction. Preparation of ortho, meta and paradinitrobenzenes and trinitrotoluene (TNT).	18
Unit III	**Amines:** Aliphatic amines: separation of mixture of amines and basicity of amines. Aromatic amines: preparation and properties of Aniline. Reactions: Nitrous acid (HNO_2), diazotisation and coupling with mechanism. Conformational analysis of Ethane, n- Butane and Cyclohexane. Distinction between conformation and configuration. **Stereoisomerism**: Optical isomerism: Conditions, R-S configuration of priority rules with examples. optical isomerism in lactic acid and tartaric acid, racemisation, methods of resolution . Geometrical isomerism: cis and trans isomerism in maleic and fumaric acid and E-Z notation	18
Unit IV	**Phase rule and phase equilibria**: Concept of phase, components and degrees of freedom with examples. Thermodynamic derivation of Gibbs-Phase Rule. One component system: Phase diagram and discussion of water and sulphur system. Two component system: Construction of phase diagram by thermal analysis. Simple	18

	eutectic- Pb-Ag System. Formation of compounds with congruent melting point: Zn-Mg system. Formation of compounds with incongruent melting point: Na-K system. Salt-Water system: Potassium Iodide-Water system.	
Unit V	**Nuclear Chemistry**: Radioactivity- types of radioactivity- types of radioactive rays - nuclear stability-n/p ratio - magic numbers- nuclear binding energy- mass defect- nuclear shell model - groups displacement law - decay constant – half- life period - radioactive equilibrium- transmutation-artificial transmutation- applications of artificial transmutation-radioactive series. Nuclear reactions types: fission and fusion reactions- principle and working of nuclear reactors. Isotopes: Separation of isotopes- identification of isotopes- isotopes of hydrogen-isotope effect- ***Application of isotopes in chemistry, agriculture and medicine.***	18
	Total Contact Hrs	**90**

Pedagogy: Direct Instruction, Digital Presentation and Flipped Class

Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Arun Bahl. & Bahl B. S	A textbook of organic chemistry, 22nd edn.	Sultan Chand and Son Pvt. Ltd, New Delhi	2016
2	Puri, B. R. Sharma. L. R. & Kalia. K. C.	Principles of physical chemistry, 33rd edn.	Vishal Publishing House Pvt. Ltd, Jalandar.	2016
3	Soni, P. L.	Text book of organic chemistry, 29th edn.	Sultan Chand and Son Pvt. Ltd, New Delhi	2012
4	Madan, R. D.	Modern inorganic chemistry, 3rd edn.	Sultan Chand and Son Pvt. Ltd, New Delhi	2011

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Morrison Boyd & Bhattacharjee	Organic chemistry, 7th edn.	Pearson Education, Indian Branch, Noida	2011
2	Gardon, M. B.	Physical chemistry, 5th edn	McGraw Hill-Edition, Chennai	2010

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of Examination
Name with Signature	**Name with Signature**	**Name with Signature**	**Name with Signature**
Name : Dr. T.Gowrani Signature	Name: Dr. Indumathy Ramasamy Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R. Manicka Chezian Signature

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY406	Title	Batch:	2022 – 2025
		Core Practical –II Volumetric, Organic Qualitative Analysis and Organic Preparations	Semester:	IV
Practical Hrs/week	3		Credits:	5

Course Objective

To develop the analytical skills in volumetric, organic qualitative analysis and organic preparations to succeed at a entry-level position as analyst in industry.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the apparatus used in volumetric analysis	K1
CO2	Understand the titrimetric principle and procedure	K2
CO3	Get the idea about organic qualitative analysis	K3
CO4	Analyse the elements and functional groups of organic compounds.	K4
CO5	Prepare an organic compound following the prescribed procedure.	K5

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	M	H	H	H	H	H	H	H
CO2	M	M	M	H	M	H	M	M	H	H
CO3	H	M	M	M	M	M	H	H	H	H
CO4	M	M	H	H	H	H	H	H	H	H
CO5	H	H	M	M	H	M	M	M	H	H

H – High; M – Medium; L – Low

Unit	Content	Hrs
	I) Volumetric Analysis **a) Permanganometry:** 1. Estimation of Ferrous ion. 2. Estimation of Oxalic acid. 3. Estimation of Sodium nitrite. **b) Dichrometry:** 1) Estimation of Ferrous ion using internal indicator. 2) Estimation of Ferric ion using external indicator **c) Iodometry:** 1) Estimation of Copper.(Demonstrationonly) 2) Estimation of Potassium dichromate. **d) EDTA-Titrations:** 1) Estimation of Calcium. 2) Estimation of Zinc. 3) Estimation of Magnesium. 4) Estimation of hardness of water-temporary andpermanent	
	Organic Qualitative Analysis Systematic qualitative analysis of organic compounds containing one functional group: Aldehydes, Ketones, Primary amines, Nitrocompounds, Amides, Anilides, Carbohydrates, Carboxylic acids and Phenols. **Organic Preparations:** 1) Acetylation of aniline to acetanilide. 2) Hydrolysis of benzamide to benzoicacid. 3) Hydrolysis of ester (ethylbenzoate to benzoicacid). 4) Nitration of acetanilide top-nitroacetanilide. 5) Acetylation of Salicylic acid to acetyl salicylic acid.	
	Total hours/Semester	**45**

Pedagogy

Demonstration and individual hands on practical

Assessment Methods:

Performance of laboratory work, Report, Recording the report, Submission of the record.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Venkateswaran. V., Veeraswamy. R and Kulandaivelu.A.R	Basic Principles of Practical Chemistry	2nd Edition. New Delhi: S.Chand Publications.	2017
2	Gopalan. R, Balasubramaniam. P.S., and Rengarajan.K.,	Elements of Analytical Chemistry	New Delhi: Sultan Chand Publishers.	2013
3	Brian S. Furniss, Atony J. Hannaford, Peter W .G. Smith, Austin R. Tatchell.	Vogel's Text book of Practical Organic Chemistry.	Fifth edition. Longman group UK limited	1989

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ahluwalia.V.K.,Sunitha Dhingra, Adarsh Gulati	College Practical chemistry	First Edition. University press (India) Pvt.Ltd.	2012
2	Thomas, A.O	Practical Chemistry	Scientific Book Centre	2003
3	Gnanapragasam.N.S. Ramamurthy.G	Organic Chemistry Lab Manual.	S.Viswanathan Printers & Publishers Pvt Ltd	1996

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr.T.Gowrani Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	**Programme Title:**	Bachelor of Chemistry	
Course Code:	22UCY4N1	**Title**	**Batch:**	2022 – 2025
		Non Major Elective - II Textile Chemistry	**Semester:**	IV
Lecture Hrs./Week	1		**Credits:**	2

Course Objective

To develop basic awarness in the area of Textile chemistry.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect the types of polymers, fibres and dyes	K1
CO2	Understand the morphology and properties of fibres	K2
CO3	Compare the natural and manmade fibres	K3
CO4	Classify dyes and dyeing processes	K3
CO5	Explain the nature of fibre and dye to attain a quality product	K3

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	-	-	-	-
CO2	H	H	H	-	-	-	-	-	-	-
CO3	H	H	H	-	-	-	-	-	-	-
CO4	H	H	H	-	-	-	-	-	-	-
CO5	H	H	H	-	-	-	-	-	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	Polymers – Introduction, Types – Natural and Synthetic, Fibres – Defenition, Morphology of fibres.	3
Unit II	Classification of fibres - Essential and desirable properties of textile fibres and their role in final products.	3
Unit III	Advantages and disadvantages of natural and manmade fibres. Processes involved in textile industry (Flow Chart).	3
Unit IV	Dyes – Classification - Natural and Synthetic Dyes, Dyeing of Cotton, Wool and Silk with natural dyes.	3
Unit V	Characteristics of Dye, Classification of Dyes based on the structure and mode of application	3
	Total Contact Hrs	**15**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Menachem Lewin,	The Handbook of Fiber Chemistry	3rd Edn., CRC Press.	2006
2	HVS. Murthy	Introduction to Textile Fibres	1st Edn., Nabu Press	2016
3	Padma S.Vankar,.	Natural Dyes for Textiles: Sources, Chemistry and Applications	1stEdn., Cambridge Elsevier Science & Technology.	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Eva Lambert, Tracy Kendall	The Complete Guide to Natural Dyeing: Techniques and Recipes for Dyeing	1st Edn., Interweave Press	2010
2	Harry Harper	Introduction to Textile Chemistry.	3rd Edition. Vikas Publishing house.	2012
3	Robert R Mather, Roger H Wardman	The Chemistry of Textile Fibres,	2nd Edn., Royal Society of Chemistry.	2015

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY4N2	Title	Batch:	2022 – 2025
		Non Major Elective - II	Semester:	IV
Lecture Hrs./Week	1	Food Science and Technology	Credits:	2

Course Objective

To create an awareness on food and nutrition to non chemistry students.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the sources, functions of food , food preservation and adultration	K1
CO2	Understand the metabolic activities, methods of food preservation, and effects and identification of food adulteration	K2
CO3	Illustrate the various food additives and adulterants	K3
CO4	Explain the types of adulteration and tests for detection	K2
CO5	Interpret the functions of food corporation of India, ISI and Agmark standards.	K3

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	-	M	-	-
CO2	H	H	H	-	-	-	-	-	-	-
CO3	H	H	H	-	-	-	-	-	-	-
CO4	H	H	H	-	-	-	-	-	-	-
CO5	H	H	H	-	-	-	-	M	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Food and Nutrition:** Functions of food, food sources, energy value of foods, elementary idea about digestion and metabolism of Carbohydrates, Fats and Proteins.	**3**
Unit II	**Food preservation:** Importance of food preservation causes of food spoilage, principles of food preservation. Methods of food preservation - Bacterostatic Methods: Dehydration, Pickling and Salting Bactericidal Methods: Canning and Cooking.	**3**
Unit III	**Milk Processing** :Pasteurisation and milk products Food Additives: Antioxidants, Food Colours, Food enzymes, Spices and flovouring agents. Merits and demerits of additives and preservatives.	**3**
Unit IV	**Food adulteration**: Common adulterants and their effects. Intentional and incidental adulterants. Metallic contamination, contamination by pests and pesticide residues. Simple physical and chemical tests for detection of food adulterants.	**3**
Unit V	**Packaging hazards**: Food poisoning and food borne diseases. Food Laws: FSSAI Food Standard: ISI standards and the Agmark standards. Functions of Food Corporation of India.	**3**
	Total Contact Hrs	**15**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Tejmeet Rekhi and Heena Yadav,	Fundamentals of Food and Nutrition	1st Edn., Elite Publishing House.	2014
2	Sunil NathaMhaske	Essentials of Nutrition	1stEdn, CBS Publication	2015
3	Fellows P.J	Food Processing Technology: Principles and Practice	4th Edn, Woodhead Publishing	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bhavbhuti M. Mehta, Peter Chi Keung Cheung	Handbook of Food Chemistry	1stEdn.,Springer	2015
2	SunetraRoday	Food Science and Nutrition	3rdEdn., Oxford University Press	2018
3	Srilakshmi. B	Food Science	7thEdn, New Age International Publishers.	2018

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

FIFTTH

SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY507			Title	Batch:	2023 – 2025
				Core Paper- V Coordination and Bioinorganic Chemistry	Semester:	V
Lecture Hrs./Week	4	Tutorials/ Sem	1		Credits:	4

Course Objective

To impart essential knowledge regarding the terminologies, theories of coordination chemistry, bonding, structure and stereochemistry of coordination compounds and Bioinorganic chemistry to succeed a chemistry graduate program.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Reminisce the important terms in coordination chemistry	K1
CO2	Understand different theories of coordination compounds	K2
CO3	Apply the theories of bonding in coordination complexes	K3
CO4	Predict the reaction mechanisms in coordination complexes and Determine the stability constant by Job's and Bjerum'smethod	K4 &K5
CO5	Acquire knowledge in Bioinorganic chemistry and metal carbonyls	K4

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	M	M	H	H	M	H	-	-
CO2	M	H	H	M	M	M	M	M	-	-
CO3	H	M	L	M	H	M	M	M	-	-
CO4	M	H	M	H	H	M	L	H	-	-
CO5	H	H	M	M	H	M	M	H	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Introduction to coordination chemistry:** Double salts- complex compounds- complex ion and coordination number- Ligands and their classification -coordination number- IUPAC Nomenclature of coordination compounds. Chelates-Factors affecting the stability of chelate complexes and their uses. Isomerism in Co-ordination compounds: Structural and Stereo isomerism- Geometrical and Optical isomerism in square planar and octahedral complexes.	12
Unit II	**Theories of coordination compounds I:** Werner's theory- Sidwick's electronic interpretation- EAN concept- valence bond theory- outer and inner orbital complexes- Limitations of VBT- crystal field theory- Crystal field splitting in octahedral, tetragonal, square planar and tetrahedral complexes- High spin and Low spin complexes.	12
Unit III	**Theories of coordination compounds II**: Factors affecting crystal field splitting, John Teller distortion- Crystal field stabilization energy- calculation and uses- Color of transition metal complexes-visible spectrum of aqueous Ti (III) ion. Limitations of crystal field theory. Introduction to MOT – Sigma bonding only.	12
Unit IV	**Properties of complexes:** Stability of complexes-overall and stepwise formation constants. Factors affecting stability-Determination of stability constant by Job's and Bjerum's method. Applications of coordination compounds: Applications of copper and silver complexes in qualitative analysis. Applications of Ca-EDTA and Ni-DMG complexes in quantitative analysis. **Reaction Mechanism in Complexes:** Ligand substitution in octahedral complexes: Inert and Labile complexes Nucleophilic ligands substitution reactions, SN1 and SN2 mechanisms. Trans effect in square planar complexes: Definition, trans effect series and uses of trans effect.	12
Unit V	**Bioinorganic chemistry**: Metals in biology-bulk and trace metals- Structure and function of Metallo porphyrins- Structure and Biological role of hemoglobin and Myoglobin. Metallo enzymes- Enzyme action -sodium and potassium ion pump. Introduction to Organometallic chemistry – Electron counting. 18 electron rule. **Metal Carbonyls** : Mono and Binuclear carbonyls - $Ni(CO)_4$, $Fe(CO)_5$, $Fe_2(CO)_9$, $Co_2(CO)_8$ and $Cr(CO)_6$ – synthesis and structure.	12

	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kalsi.P.S.,Kalsi.J.P., AshuChaudhary	Bioinorganic Chemistry and Supramolecular Chemistry	New Age International Pvt., Ltd.	2020
2	Soni. P.L	Text book of Inorganic Chemistry	20th revised Edition. Sultan Chand & Sons	2017
3	Madan, Malik and Tuli.	Selected Topics in Inorganic Chemistry.	Sultan Chand &Sons	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Puri and Sharma and Kalia. K.C.,	Principles of Inorganic Chemistry	33rd Edition. Milestone Publishers and Distributors	2016
2	Gopalan. R. and RamalingamV	Concise Coordination Chemistry.	Vikas Publishing house. 3rd Edition	2008
3	Lee. J.D	Concise Inorganic Chemistry	5th Edition. London: Black Well Science Ltd	2006

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. M. Amutha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY508			Title	Batch:	2022 – 2025
				Core - VI	Semester:	V
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Organic Chemistry – I	Credits:	4

Course Objective

To make the students to understand the mechanisms of molecular rearrangements, to acquire knowledge on heterocyclic compounds, carbohydrate chemistry and structural elucidation of natural products.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect and interpret the mechanisms of molecular rearrangements	K1, K4
CO2	Understand the significance of heterocyclic compounds	K2
CO3	Understand the importance of carbohydrate chemistry	K2
CO4	Apply and interpret various chemical methods in deducing the structures of alkaloids	K3,K4
CO5	Apply and deduce the structure of terpenoids	K3,K4

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	M	H	H	H	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H	H
CO3	H	M	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	H	H	M	H
CO5	H	M	H	H	H	H	H	H	M	H

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Molecular Rearrangements**:Pinacol Pinacolone, Beckmann,Hoffmann, Curtius, Schmidt,Lossen, Benzidine, Benzilic acid, Fries, Baeyer Villiger, Cope and Claisen rearrangements.	12
Unit II	**Heterocyclic Compounds**: Chemistry of Furan, Pyrrole, Thiophene, Pyridine, Quinoline, Isoquinoline and Indole. Pyrazole - Preparation and properties. **Reagents in organic synthesis**: Ozone, Osmium tetroxide, Lithium Aluminium hydride, sodium borohydride and Birch reduction.	12
Unit III	**Carbohydrates**: Classification, configuration of Monosaccharides, chemistry and structural elucidation of Glucose and Fructose, interconversion in sugar series [Glucose to Fructose and vice versa, Glucose to Arabinose and vice versa], Muta-rotation and epimerization. Analysis of carbohydrates. Sucrose, Maltose and Lactose – Preparation, Properties and uses [Structural elucidation is not required]. Introduction to Polysaccharides: Starch and cellulose (Structural determination is not required)	12
Unit IV	**Alkaloids**: Definition, occurrence and extraction of alkaloids from plants. General methods of determining structure. Determination of structure of Coniine, Piperine, Papaverine and Nicotine.	12
Unit V	**Terpenoids**: Classification, isoprene rule, special isoprene rule and Gemdialkyl rule, Extraction from plants, structural elucidation of Citral, Camphor, α - terpineol and Menthol.	12
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Finar, I.L.	Organic Chemistry-Volume II.	Pearson Education,5th edn,	2011
2.	Arun, B and Bahl, B.S.	Advanced Organic Chemistry	S. Chand & Co. 5th edn.	2012
3.	Soni, P.L.	Textbook of Organic Chemistry	S. Chand & Co.	2012

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Gurtu, J.N. and Kapoor, R.	Organic Reactions and Reagents	S.Chand& Co.	1998
2.	Agarwal, O.P.	Organic Chemistry-Natural Products Vol.I.	Meerut:Goel Publishing House. 42nd edn.	2013
3.	Agarwal, O.P.	Organic Chemistry-Natural Products Vol.II.	Meerut:Goel Publishing House. 41st edn.	2014
4.	Bansal, R. K.	Heterocyclic Chemistry: Syntheses, Reactions and Mechanisms.	New Age International Publishers.3rd edn.	1999

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. Indumathy Ramasamy Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY509			Title	Batch:	2022 – 2025
				Core Paper – VII	Semester:	V
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Electro Chemistry	Credits:	4

Course Objective

To learn about the theories of conductance, basic principles and applications of electrochemical cells and apply electro chemical principles to fuel cells, batteries and mechanism of corrosion.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Discuss the theories/laws of conductance, apply the theories of electrolytes	**K2, K3**
CO2	Construct the electrochemical cell and apply the electrolytic cell reaction to calculate enthalpy, entropy and free energy	**K4, K3**
CO3	Analyze the types of solutions based on pH and predict suitable indicators for the volumetric titrations	**K4, K2**
CO4	Appraise the pH, valency, equilibrium constant for a given electrolyte	**K4**
CO5	Discuss the types of batteries, fuel cells, theories of corrosion & its mechanism	**K5**

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	H	M	-	-
CO2	H	H	H	M	M	M	H	M	-	-
CO3	H	H	H	M	M	M	H	H	-	-
CO4	H	H	H	M	M	M	H	H	-	-
CO5	H	H	H	M	M	M	H	H	-	-

High – H, Medium – M, Low – L

Units	Content	Hrs
Unit I	**Conductivity of Ions**: Electrolytic Conduction and Electrolysis - Faradays Laws of electrolysis. Measurement of conductivity in electrolytic solution. Variation of specific and equivalent conductances with dilution. Ionic mobility, Discharge of ions on electrolysis. Transport Number: Definition, Determination by the Hittorf's method and the Moving Boundary Method. Arrhenius theory of electrolytic dissociation and the Ostwalt's dilution law. Kohlrausch's law of independent migration of ions and its applications. Debye -Huckel theory of strong electrolytes. Debye Huckel Onsager equation for the equivalent conductivity of strong electrolytes (Derivation not required), Wein and Debye Falkenhagen effects.	12
Unit II	**Applications of conductance measurements:** Determination of degree of dissociation of weak electrolytes, determination of ionic product of water, determination of solubility and solubility product of sparingly soluble salts and conductometric titrations. **Electrochemical cells I:** Nernst Equation, EMF of a cell and it's measurement. Thermodynamic quantities of cell reactions: ΔH, ΔS and ΔG from EMF data. Reversible electrodes and their types: Metal - Metal ion, Metal - insoluble salt, Gas - ion and redox electrodes. Single electrode potentials, standard electrode potentials, electrochemical series, computation of standard EMF and writing cell reactions.	12
Unit III	**Electrochemical cells II:** Concentration cells with and without transference. Liquid junction potential - Formation and elimination. Applications of EMF measurements: Determination of Activity Coefficients of Electrolytes, Calculation of valency of ions in doubtful cases (Hg^{+}/Hg^{2+}), determination of solubility of sparingly soluble salts. Electrochemical instrumentation and techniques: Potentiostatic and galvanostatic experiments. Polarography and Cyclic voltammetry.	12
Unit IV	Acid-Base Indicators: pH scale, Common ion effect. Buffer solution: Buffer action, Henderson's equation and the evaluation of the dissociation constant. Theories of Acid-Base Indicators. Acid-Base Titrations. Hydrolysis of Salts: Degree of hydrolysis, Relationship between Kh, Kw and dissociation constant for salts such as sodium acetate, ammonium chloride and ammonium acetate. Determination of Degree of hydrolysis- indirect method and Electrical Conductance method. **Electrodes for the**	12

	measurement of pH: Hydrogen gas electrode, Quinhydrone electrode and glass electrode.	
Unit V	**Batteries:** Primary and Secondary Batteries. Dry Cell, Lead-Acid storage cell and Nickel- Cadmium, Lithium ion Battery. Fuel Cell: Hydrogen - Oxygen fuel cell, Hydrogen - Oxygen fuel cell in manned space flights. Hydrogen over voltage: Measurement and its application to metal deposition. **Electrochemical corrosion**: Mechanism, Galvanic and differential aeration corrosion. Metallic coatings: Anodic and cathodic coatings. Method of application of metallic coatings: Hot dipping and electro plating (Nickel and chromium plating). **Prevention of corrosion: Proper designing, using pure metal, using metal alloys, and uses of inhibitor (Brief account only).**	12
	Total Contact Hrs	**60**

Pedagogy

Instruction, Digital Presentation, Flipped Class

Assessment Methods

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Soni. P.L., and Dharmarha. O.P. & Dash U.N.	Text book of Physical Chemistry	Sultan Chand & Sons	2016
2	Puri. B.R., Sharma L.R., Pathania M.S.	Principles of Physical Chemistry	44th Edn. Vishal Publishing Company	2010
3	Jain. P.C. and Monica Jain.	Engineering Chemistry, 17th Edition	Dhanpat Rai Publishing Company(P) Ltd	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Glasstone S	Introduction to Electrochemistry	East-West Press (Pvt) Ltd.	2014
2	Gurdeep Raj	Advanced Physical Chemistry	35thEdn. GOEL Publishing House	2014
3	John.O.M. Bockris & A.K.N. Reddy	Modern Electrochemistry (Vol I & II)	2nd Edn. Plenum Publishing Corporation	2006

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. T.Gowrani Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY510			Title	Batch:	2022 – 2025
				Core Paper – VIII	Semester:	V
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Dye Chemistry	Credits:	4

Course Objective

To enhance the basic knowledge and improve skills on preparation and uses of various dyes and fibres to choose their career as dye chemists in dyeing and textile industry.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the classification, basic concepts, theories of colour and constitution	K1
CO2	Understand the preparation and applications ofvarious azo and nitro dyes	K2, K4
CO3	Utilize the classification, preparation and uses of some important phenyl methane dyes	K3
CO4	Analyze the various anthroquinone dyes, organic pigments and fluorescent brightening agents	K4
CO5	Explain the preparation and properties of various types of textile fibres to dye industry and uses of non textile ibres	K2, K5

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	H	M	H	H	-	-
CO2	H	H	H	M	H	M	H	H	-	-
CO3	H	H	H	M	H	M	H	H	-	-
CO4	H	H	H	M	H	M	H	H	-	-
CO5	H	H	H	M	H	M	H	H	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Electromagnetic spectrum**: Relationship of colour observed to wavelength of light absorbed. Complementary colours. Terms used in dye Chemistry - Chromophores, Auxochromes, Bathochromic shift, Hypsochromic shift, Hypochromic shift and Hyperchromic shift. Colour and constitution: Otto Witt's theory, Quinonoid theory and Molecular orbital theory of various transitions. Classification of dyes according to their chemical constitution and mode of applications.	12
Unit II	**Azo dyes**: Principles governing azo-coupling, diazotisation, mechanism of diazotization, coupling with amines and phenols, effects of substituent on diazotization. Synthesis and applications of important azo dyes: Methyl orange, Orange I, Orange II, Metanil yellow, Eriochrome black – T, Bismark brown and Congo red. Synthesis and applications of nitro dyes: Picric acid, Martius yellow and Naphthol yellow S - Nitroso dyes: Fast green O and Naphthol green Y.	12
Unit III	Synthesis, reactions and uses of Diphenyl methane dyes: Auramine O and Auramine G - **Triphenyl methane dyes**: Malachite green, Rosaniline, Crystal violet – Phthalein dyes: Phenolphthalein - Xanthene dyes: Eosin and Rhodamine B. Synthesis and uses of Indigoid dyes: Indigotin and Indigosol O.	12
Unit IV	**Anthroquinone dyes**: Anthraquinone acid dyes – Alzarin cyanine green and Solwayultra blue B. Mordant dyes - Alizarin and Alizarin Blue. Vat dyes - Vat Blue 43 (Carbazole). Disperse dyes - Disperse Red 15. **Organic Pigments**: Characteristics of pigments, uses of pigments. Types of Pigments – Lakes and Toners.Fluorescent brightening agents. Classification and properties. Fluorescent brighteners for a). Cellulosic fibers b). Acrylic fibers.	12
Unit V	**Textile fibres**: Definition – classification of textile fibres – structure, physical, chemical properties and uses of cellulose fibre (cotton), protein fibre (silk and wool). Rayon – different types of rayon and their sources - manufacture of viscose rayon. Various methods of dyeing - Direct dyeing, Mordant dyeing, Vat dyeing, Disperse dyeing. Non-textile uses of dyes in leather, paper, foods, drugs, colour photography and indicators.	12
	Total Contact Hrs	**60**

Pedagogy: Direct Instruction, Digital Presentation and Flipped Class

Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task

Text Book

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Gurdeep, R	Synthetic dyes, 4th edn	Mumbai: Himalaya Publishing House Pvt Ltd	2016
2	Arun Bhal & Bahl, B. S.	A textbook organic chemistry, 22nd edn	New Delhi: S. Chand and Company Ltd	2016
3	Sharma, B. K.	Industrial chemistry. 14th edn	New Delhi: Goel Publishing House	2008
4	Tyagi, O. D & Yadav, M. A.	A text book of synthetic dyes, 2nd edn.	New Delhi: Anmol Publications Pvt. Ltd.	2002

Reference Book

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Rao, R. S., Shridhar, G., Mukherjee, B. & Parulekar, T.	Introduction to synthetic drugs and dyes. 13th end	Mumbai: Himalaya Publishing House Pvt Ltd.	2018
2	Pope Sine	Synthetic dye, 1st edn.	New Delhi: Rajat Publications.	2003
3	Rajbir Singh	A handbook of synthetic dyes, 1st edn.	New Delhi: Mittal Publications	2016

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of Examination
Name with Signature	Name with Signature	Name with Signature	Name with Signature
Name : Dr. M. Selladurai Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	ProgrammeTitle :	Bachelor of Chemistry	
Course Code:	22UCY5E1	Title	Batch :	2022 – 2025
		Core Elective Paper – I	Semester	V
Hrs/Week:	4	Analytical chemistry- I	Credits:	5

Course Objective

To build a basic knowledge on generation of analytical data in an appropriate manner.To expertise the instrumental methods of chemical analysis for microgram level; to cultivate the analytical skill in the structural identification of chemical compounds.

Course Outcomes

On the successful completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Provide thorough knowledge on gravimetry.	K1,K2
CO2	Learn instrumentation and basic principles and applications ofmodern analytical tools such as TGA and DTA	K2, K3
CO3	Have knowledge on application of Polarimetry, Nephlometry and Turbidimetry	K2, K4
CO4	Acquire knowledge and analyze analytical tools like polorography and amperometric titrations	K3
CO5	Know the importance of chromatography	K2, K5

Mapping with PO / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	H	H	H	H
CO2	H	H	H	M	M	M	H	H	H	H
CO3	H	H	H	M	M	M	H	H	H	H
CO4	H	H	H	M	M	M	H	H	H	H
CO5	H	H	H	M	M	M	H	H	H	H

H – High; M – Medium; L – Low

Unit	Content	Hrs
Unit I	**Data Analysis: Definition and terms, Classification of errors. – absolute and relative error. Precision and accuracy. Sources and minimisation of errors. Significant figures.** Sampling: Significance of sampling, types of sample, sampling methods for solids, liquid and gases. **Gravimetric Analysis:** Precipitation methods. Conditions of precipitation, co-precipitation and post precipitation. Precipitation from homogeneous solution. Washing of the precipitate. Organic precipitants – DMG, Cupron, Cupferron, oxine and salicylaldoxime.	**12**
Unit II	**Thermogravimetric Analysis (TGA):** Principle, discussion of various components with block diagram, Characteristics of TGA curve, factors affecting thermogravimetric curves. Applications: Evaluation of gravimetric precipitation, curie point determination and study of organic compounds. **Differential thermal analysis (DTA):** Principle, discussion of various components with block diagram, Characteristics of DTA curve, factors affecting the DTA curve. Applications: heat of reaction, specific heat and quality control. Thermometric titrations (TTA): Principle and applications.	**12**
Unit III	**Polarimetry:** Theory and instrumentation. Comparison of acid strength using polarimeter and estimation of glucose. **Nephlometry and Turbidimetry**: Theory, principles and applications in Inorganic analysis, turbidimetric titrations and phase titrations. **Flame photometry:** Theory, principle and applications in Qualitative and Quantitative analyses.	**12**
Unit IV	**Polarography:** Principle, dropping mercury electrode – advantages and disadvantages. Experimental assembly, current – voltage curves. Significance of Ilkovic equation (derivation not required).Half wave potential. Applications in qualitative and quantitative analyses. **Amperometric Titrations:** Principle, apparatus and technique. Dead stop endpoint method. Advantages and disadvantages of amperometric titrations.	**12**

Unit V	**Chromatographic techniques:** **Paper Chromatography**: Principle, RF value and experimental details. Applications in qualitative and quantitative analyses. **Thin Layer Chromatography**: Principle, brief account of experimental details and its advantages. Applications in the separation of amino acids. **Column Chromatography**: Principle, experimental details, factors affecting the column efficiency and applications. **Ion Exchange Chromatography**: Principle, types of resins, action of resins and applications in softening of hard water. **Gas liquid chromatography**: types, principle, theory and applications of gas liquid chromatography.	**12**
	Total contact Hrs/Semester	**60**

***Italics denotes self study topics**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Khopkar S.M	Basic concepts of Analytical Chemistry.	New Age International Pvt Ltd. 4th Edition.	2020
2	Gurdeep R Chatwal Sham K. Anand	Instrumental Methods of Chemical Analysis	Himalaya publishing House. 5thEdition.	2014
3	Arthur. I.Vogel	Inorganic Quantitative Analysis.	4th Edition.Longmans	1978

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Usharani S	Analytical Chemistry.	Laxmi Publications, 1st Edition.	2019
2	Douglas A. Skoog, Donald M. West and F. James Holler	Fundamentals of Analytical Chemistry.	Harcourt Asia Pvt. Ltd. 9thEdition.	2001
3	Douglas A.Skoog, Donald M. West and F. James Holler	Analytical Chemistry, An Introduction.	Saunders College Publishers .7th Edition.	2000
4	Skoog D. A	Principles of Instrumental Analysis	Saunders College Publishers, 5thEdition	1998

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of chemistry	
Course Code:	22UCY5E2	Title	Batch:	2022 – 2025
		Core Elective – I	Semester:	V
Lecture Hrs./Week	4	Pharmaceutical Chemistry-I	Credits:	5

Course Objective

To create awareness among the students about the historical development of profession of Pharmacy, the formulation aspects of different dosage forms, and how a drug's chemical structure describe the factors that affect its absorption, distribution, metabolism, and excretion, traditional and alternative system of medicine and principles involved in limit test for impurities.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify their professional role in the healthcare system	K1
CO2	Classify different dosage forms and apply principles of pharmaceutical science in formulation and dispensing the various dosage forms	K2
CO3	Understand the concept of Pharmacology and pharmacodynamics	K3
CO4	Analyse the scope and development of Pharmacognosy	K4
CO5	Explain the types of impurities, limit test for impurities and classification of Antidotes and Antacids	K5

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	M	M	H	M	M	H	H	H
CO2	M	H	M	L	M	H	M	M	H	H
CO3	M	H	H	M	H	M	H	H	H	H
CO4	H	M	M	M	M	H	M	M	H	H
CO5	H	M	M	M	H	M	M	H	M	M

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Historical background and development of profession of Pharmacy:** Pharmacy-Definition, Historical development of profession of Pharmacy –History of pharmacy profession in India, Pharmaceutical education and pharmaceutical industry in India. Career opportunities for Pharmacy professionals. Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeias.	12
Unit II	**Introduction to Pharmaceutics:** Pharmaceutics- Definition-Dosage forms- Definition, classification of dosage forms based on sterility and their physical nature. Development and evaluation of new drugs- Stages of drug development – Preclinical development and clinical development.	12
Unit III	**Introduction to Pharmacology:** Pharmacology-definition. Pharmacodynamics – Definition, Receptor and non-receptor mechanisms, Site of drug action, Dose Response relationship, Structural activity relationship. Pharmacokinetics – Definition, Mechanism of action of Drugs (Absorption, Distribution, Metabolism and Excretion of Drugs). Clearance of a drug. Theoretical Pharmacokinetics –Half life-order of kinetics and steady state plasma concentration. Drug safety and effectiveness- Factors modifying the dosage and action of drugs.	12
Unit IV	**Introduction to Pharmacognosy:** History, scope and development of Pharmacognosy, Source of Drugs (Biological, Marine, Mineral and plant tissue cultures as source of drugs. Traditional and Alternative system of medicine (Ayurvedha, Unani, Homeopathic, Siddha, Acupuncture and Yoga.) Collection and processing of Herbal drugs.	12
Unit V	**Introduction to Pharmaceutical Chemistry:** Sources & types of impurities, principles involved in limit test for chloride, sulphate, iron, arsenic, lead, heavy metals, Selected terminology in pharmaceutical chemistry, Antidotes & Antacids -Definition, Classification, Properties. Antimicrobials, Antioxidants, Astringents, Expectorant and Emetics –Definition, examples and uses.	12
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ali.M.,	Textbook of Pharmaceutical Chemistry-I	CBS publishers and distributers Pvt.Ltd	2020
2.	Murugesh.	Text book of Pharmacognosy.	Sathya Publishers	2018
3	Mehta R.M.,	Pharmaceutics-I.	Vallabh Prakashan	2017
4	Suresh P. Vyas, Amit K. Goyal, GoutamRath.,	Handbook of Pharmaceutical dosage forms.	Vallabh Prakashan	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Pathania J S.	Textbook of Pharmacology For Bsc Nursing Students With Revision Booklet	CBS Nursing.	2017
2	Bharath .S.,	Pharmaceutical Technology: Concepts and applications.	Pearson Education India	2013
3	Shayne Cox Gad.,	Pharmaceutical Manufacturing Handbook: Production and Process.	A John Wiley & Sons, Inc., publication	2008

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. M. Amutha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY5E3	Title	Batch:	2022 – 2025
		Core Elective – I	Semester:	V
Lecture Hrs./Week	4	Leather Chemistry	Credits:	5

Course Objective

To understand the basics of skins, leather and their composition, impart the principle involved in pre-tanning, structure, process of various tanning, process of dyeing leather and acquire knowledge on the water pollution by tannery industry and it's effluent treatment.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Relate the basic principle involved in pre-tanning of skins and hides	K3
CO2	Have knowledge on various types of tanning and their physic-chemical properties	K2, K3
CO3	Interpret the chemistry behind the chrome tanning process	K4
CO4	Analyze the process involved in curing of hides and skin and their preservation	K1, K4
CO5	Have clear idea on sources of tannery effluents and their treatment	K2, K3

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	H	H
CO2	H	H	H	M	M	M	H	H	H	H
CO3	H	H	H	M	M	M	M	H	H	H
CO4	H	H	H	M	M	M	H	H	H	H
CO5	H	H	H	M	M	M	M	H	H	H

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Basic Principles and Leather Constituents**: Introduction, chief process involved in leather manufacture - elementary knowledge of the structure and composition of hides and skins. Proteins and their characteristics, Anatomy and histology of protein constituents of leather (an elementary concept).Basic principle involved in pre-tanning such as soaking, liming, deliming, bating, pickling involved in pre-tanning such as soaking, liming, deliming, bating, pickling and depickling.	12
Unit II	**Types of Natural and Synthetic Tanning:** Types of tanning-vegetable and mineral tanning, Different types of vegetable tanning- materials classification and chemistry of vegetable tanning. Factors and Physio-chemical principle involved in vegetable tanning, Fixation of vegetable tanning. Synthetic tanning-their classifications, general methods of manufacture and use.	12
Unit III	**Chemistry of Chrome Tanning**: The preparation and chemistry of chrome tanning liquids, Olation, Oxolation and hydrolysis of chrome liquids. Effect of adding tanning agents-Role of pH in the reaction of chromium complexes with hide proteins. Factors governing chrome tanning-chemistry of neutralization process. A brief survey of chemistry of other tanning like Al, Zr and Te salts and their relative merit in contrast with chrome tanning. Chemistry of combination of tannage involving vegetable tanning aldehydes, chrome and other mineral tanning agents.	12
Unit IV	**Preservation of Hides and Skins and Leather Dyeing**: Chemical methods of curing and preservation of hides and skins in acid and alkaline solution. Principles of analytical methods employed in curing, liming, deliming, bating, pickling. Analysis of vegetable tanning materials and extract. Process of dyeing leather-Use of mordants, dyeing auxillaries such as levelling, wetting and dispersing agents-Dye fixations.	12
Unit V	**Animal Wastes and Treatment Processes:** Animal bye-products - their collection, handing and preservation methods (such as hair, blood, bones, glands, Kerationus materials and their utilization).Tannery effluents and treatment: Types of water pollution-physical,chemical,physiological and biological. Different types of tannery effluents and wastes-beam-house waste-liquors- tanning and finishing yard waste liquors, solid waste-origin and disposal. Non-textile uses of dyes in leather, paper, foods and drugs, colour	12

	photography and indicators.	
	Total Contact Hrs	60

Pedagogy

Instruction, Digital Presentation, Flipped Class

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jain P.C. & Monica Jain.	Engineering Chemistry	16th Edn. Dhanpat Rai Publishing Co., Pvt. Ltd	2016
2	Jayashree Ghosh	Fundamental Concepts of Applied Chemistry	S. Chand and Company Ltd	2010
3	Sharma B. K.	Industrial Chemistry.	14th Edn. Goel Publishing House	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Anthony D.Covington	Tanning Chemistry	The Science of Leather. RSC Publishing	2011
2	Fred, William T.Roddy& Robert M. Lollar	The Chemistry and Technology of Leather	1st Edn.Reinhold Publishing Co.	1956

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. T. Gowrani Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY5AL	Title	Batch:	2022 – 2025
		Advanced Learner Course – I Environmental Chemistry (Optional)	Semester:	V
Lecture Hrs./Week	Self Study		Credits:	4*

Course Objective

To enhance the knowledge on environmental chemistry and to inculcate the responsibilities in protecting the environment from chemical and biological pollutants.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the environmental constituents, air, water and soil contaminants and quality parameters.	K1,K2
CO2	Understand the environmental segments, composition and effects of pollution and types of biomedical wastes	K2, K3
CO3	Apply the suitable techniques for pollution control and waste management	K2, K3
CO4	Review the health, environmental and industrial problems caused by pollution	K4,K5
CO5	Distinguish various biomedical wastes judicially and manage them properly	K4

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	M	M	H	H
CO2	H	H	H	-	-	-	M	M	H	H
CO3	H	H	H	-	-	-	M	M	H	H
CO4	H	H	H	-	-	-	M	M	H	H
CO5	H	H	H	-	-	-	M	M	H	H

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Earth and atmosphere** Planet Earth-Formation of earth and atmosphere – Big bang theory, environmental segments- biosphere, lithosphere, hydrosphere, atmosphere, composition of atmosphere-troposphere, stratosphere, mesosphere, thermosphere, air quality parameters, methods of air pollution control – scrubbers, air filters, cyclones, electrostatic precipitators and incinerators.	-
Unit II	**Contaminants and their degradation** Causes, effects and control measures of Green house effect, global warming and ozone depletion - carbon cycle, nitrogen cycle, sulphur cycle, formation of CO in the atmosphere, organic pollutants, and contaminants from combustion.	-
Unit III	**Water and Water Treatment** Water- Hydrological cycle, water quality parameters, ground and surface water contaminants, Hardness-Units of hardness-Estimation of Hardness of water by EDTA method, problems of using hardwater in boilers – Scales and Sludge, corrosion, caustic embrittlement, priming and foaming, Water conditioning – internal and external conditioning of water – limesoda process, zeolite process, demineralization, desalination, electrodialysis, reverse osmosis, water treatment for municipal supply – physical and chemical methods of disinfection- break point chlorination, sewage treatment.	-
Unit IV	**Soil Pollution** Soil formation, soil characteristics, problems caused by landfills, Waste management – Solid waste management, E- waste management and plastic waste management.	-
Unit V	**Biomedical waste** Definition, Sources of biomedical wastes, various types of biomedical wastes, infection control practices, Biomedical waste management – segregation, storage, transportation, reuse, recycle, incineration, land fill and decomposition.	-
	Total Contact Hrs	**-**

Pedagogy: Self study

Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Monika Jain and Jain P.C	Engineering Chemistry	17th Edn., Dhanpat Rai Publishing Company	2019
2	Dana Desonie	Atmosphere: Air Pollution and Its Effects	1st Edn., Chelsea House Publications	2007
3	Anubha Kaushik	Environmental Science and Engineering	3rd Edn., New Age international publishers.	2010
4	Shahanawaz Hamid	A Handbook on Biomedical Waste: National and International Overview, Notion press.	Notion press.	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Linda. D. Williams	AP Environmental Science	5th Edn., McGraw-Hill Education	2017
2	R. Radhakrishnan	Biomedical waste management	Sumit Enterprises.	2007
3	R. Rajagopalan	Environmental Studies,	3rd Edn., Oxford University Press.	2015
4	John. H. Seinfeld, Spyros N. Pandis	Atmospheric Chemistry and Physics: From Air Pollution to Climate Change.	3rd Edn., Wiley.	2016

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	ProgrammeTitle :	Bachelor of Chemistry	
Course Code:	22UCY5S1	Title	Batch :	2022 – 2025
		Skill Based Elective-I Food Chemistry	Semester	V
Hrs/Week:	2		Credits:	2

Course Objective

To develop the skill to aesthetically appreciate Food Science

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the sources, functions of food , food preservation and adultration	K1
CO2	Understand the metabolic activities, methods of food preservation, and effects and identification of food adulteration	K2
CO3	Illustrate the various food additives and adulterants	K3
CO4	Explain the types of adulteration and tests for detection	K2
CO5	Interpret the functions of food corporation of India, ISI and Agmark standards.	K3

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	-	M	-	-
CO2	H	H	H	-	-	-	-	-	-	-
CO3	H	H	H	-	-	-	-	-	-	-
CO4	H	H	H	-	-	-	-	-	-	-
CO5	H	H	H	-	-	-	-	M	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Food and Nutrition:** Functions of food, food sources, energy value of foods, elementary idea about digestion and metabolism of Carbohydrates, Fats and Proteins.	**3**
Unit II	**Food preservation:** Importance of food preservation causes of food spoilage, principles of food preservation. Methods of food preservation - Bacterostatic Methods: Dehydration, Pickling and Salting Bactericidal Methods: Canning and Cooking.	**3**
Unit III	**Milk Processing** :Pasteurisation and milk products Food Additives: Antioxidants, Food Colours, Food enzymes, Spices and flovouring agents. Merits and demerits of additives and preservatives.	**3**
Unit IV	**Food adulteration**: Common adulterants and their effects. Intentional and incidental adulterants. Metallic contamination, contamination by pests and pesticide residues. Simple physical and chemical tests for detection of food adulterants.	**3**
Unit V	**Packaging hazards**: Food poisoning and food borne diseases. Food Laws: FSSAI Food Standard: ISI standards and the Agmark standards. Functions of Food Corporation of India.	**3**
	Total Contact Hrs	**15**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Tejmeet Rekhi and Heena Yadav,	Fundamentals of Food and Nutrition	1st Edn., Elite Publishing House.	2014
2	Sunil NathaMhaske	Essentials of Nutrition	1stEdn, CBS Publication	2015

3	Fellows P.J	Food Processing Technology: Principles and Practice	4thEdn, Woodhead Publishing	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bhavbhuti M. Mehta, Peter Chi Keung Cheung	Handbook of Food Chemistry	1stEdn.,Springer	2015
2	SunetraRoday	Food Science and Nutrition	3rdEdn., Oxford University Press	2018
3	Srilakshmi. B	Food Science	7thEdn, New Age International Publishers.	2018

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	22UCY5S2	Title	Batch :	2022 – 2025
		Cyber Security – Ethical Hacking	Semester	V
Hrs/Week:	2		Credits:	2

Course Objective

To understand the basics of cyber security and how ethical hacking is done on Cyber space and how to secure and protect them like security experts

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of cyber security	**K1,K2**
CO2	Understand the knowledge about ethical hacking	**K2, K3**
CO3	Deploy the use of hacking tools	**K2, K3**
CO4	Understand the concepts of Network	**K2**
CO5	Advantages of internet	**K3**

Mapping with PO / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	M	M	H	H	M	M	-	-
CO2	M	H	M	H	M	M	M	M	-	-
CO3	H	H	H	M	H	M	M	M	-	-
CO4	H	M	H	M	M	M	M	M	-	-
CO5	H	H	H	H	H	M	M	M	-	-

H – High; M – Medium; L – Low

Unit	Content	Hrs
Unit I	To Understand how websites work, how to discover and exploit web application vulnerabilities and to gain full control over websites. Secure systems from all the known attacks. Secret tracking and hacking infrastructure.	**3**
Unit II	Ethical hacking in Cyber space - its fields and the different types of hackers. Hack & secure both Wi-Fi & wired networks	**3**
Unit III	Discover vulnerabilities & exploitation of hacking in cyber network servers. How secure systems are hacked using client-side and social engineering attacks. Use of hacking tools suchas Metasploit, Aircrack-ng, SQLmap., etc.	**3**
Unit IV	Network basics & how devices interact inside a network - Network Penetration. Control connections of clients in network by password cracking. Fake Wi-Fi network creation with internet connection and spy on clients. To Gather detailed information about clients and networks like their OS, opened ports...etc.	**3**
Unit V	Explore the threat landscape - Darknets, dark markets, zero day vulnerabilities, exploit kits, malware, phishing and much more. Master defenses against phishing, SMShing, vishing, identity theft, scam, cons and other social engineering threats.	**3**
Total Contact Hrs		**15**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation, Materials will be made online through NGM Open source learning platforms

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

SIXTH SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY611			Title	Batch:	2022 - 2025
				Core – IX: Physical Methods and Chemical Structure	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1		Credits:	4

Course Objective

To make the students to acquire knowledge in basic concepts of spectroscopy, gain basic knowledge in various spectroscopic techniques like rotational,vibrational, Raman, UV-visible, NMR, EPR and Mass spectrometry and to understand the electrical and magnetic properties of molecules.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recollect and understand the basic theoretical concepts in various types of spectroscopy	K1, K2
CO2	Interpret the structure of the unknown molecules from the given spectra	K4
CO3	Evaluate various parameters like bond length, vibrational frequency, Chemical shift, coupling constant from different spectroscopic techniques	K4
CO4	Understand the crystal packing and defects in ionic and covalent solids	K2
CO5	Apply electrical and magnetic properties in solving the structures of the molecules	K3, K4

Mapping with PO / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H	H
CO3	H	M	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	H	H	H	H
CO5	H	M	H	H	H	H	H	H	H	H

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Molecular Spectroscopy:** Basic concepts of molecular spectroscopy, types of changes induced by the interaction of electromagnetic radiation with matter, regions of Electromagnetic spectrum. **Microwave Spectroscopy:** Theory, Rigid and non-rigid rotor models, patterns of spectral lines, Determination of bond length and accurate mass of atom. **IR spectroscopy:** Theory, Molecular vibrations, vibrational degrees of freedom, Harmonic and anharmonic oscillator models. Force constant, Vibrational frequency, factors affecting carbonyl stretching frequency (inductive and mesomeric effects) and hydrogen bonding. Overtones,combination bands, Fermi resonance and fingerprint region.	12
Unit II	**Raman spectroscopy:** Origin of Raman lines - stokes and anti-stokes lines. Characteristics of Raman lines, Mechanism of Raman effect, Differences between Raman and Infrared spectra. **UV and Visible Spectroscopy:** Theory, types of electronic transitions, chromophore, auxochrome, intensity shifts, absorption bands and intensity. Franck – Condon principle, pre-dissociation spectra, Birge-Spooner method of evaluation of dissociation energy from electronic spectra. Woodward Fischer rule for calculation for absorption maxima in dienes.	12
Unit III	**NMR Spectroscopy:** Theory and principles, chemical shift, factors affecting chemical Shift, Anisotropy and inductive effect, reference (TMS) and solvents used. Splitting of signals, spin-spin coupling, coupling constant, Peak area and proton counting (elementary ideas). Application of NMR in the study of simple molecules (Ethanol, Ethyl bromide, diethyl ether, Benzene, Toluene, and Mesitylene). **ESR:** Theory, 'g' factor, derivative curves. Hyperfine splitting, line width.Applications of CH_3 radical and Mn^{2+} ion.	12
Unit IV	**Mass Spectra:** Theory, basic principle, isotope abundance, base peak, molecular ion peak, Determination of molecular ion peak, meta stable ion, **Solid State Chemistry:** Unit Cell, crystal systems, Bravais Lattice, Law of rational indices, Miller indices. Geometrical requirement in close packed structures. Packing in ionic crystals. Simple cubic (SC), body centered cubic (BCC) and hexagonal close packed (HCP) structures, crystal structures of NaCl, ZnS, diamond and graphite.Defects	12

	in crystals: Point defects, Schottky defects, Frenkel defects, metal excess defects and metal deficiency defects. The radius-ratio rule. X-ray examination of solids by Debye-Scherer method.	
Unit V	**Electrical properties of Molecules:** Polar and non-polar molecules, Dipolemoment, Meaning of the terms – total molar polarisation, orientation polarisation and distortion polarisation. Effect of temperature on Molar polarization. Determination of dipolemoment of polar gas, Application of dipolemoment in the study of simplemolecules. **Magnetic properties of molecules:** Meaning of the terms – magnetic susceptibility, and magnetic moment. Diamagnetism, Paramagnetism and Ferromagnetism. Curie-Weiss Law. Determination of magnetic susceptibility of paramagnetic substance using Guoy balance, Faraday Balance. Application of magnetic properties in identifying the geometry of simple and complex molecules.	12
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Puri, B.R., Sharma L.R., and Pathania, M.S.	Principles of Physical Chemistry.	Vishal Publishing Co. 47thedn	2017
2.	Sharma, Y.R.	Elementary Organic Spectroscopy	S. Chand & Company Pvt. Ltd. 5thedn.	2013
3.	Gurdeep, C.& Anand, S.K.	Instrumental Methods of Analysis,	Himalaya Publishing House.	2005

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Kemp, W.	Organic Spectroscopy	ELBS edition	1985
2.	Banwell, C.N. McCash, E.M.	Fundamentals of Molecular spectroscopy.	Tata McGraw Hill,4th edn.	2016
3.	Sharma, B. K	Instrumental Methods of Chemical Analysis.	Goel Publishing House, 24th edn.	2011

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. Indumathy Ramasamy Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name:Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY612			Title	Batch:	2022 - 2025
				Core – X Organic Chemistry - II	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1		Credits:	4

Course Objective

To enhance the basic knowledge of the chemistry of solving problems, polynuclear hydrocarbons, amino acids, peptides, proteins, lipids, vitamins and chemotherapy.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember in solving problems of some functional groups and preparation, properties, reactions of polynuclear hydrocarbons	K1
CO2	Relate the structure and properties of amino acids, nucleic acids and peptides	K2
CO3	Analyze the classification, constitution and synthesis of proteins, lipids and vitamins	K4
CO4	Explain the synthesis of amino acids and peptides and functions, energy carriers of nucleotides.	K5
CO5	Develop the skill to classify the drugs such as chemotherapy, sulphadrugs, antimalarials, aneastheticsand antibiotics	K3

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	H	H	M	H	H	-	-
CO2	H	H	H	M	H	M	H	H	-	-
CO3	H	H	H	M	H	M	H	H	-	-
CO4	H	H	H	M	H	M	H	H	-	-
CO5	H	H	H	M	H	M	H	H	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Polynuclear hydrocarbons**: Condensed systems – Naphthalene, Anthracene and phenanthrene - Preparation, properties and uses. Structural elucidation of Naphthalene and Anthracene. Solving problems of structures of organic compounds based on reactions of the following: Aldehydes, Ketones, Amines, Nitro-compounds, Phenols and Acids.	12
Unit II	**Amino acids**: Definition – Optical activity, chemical and physical properties of amino acids. Synthesis and properties by the following methods: Amination of α - halo acids, Gabriel's phthalimide and Strecker synthesis method. Terminal residual Analysis: N-Terminal end by Sanger's method and C-Terminal end by reduction method. **Proteins and Peptides**: Primary, secondary, tertiary and quaternary structures of proteins. Denaturation and biological functions of proteins. Synthesis of polypeptides by carbobenzoxy method (Bergmannmethod).	12
Unit III	**Nucleic acids**: Definition, chemical composition and nitrogen bases present in nucleic acids. Nucleosides and Nucleotides with examples. Functions of nucleotides. Nucleotide as energy carriers. Structure, replication and functions of DNA. Structure and functions of RNA. **Lipids**: Classification - oils and fats - structure, chemical reactions, saponification value and iodine value.	12
Unit IV	**Vitamins**: Introduction – Importance of vitamins - classification as fat and water soluble vitamins and deficiency diseases. Constitution and Synthesis of the following: Vitamin A1 (Retinol), Vitamin B1 (Riboflavin), Pyridoxine and Ascorbic acid.	12
Unit V	**Chemotherapy**: Introduction, Definition and classification of drugs. Sulphadrugs: Structure and uses of sulphanilamide, sulphapyridine, sulphadiazine, sulphaacetamide, sulphathiazole and sulpha guanidine. Mode of action of sulpha drugs. Antimalarials: Classification, structure and uses of chloroquine and pamaquine. Anaesthetics: characteristics, structure and uses of Procaine and Pentothal sodium. Antibiotics: Introduction, structure and uses of Penicillin and Tetracycline.(Note: Structural elucidation of drugs not required)	12
	Total Contact Hrs	**60**

Pedagogy: Direct Instruction, Digital Presentation and Flipped Class

Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Chawla, H. M. &Soni, P. L.	Textbook of organic chemistry	New Delhi: Sultan Chand and Sons Pvt. Ltd.	2019
2	Bahl, B.S.& Arun Bhal	Advancedorganic chemistry. 5th edn.	New Delhi: Sultan Chand and Sons Pvt. Ltd.	2012
3	Finar, I. L	Stereochemistry and the chemistry natural products (Vol II).5th edn	New Delhi: Pearson Education India Pvt. Ltd.	2011

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Gurdeep, R C	Organic chemistry of natural products (Vol – I and II).4th edn	Mumbai: Himalaya Publishing House Pvt. Ltd	2019
2	Agarwal, O. P.	Organic chemistry natural products, (Vol. I)	Meerut: Krishna Prakashan Media (P) Ltd	2015

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of Examination
Name with Signature	Name with Signature	Name with Signature	Name with Signature
Name : Dr. M. Selladurai Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY613			Title	Batch:	2022 – 2025
				Core - XI	Semester:	VI
Lecture Hrs./Week	4	Tutorials /Sem	1	Chemical Kinetics and Quantum mechanics	Credits:	4

Course Objective

To acquire the necessary knowledge on type of reactions, determination of rate, theories of reaction rate, mechanism of catalytic action, basics and kinetics of photochemical reactions and the fundamentals of quantum mechanics.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recognize the basic terminologies of chemical kinetics	K1
CO2	Understand the theories of reaction rates	K2
CO3	Analyse the types and kinetics of catalysis, adsorption isotherms and their significance.	K3
CO4	Describe the laws of photochemistry and theories of reaction rates and explain various photochemical processes usingJablonskidiagram	K4& K5
CO5	To become familiar with the quantum mechanical functions and operators	K2

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	M	M	H	H	M	M	-	-
CO2	M	M	H	M	M	M	M	M	-	-
CO3	H	H	M	L	H	M	M	H	-	-
CO4	M	H	H	M	H	L	H	M	-	-
CO5	M	M	M	M	M	M	L	H	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Chemical Kinetics-I:**The concept of Reaction Rate, Rate law and Rate equation. Factors influencing rates of chemical reactions. Order and Molecularity of a reaction. Setting and solving simple differential equations for first order, Second orderand Zero order reactions. Pseudounimolecular reactions. Half-life time of a reaction – Expressions for t½-for first, second and nth order reactions. Experimental techniques for measuring reaction kinetics – Volumetry and Polarimetry.	12
Unit II	**Chemical Kinetics-II:** Methods of determining order of a reaction – Differential rate expressions, Integral rate expressions and Half-life method. Equilibrium approximation and Steady state approximation. Effect of Temperature on reaction rates –Temperature co-efficient, The Arrhenius equation – Derivation, activation energy and its determination. Theories of reaction rates: Lindemann theory of Unimolecular reactions, Collision theory and Absolute reaction rate theory (Derivation not necessary).	12
Unit III	**Catalysis:** General characteristics of Catalytic reactions. Types of catalysis –Theories of Homogeneous and Heterogeneous catalysis- Kinetics of acid base catalyzed reactions. **Enzyme catalysis:** Kinetics of enzyme-catalysed reactions – Michaelis Menten equation. Effect of Temperature and pH on enzyme catalysis. **Adsorption:** Chemisorption and physisorption, Adsorption of gases by solids. Factors affecting adsorption – Types of adsorption isotherms – Freundlich adsorption isotherm and Langmuir adsorption isotherms.	12
Unit IV	**Photochemistry**: Consequence of light absorption – The Jablonski diagram, Laws of Photochemistry - Lambert and Lambert-Beer's laws, Grothus–Draper law, The Stark–Einstein law of photochemical equivalence, Quantum efficiency and its determination. The photochemical rate law: Kinetics of H2 - Cl2 reaction, Kinetics of H2–Br2 reaction, Comparison of thermal and photochemical reactions. Photosensitization and Quenching, Chemiluminescence. Lasers and their uses (Elementary idea only).	12

Unit V	**Quantum Chemistry**: The need for quantum mechanics. Functions: Real, complex, odd, even, orthogonal and normalized functions. Operators: linear and non-linear, differential, Hermitian, Hamiltonian, momentum (linear and angular) commutator (Theorems) and non- commutators, Eigen functions and eigen values. Postulates of quantum mechanics (statements only).	12
	Total Contact Hrs	**60**

Pedagogy: Direct Instruction, Power point presentation, Group learning, Student seminar and Flipped Class

Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task-GD.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Puri, Sharma and Pathania	Principles of Physical Chemistry	Vishal Publishing Co.,	2020
2	Mandeep Dalal	A Textbook of Physical Chemistry	Volume 11st Edition. Dalal Institute	2018
3	Soni. P.L. and Dharmarha.O.P	Text book of Physical Chemistry	23rd revised Edition. New Delhi: Sultan Chand & Sons.	2016
4	Ajoy Ghatak	Basic Quantum mechanic	Laxmi Publications.	2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Puri and Sharma and Kalia. K.C	Principles of Inorganic Chemistry	33rd Edition. Milestone Publishers and Distributors.	2016
2	Jain. P.C and Monika Jain	Engineering Chemistry	17thEdition.Dhanpat Rai Publishing Company (P) Ltd.	2015

3	Moudgil. H.K	Text Book of Physical Chemistry	2nd Edition. Delhi: PHI learning Pvt. Ltd	2015

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. M. Amutha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY614			Title	Batch:	2022 – 2025
				Core – XII	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Polymer Chemistry	Credits:	4

Course Objective

To learn about recent advances in polymers, impart knowledge about polymerization reactions and stereo chemistry, familiarize the different polymer processing techniques and synthesis of some commercially important polymers.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Classify the types of polymers and recognize the basic concepts	**K2**
CO2	Understand and illustrate the mechanisms of polymerization	**K2,K3**
CO3	Appraise the stereochemistry of polymers and apply Z-N catalyst for the polymers	**K4, K3**
CO4	Calculate the molecular weight of polymers by various methods	**K3**
CO5	Acquiring knowledge of commercially important polymer products and its applications.	**K2, K5**

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	M	-	-
CO2	H	H	H	M	M	M	M	M	-	-
CO3	H	H	H	M	M	M	M	M	-	-
CO4	H	H	H	M	M	M	M	M	-	-
CO5	H	H	H	M	M	M	M	M	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Basic Concepts and Classification of Polymers:** Monomers, Polymers, Polymerization, Degree of polymerization. Classification of polymers: Plastics: Definition - Thermoplastic, Thermosetting plastics and Reinforced Plastic. Elastomers: Definition - Natural & synthetic rubber -smoked rubber -Reclaimed rubber -Foam rubber -Spongy rubber - Laminate rubber. Adhesives: Definition - thermosetting - thermoresins. Fibres: Definition-Natural and synthetic. Classification: comfort-safety-Industrial fibres. Primary And Secondary Bond Forces In Polymers. Thermal stabilisers- Antioxidants-photo stabilisers. Polymerization Techniques: Bulk, Solution, Suspension and Emulsion Polymerization.	13
Unit II	**Types of polymerization reactions**: Addition Polymerization and Condensation polymerization. Types of Initiators. Inhibitors. Chain transfer agents. Addition Polymerization – Free radical Mechanism, Ionic Polymerisation: Anionic and Cationic Polymerizations. Step growth of polymerisation (Condensation polymerisation) Copolymers - Types, Co-Polymerisation: Random-Alternating-Block and Graft copolymers. Importance of Copolymerization. Miscellaneous Polymerization reactions-Electrochemical Polymerization.	12
Unit III	**Stereochemistry of Polymers:** Stereo Regular Polymers: Isotatic, syndiotactic & Atactic. Geometrical isomers. Factors influencing Structural regularity. Ziegler-Natta Catalysts -Bi metallic and Mono metallic mechanisms. Glass transition temperature (Tg) and Tm. Determination of Tg by differential scanning calorimeter. Factors affecting Tg, Tg of copolymers. Degradation - Types of degradation - Thermal, Photo, High energy radiation and Oxidative method and Hydrolytic method. Polymer Additives - Fillers, Plasticizers, antioxidants, thermal stabilizers, fire retardants and colourants.	13
Unit IV	**Determination of Molecular Weight Methods**: Molecular weights of polymers: Number-Average, Weight-Average, Sedimentation-Average & Viscosity-Average molecular weights. Molecular weight distribution – GPC method.Determination of Average molecular weight: Ebulliometry method, Cryoscopy method, osmometry method, Light Scattering method, Viscosity method and End group Analysis. Application of FTIR, UV-visible, NMR, and Mass Spectroscopy for Identification of	12

	polymers.	
Unit V	**Industrial Polymers**: Polymer processing techniques: Calendaring, film casting, compression moulding, blow moulding, extrusion moulding foaming and filament winding technique. Recent Advances in Polymers: Polymer and environmental effect-introduction- disposal of polymer waste- recycling system- importance of biopolymers. ***Preparation and uses of the following polymers:*** Polyethylene (LDPE & HDPE), P.V.C, Teflon, polystyrene, Nylon-6, Nylon-66,Polyester, Phenol formaldehyde resins, Polymethylmethacrylate, Polyethyleneterephthatalate and Polycarbonates.	10
	Total Contact Hrs	**60**

Pedagogy

Instruction, Digital Presentation, Flipped Class

Assessment Methods

Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Fred.W.Billmeyor	Text Book of Polymer Science	2nd Edn. John Wiley.	2011
2	Gowariker.V.R., Viswanathan. N.V., Jeyadev Sreedhar	Polymer Science	2nd Edn.New Age International Ltd	2015
3	Sharma B. K.	Polymer chemistry.	4th Edn. Goel Publishing House	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ahluwalia V.K. & Anuradha Mishra	Polymer Science: A Text Book	1st Edn.Ane Books.	2008
2	Stevens M.P.	Polymer Science: An Introduction	3rd Edn. Oxford Publication	2009

3	Fred J.R.	Polymer Science and Technology.	3rd Edn. Prentice-Hall of India.	2014

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. T.Gowrani Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	ProgrammeTitle :	Bachelor of Chemistry	
Course Code:	22UCY6E1	Title	Batch :	2022-2025
		Core Elective - II : Analytical Chemistry - II	Semester	VI
Hrs/Week:	4		Credits:	5

Course Objective

To acquire knowledge on basic concepts in separation techniques, volumetric analysis, various types of titrations, and Core Elective - II : Analytical Chemistry understand the basic principles of instrumentation.

Course Outcome

On the successful completion of the course students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic principles of UV-visible spectrophotometer and IR spectrophotometer.	K1,K2
CO2	Apply separation techniques for the extraction of solvents	K2, K3
CO3	Understand the basic principles involved in neutralization titrations, PH and Buffer solutions.	K2, K4
CO4	Know about different types of titrations	K3
CO5	Gain knowledge on Analytical method in chemistry	K2, K5

Mapping with PO / PSOs Vs Cos

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	H	H	H	H
CO2	H	H	H	M	M	H	H	H	H	H
CO3	H	H	H	M	H	M	H	M	H	H
CO4	H	H	H	M	M	M	H	H	H	H
CO5	H	H	H	M	H	M	H	H	H	H

H – High; M – Medium; L – Low

Unit	Content	Hrs
Unit I	**Instrumentation:** Basic principles of UV-visible spectrophotometer, Lambert- Beer Law and its limitations. Instrumentation consisting of source, monochromator, grating and detector. Applications of UV-visible spectroscopy. Basic principles of IR spectrophotometer, Instrumentation consisting of source, monochromator grating and various detector. Characteristic absorption bands of Alcohols, Phenols, Ethers, Aldehydes and Ketones. Applications of infrared spectroscopy.	**12**
Unit II	**Separation techniques:** Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous and counter current extractions. Qualitative and quantitative aspects of solvent extraction: extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and non aqueous media.	**12**
Unit III	**Neutralisation Titrations**: Principles of titrimetric analysis, titration curves for strong acid-strong base, weak acid-strong base, strong acid-weak base titrations, Indicators: Theory and the choice in acid –base titration. **pH and Buffer solution:** pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers.	**12**
Unit IV	**Redox Titration**: Principle, Different types of Redox Titrations, Redox indicators and choice of redox Indicatiors. **Complexometric Titrations**:Theory of complexometric titration, indicators for EDTA titration,determination of total hardness of water by complexometric titration with EDTA. **Precipitation Titrations**:Indicators for Argentometric titrations, Estimation of chlorides by Volhard's Method.	**12**

Unit V	**Analytical method in chemistry: Analysis of water**-Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods. a. Determination of pH, acidity and alkalinity of a water sample. **Analysis of food products:** Nutritional value of foods, idea about food processing and food preservations and adulteration. a. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses.	**12**
	Total hours/Semester	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S M Khopkar	Basic concepts of Analytical Chemistry.	New Age International Pvt Ltd, 4th Edition.	2020
2	Chatwal and Anand	Instrumental Methods of Chemical Analysis.	Himalaya publishing House, 5thEdition.	2014
3	Willard, H. H	Instrumental Methods of Analysis.	CBS Publishers	1998
4	Svehla. G	Vogel's Qualitative Inorganic Analysis.	Prentice Hall, 7th Edition.	1996

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	D.A. Skoog, D.M. West, F.J. Holler and	Fundamentals of Analytical Chemistry	Cengage Learning	2018
2	Usharani. S	Analytical Chemistry	Macmillan India Ltd, 1st Edition	2000
3	Skoog, D.A.; West, D.M. & Holler, F.J	Fundamentals of Analytical Chemistry	Saunders College Publishing, Fort Worth,6th Ed.	1992
4	Arthur. I.Vogel	Inorganic Quantitative Analysis	Longman, 4th Edition.	1978

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY6E2			Title	Batch:	2022 – 2025
				Core Elective- II Pharmaceutical Chemistry-II	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1		Credits:	5

Course Objective

To inculcate the basic knowledge on the preparation, properties and uses of some organic, inorganic and radioactive drugs to make the students opt their career in pharmaceutical industry.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the names of organic, inorganic and radioactive drugs and their basic analysis.	K1
CO2	Understand the preparation of organic and inorganic drugs and the principles behind their analysis.	K2
CO3	Apply the properties of pharmaceuticals towards their respective applications.	K3
CO4	Sketch the radioactivity, precautions and the storage conditions of radioactive drugs.	K3
CO5	Analyze and apply the available analytical techniques towards the quantification of organic and inorganic pharmaceuticals.	K3&K4

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	H	H	H	H
CO2	H	H	H	H	M	-	H	H	H	H
CO3	H	H	H	M	-	-	H	H	H	H
CO4	H	H	H	-	-	-	H	H	H	H
CO5	H	H	H	H	M	-	H	H	H	H

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Important organic Drugs:** Definition, chemical structure, method of preparation, important physical and chemical properties and uses of the following organic drugs drugs. Sulphonamides – sulfacetamide, Antileprotic Drugs – Dapsone, Anti-tubercular Drugs- Isoniazid, Antibiotics- Ampicillin, Antimalarial Drugs-Chloroquine, Hypnotics- Phenobarbitone, Diuretic Drugs- Furosemide, Cardiovascular Drugs- Ethylnitrite and Analgesics and Anti-pyretics- Aspirin.	**13**
Unit II	**Important Inorganic Drugs:** Definition, properties and medicinal uses of the following inorganic compounds. Electrolytes used in the replacement therapy- Sodium chloride, Calcium gluconate, Gastrointestinal agents Acidifiers- Ammonium chloride, Sodium Bicarbonate, Antimicrobials-Hydrogen peroxide, Chlorinated lime, Expectorants- Ammonium Chloride, Emetics- Copper sulphate, Haematinics- Ferrous sulphate, Antidote- Sodium thiosulphate.	**13**
Unit III	**Radiopharmaceuticals:** Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide (I_{121}), Storage conditions, precautions & pharmaceutical application of radioactive substances.	**10**
Unit IV	**Pharmaceutical Analysis:** Non- aqueous titrations - Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate, Precipitation titrations: Mohrs method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride, Complexometric titration: Classification, metal ion indicators, estimation of Magnesium sulphate, Redox titrations- Concepts of oxidation and reduction, Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry.	**12**
Unit V	**Electrochemical methods of analysis** - Conductometry - Introduction, Conductivity cell, Conductometric titrations, applications, Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.	**12**
	Total Contact Hrs	**60**

Teaching Methods: Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Vardanyan R.S., Hruby V. J	Synthesis of Essential Drugs	1st Edn., Elsevier.	2006
2	Gundu Rao. P	Pharmaceutical and Medical Inorganic Chemistry and updated version of Inorganic Pharmaceutical Chemistry	1st Edn., Vallabh Prakashan publisher.	2008
3	Gurdeep R Chatwal, Madhu Arora	Analytical Chemistry	1st Edn., Himalaya Publishing House	2008
4	Chatwal. G.R	Pharmaceutical Chemistry-Inorganic	5th Edn., Himalaya Publishing House.	2017
5	Atherden L.M	Bentley and Driver's Textbook of Pharmaceutical Chemistry	1st Edn., Oxford University Press.	2020

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Vogel A. I, Bassett, Jeffrey, Mendam and Denney	Vogel's Textbook of Quantitative Chemical Analysis	1st Edn., Longman Higher Education Publisher.	1994
2	Skoog A, West D. M, Holler F. J	Fundamentals of Analytical Chemistry	Cengage Learning Publisher..	2004
3	Abhishek Tiwari, Neeraj Upmanyu, Anup K. Chakraborty	Pharmaceutical Organic Chemistry-I	1st Edn., Nirali Prakashan Publisher.	2017
4	Rajasekaran	Textbook of Pharmaceutical Inorganic	2ndEdn., CBS Publication.	2019

		Chemistry Theory and Practical		
5	M. Ali	Textbook of Pharmaceutical Chemistry I (Inorganic)	1stEdn., CBS Publication	2020

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY6E3	Title	Batch:	2022 – 2025
		Core Elective- II- Agricultural Chemistry and Analytical Techniques for Agrochemicals	Semester:	VI
Lecture Hrs./Week	4		Credits:	5

Course Objective

To give the students the importance of Agricultural chemistry and an exposure to find, analyse and find a suitable method to cultivate and promote agricultural methods.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the nature of soil.	K1,K2
CO2	Gain Knowledge on Soil fertility and Organic Manures	K2, K3
CO3	Find applications of Pesticides, Rodenticdes and Herbicides and weedicides	K3
CO4	Know the analysis of agrochemicals by Potentiometry and Electrical conductivity	K4
CO5	Know the application of Non Instrumental Techniques in the analysis of agrochemicals	K4

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	M	M	M
CO2	H	H	H	M	M	M	M	M	M	M
CO3	H	H	H	M	M	M	M	M	M	M
CO4	H	H	H	M	M	H	H	H	M	M
CO5	H	H	H	M	M	H	H	H	M	M

High- H,Medium-M, Low-L

Unit	Content
Unit I	**Soil chemistry:**Soil analysis . Composition of soil : Organic and Inorganic constituents. Soil acidity : buffering capacity of soils. Limiting of soil. Absorption of cations and anions : availability of soil nutrients to plants..
Unit II	**Soil fertility and productivity**: Organic Manures - Farmyard Manure - Compost - Oil cakes - Bone meal - Meat meal - Fish meal - Blood meal and green Manures - Fertilizers - Classification of fertilizers - Requisites of a good fertilizers - NPK fertilizers - ill effects of fertilizers - effect of mixed fertilizers on soil pH - Micronutrients - role of micronutrients sources - Need for nutrient balance - Soil management and Micronutrients needs.
Unit III	**Insecticides:** stomach and contact poisons. Plant derivatives: pyrethrine, Nicotine and rotenone Synthetic organic: carbophos, carbaryl, p-DCB, dimethoate, butachlor, Endrin, Aldrin (Chemical name and uses). **Fungicides:**Inorganic (Bordeaux Mixture) and organic(dithiocarbamate). Industrial fungicides: creosote fractions. **Herbicides and weedicides:** Selective and non-selective, 2, 4-D and 2, 4, 5-t (structure and function) Intenerated pest management.
Unit IV	**Potentiometry**: Measurement of EMF, PH-metry and its applications in the analysis of pesticide residues in Agrochemicals, Food, Juices and Water. **Electrical conductivity:** Electrical conductivity of electrolyte, Conductivity meter, Specific and Equivalent conductivities, Applications of conductivity measurement in the Analysis of Salinity, Halide and Soil moisture.
Un it V	**Non Instrumental Techniques:** Acid base titrations acid-base indicators; Redox titrations determination of halide ions by Complexometric titration, Precipitation titrations methods of determination of Mg, Zn, Ca, Al, Cu, Metallochromic indicators, Gravimetric estimation of SO_4^{2-} and Fe^{+++}.

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jayashree Ghosh	Fundamental concept of Applied chemistry.	S. Chand & Company Ltd.,	2010
2	B.A. Yagodin (Ed).	Agricultural Chemistry.	2 Volumes, Mir Publishers Moscow	1984
3	K.Bagavathi - Sundari	Applied chemistry,	MJP Publishers.	

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	T.D. Biswas and S.K. Mukerijee	Text book of soil science.	McGraw Hill Education,2nd Edition.	2017
2	G.T. Austin	Shreve's Chemical Process Industries.	Mc-Graw-Hill,5th Edition.	2017
3	Nyle.C.Bready	The nature and properties of soils.	Pearson Education, 14thEdition.	2012
4	Louis M.Thompson - and Frederick. R.Troch	Soils and soil fertility.	Oxford University Press Inc. 5thEdition.	1993

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY615	Title	Batch:	2022 – 2025
		Core Practical - III Gravimetric Analysis and Physical Chemistry Experiments	Semester:	VI
Practical Hrs./Week	6		Credits:	5

Course Objective

To develop practical and analytical skills in gravimetry and physical chemistry.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept of gravimetric analysis	K1
CO2	Analyse cations and anions quantitatively using gravimetric method	K1-K4
CO3	Enable the students to acquire practical skills in physical chemistry experiments	K3
CO4	Perform conductometric and potentiometric titrations and arrive the endpoint	K3,K4
CO5	Perform graphical analysis based on experimental data and to validate the experimental results	K5

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H	H
CO3	H	M	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	H	H	H	H
CO5	H	M	H	H	H	H	H	H	H	H

High- H, Medium-M, Low-L

Units	Content	Hrs
	I: Gravimetric Estimations: 1. Lead as Lead Chromate 2. Barium as Barium Chromate 3. Barium as Barium Sulphate 4. Calcium as Calciumoxalate 5. Magnesium as Magnesiumoxinate 6. Nickel as dimethylglyoxime complex **(any Four)** **II: Physical Chemistry:** **1. Heterogeneous Equilibria:** i) Determination of transition temperature (thermometric method) a) Sodium acetate b) Sodium thiosulphate c) Strontium chloride d) Sodium bromide ii) Eutectic systems: a) Naphthalene and diphenyl b) Naphthalene and diphenylamine c) Naphthalene and benzophenone d) Naphthalene and p-nitrotoluene iii) Critical solutiontemperature: a) Phenol – Water system. b) Effect of NaCl on C.S.T. (between 1to 2 %) c) Effect of Succinic acid on C.S.T. (between1 to 3 %) d) Determination of unknown concentration of the given NaCl/Succinic acid using C.S.T iv) Molecular weight determination: Rast's method Solvents – Naphthalene and diphenyl.	

	2. Kinetics: a) Acid catalysed hydrolysis of methylacetate b) Potassium persulphate Oxidation **3. Conductivity Experiments:** a) Cell constant b) Verification of Debye – Huckel Onsager Equation c) Conductometric Acid – Base titrations (HCl x NaOH) **4. Potentiometric Titrations** a) Acid – Base titration (HCl x NaOH) b) Redox titrations ($FeSO_4$ x $KMnO_4$)	
	Total Contact Hrs/semester	**90**

Pedagogy

Demonstration and individual hands on practical.

Assessment Methods

Performance of laboratory work, Report, Recording the report, Submission of the record

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Venkateswaran, V.Veeraswamy, R.Kulandaivelu, A.R.	Basic Principles of Practical Chemistry	S. Chand & Sons,	2017
2.	Thomas, A.O.	Practical Chemistry for B.Sc. Main Students.	Sharada press, 8th edn.	2000

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Jeffery, G.H. Bassett, J. Mendham, J. Denney. R.C.	Vogel's Textbook of Quantitative Chemical Analysis.	Bath Press, 5thedn.	1989

2.	Yadav, J.B.	Advanced Practical Physical Chemistry	Goel Publishing House	2014

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. M. Amutha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY6AL	Title	Batch:	2022 - 2025
		Advanced Learner Course – II: Applications of Spectroscopy (Optional)	Semester:	VI
Lecture Hrs./Week	Self study		Credits:	4*

Course Objective

To acquire knowledge and skills in the interpretation of various spectra of the molecules and applications of spectroscopy.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Calculate the absorption maxima and interpret the types of electronic transitions of compounds in absorption spectra	**K3, K4**
CO2	Analyse the IR spectra and predict the type of functional group	**K4**
CO3	Identify the structure of molecule with the NMR Spectra	**K4**
CO4	Determine and deduce the molecular mass and structure of the molecules using fragmentation pattern of mass spectra	**K3, K4**
CO5	Apply the knowledge of hyperfine splitting in the prediction of EPR spectra	**K3**

Mapping with POs / PSOs Vs COs

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H	H
CO3	H	M	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	H	H	H	H
CO5	H	M	H	H	H	H	H	H	H	H

H – High; M – Medium; L – Low

Units	Content
Unit I	**UV-visible spectroscopy:** Principles, absorption bands, Effect of temperature and solvent on the fine structure of absorption bands, Woodward-fieser Rules for calculating absorption maximum in poly-ynes and α, β -unsaturated carbonyl compounds, acids and esters. Electronic transitions for charge transfer complexes, spectrophotometric titrations.
Unit II	**IR Spectroscopy:** Principles, sampling techniques, Interpretation of spectra of hydrocarbons, halogen compounds, alcohols, phenols, ethers, carbonyl compounds, esters, acids, amides, acid anhydrides and nitro compounds. Application of IR to quantitative analysis and Limitations of IR spectroscopy.
Unit III	**NMR spectroscopy:** Principle, Instrumentation, Chemical Shift, splitting of signals, Interpretation of NMR spectra of organic molecules like propene, 1-pentyne, butyl methyl ether, acetaldehyde, acetone, ethyl acetate, acetic acid, 1-nitrobutane.^{13}C spectroscopy, Chemical shift, proton coupled and decoupled ^{13}C spectra and Applications of NMR spectroscopy.
Unit IV	**Mass Spectroscopy:** Principles, Instrumentation, General fragmentation modes, Interpretation of mass spectra of compounds containing different functional groups, Applications of Mass spectrometry and solving numerical problems of mass spectrometry pertaining to simple organic compounds.
Unit V	**EPR Spectroscopy:** Theory, Instrumentation, g-factor and hyperfine splitting. EPR spectra of the following compounds 1,4-Benzoquinone radical anion, naphthalene negative ion, Co^{2+} and Cu^{2+}systems. Anisotropic systems: anisotropic effect, zerofield splitting, Krammer's degeneracy and applications of ESR spectroscopy for organic and inorganic systems.

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Sharma, Y.R.	Elementary Organic Spectroscopy, 5thedn.	S. Chand & Company Pvt. Ltd.	2013

2.	Gurdeep, C.& Anand, S.K.	Spectroscopy. 5th edn.	Himalaya Publishing House	2002
3.	Kemp, W.	Organic Spectroscopy	ELBS edition	1985

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Silverstein, R. M., Bassler, G. C. and Morril, T. C.	Spectrometric identification of organic compounds	Wiley India Pvt. Ltd. 6th edn.	1991
2.	Kalsi, P.S.	Spectroscopy of Organic Compounds.	New Age International Pvt Ltd Publisher, 6thedn	2007
3.	Pavia, D.L., Lampman, G.M., Kriz, G.S. and Vyvyan, J.R.	Spectroscopy.	Brooks/Cole, Cengage Learning. 1st edn	2008

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. Indumathy Ramasamy Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	ProgrammeTitle :	Bachelor of Chemistry	
Course Code:	22UCY6S1	Title	Batch :	2022 – 2025
		Skill Based Elective –II	Semester	VI
Hrs/Week:	2	Green Chemistry	Credits:	2

Course Objective

To learn about the environmental status, public awareness in evolution, principles involved in green chemistry, bio-catalytic reactions, global warming and its control measures, availability of green analytical methods.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the green chemistry	K1
CO2	Understand the basic principles of green chemistry	K2
CO3	Identify the environment friendly technologies and working conditions	K3
CO4	Analyse eco-friendly and less wasteful manufacturing process for the sustainable development of our country	K2 & K3
CO5	Know about the various analytical green methods	K3

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	M	M	M	M	M	M	M	M	-	-
CO2	M	M	M	M	M	M	M	M	-	-
CO3	H	M	M	M	H	M	M	M	-	-
CO4	H	H	H	M	H	M	M	M	-	-
CO5	M	M	H	M	M	M	M	M	-	-

High- H, Medium-M, Low-L

Unit	Content	Hrs
Unit I	**The need for green chemistry:** Sustainability and cleaner production. Greenchemistry and Eco- efficiency. Environmental Protection Laws. Challenges ahead for a chemist. Green chemistry education. **Future trends in Green Chemistry**: Green nano-synthesis and Green polymer chemistry.	**3**
Unit II	**Twelve Principles of Green Chemistry**: Explanation with examples. AwardsforGreen Chemistry.	**3**
Unit III	**Water as greener solvent**: An alternative approach to solvent chemistry: Solvent free reactions. Solvent free microwave assisted organic synthesis. **Ionic Liquids:** Prospects and Retrospects	**3**
Unit IV	**Super critical fluid extraction:** Supercritical fluids. Advantages and applications of super fluid extraction technology. **Carbon dioxide as a super critical fluid:** Advantages and industrial applications.	**3**
Unit V	**Green Techniques:** .Green Chemistry Using Bio Catalytic Reactions – Introduction - Fermentation and Bio transformations - Production of Bulk and fine chemicals by microbial fermentation. Oxidation technology for waste water treatment-photocatalytic oxidation.Chitin – Green polymer.	**3**
	Total contact Hrs/Semester	**15**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	lndu Tucker Sidhwani and Rakesh	An Introductory Text on Green Chemistry: For Undergraduate	Wiley.	2020

	K. Sharma	Student.		
2	V. Kumar	An Introduction to Green Chemistry.	1st (Reprint) Edition.Vishal Publishing Co.,	2013
3	Rashmi Sanghi and M.M. Srivastava	Green Chemistry, (Environment Friendly Alternatives).	1st Edition. Narosa Publishing House, New Delhi.	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Asim K. Das	Environmental Chemistry with Green Chemistry.	1st Edition.Books and Allied (P) Ltd., Kolkata	2014
2	Samuel Delvin	Green Chemistry.	1st Edition. IVY Publishing House, New Delhi.	2006
3	V.K. Ahluwalia	Green Chemistry (Environmentally Benign	1st Edition. Ane Books Pvt.Ltd., New Delhi.	2006

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	22UCY6S2	Title	Batch :	2022 – 2025
		Skill Based Elective-II Clean energy	Semester	VI
Hrs/Week:	2		Credits:	2

Course Objective

To develop the theoretical knowledge in practical chemistry.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know about renewable and non-renewable energy resources	**K1,K2**
CO2	Understand solar energy and working of solar cells	**K2, K3**
CO3	Develop knowledge on working of wind mill	**K1, K2**
CO4	Find the application of bio energy	**K3**
CO5	Study environmental aspect of Tidal, ocean and geothermal energy	**K3**

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	M	-	L
CO2	H	H	H	M	M	M	M	M	-	L
CO3	H	H	H	M	M	M	M	M	-	L
CO4	H	H	H	M	M	M	M	M	-	L
CO5	H	H	H	M	M	M	M	M	-	L

H – High; M – Medium; L – Low

Unit	Content	Hours
Unit I	**Consumption of energy** - Indian and global energy status- commercial and non – commercial energy sources. Renewable and non-renewable energy resources- Conservation of energy.	**3**
Unit II	**Solar energy:** Solar Radiation – Solar Thermal Collectors – Flat Plate and Concentrating Collectors– Solar Applications – fundamentals of photo Voltaic Conversion – Solar Cells – PV Systems – PV applications.	**3**
Unit III	**Wind energy:** Wind power – mean wind velocity- factors affecting velocity- Wind Energy generators-types.-construction of a Wind Turbine - Important Factors for building windmill.	**3**
Unit IV	**Bio – energy:** Biomass, Biogas, Source, Composition, Technology for utilization – Biomass direct combustion – Biomass gasifier – Biogas plant – Digesters – Ethanol production., Bio-Diesel production.	**3**
Unit V	**Tidal, ocean and geothermal energy:**Wave energy - converting system. Ocean thermal energy -Open and closed cycles. Geothermal energy sources-utilizations-environmental aspects.	**3**
	Total contact Hrs/Semester	**15**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Solanki C.S	Solar Photovoltaic Technology and Systems.	Prentice Hall India Learning Private Limited	2013
2	Rai, G.D.	Non Conventional Energy Sources.	Khanna publishers New Delhi	1999

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Asim K Das	Environmental chemistry with Green chemistry	Books and Allied (P) Ltd, Kolkata	2010
2	Sukhatme, S.P.	Solar Energy	Tata McGraw-Hill Publishing Company Ltd	1997

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

DEPARTMENT OF CHEMISTRY

B.Sc., PHYSICS/B.Sc., BOTANY/ B.Sc., ZOOLOGY DEGREE

PROGRAMME

III AND IV SEMESTERS

SCHEME OF EXAMINATIONS

SEM.	SUBJECT CODE	TITLE	HRS/ EXAM	HRS/ WEEK	MAXIMUM MARKS		TOTAL MARKS	CREDITS
					INT	EXT		
III	22UPS3A4/ 22UBY3A4/ 22UZY3A4	ALLIED CHEMISTRY PAPER – I INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY	3	6	50	50	100	4
IV	22UPS4A5/ 22UBY4A5/ 22UZY4A5	ALLIED CHEMISTRY PAPER – II INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY	3	6	50	50	100	4
IV	22UPS4A6/ 22UBY4A6/ 22UZY4A6	ALLIED CHEMISTRY PRACTICAL	3	2	50	50	100	2

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	22UPS3A4/ 22UBY3A4/ 22UZY3A4	Title	Batch :	2022-2025
		Allied Chemistry Paper – I Inorganic, Organic and Physical Chemistry	Semester	III
Hrs/Week:	6		Credits:	4

Course Objective

To learn the chemistry of chemical bonding and co-ordination compounds. To understand basic principles of volumetric analysis and water treatment. To learn the chemistry of basic aromatic compounds. To know about some common diseases and the drugs used. To study about electrochemical conductance.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the principle of chemical bonding, coordination chemistry and applications of biologically important molecules.	K1,K2
CO2	Gain Knowledge on volumetric analysis and water treatment process	K2, K3
CO3	Sketch the synthesis of heterocyclic compounds and reactions of aromatic compounds and heterocycles.	K3
CO4	Explain pharmaceutical chemistry with some important drugs	K4
CO5	Know the basic principle of electro chemistry and corrosion	K4

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	M	H	M	M	M	M	M	H	-	-
CO2	M	H	M	M	M	M	M	M	-	-
CO3	M	H	H	M	M	M	M	M	-	-
CO4	M	H	H	M	M	M	M	H	-	-
CO5	M	H	H	M	M	M	M	H	-	-

High- H, Medium-M, Low-L

Unit	Content	Hrs
Unit I	**Chemical bonding**: Molecular orbital theory - bonding, anti-bonding and non-bonding orbitals, Application of Molecular orbital theory – MO configuration and bond order of H_2, N_2, O_2, F_2. VSEPR Theory – postulates, limitations and applications to $BeCl_2$, BCl_3, H_2O, NH_3, CH_4, PCl_5 and SF_6 molecules. **Coordination Chemistry**: Ligands–Mono and bidentate ligands; Coordination number. Nomenclature – Mononuclear complexes. Werner & Sidgwick Theories; Chelation and its industrial importance with reference to EDTA. Biological role of Haemoglobin and Chlorophyll. Applications in qualitative and quantitative analyses.	**18**
Unit II	**Volumetric Analysis**: Primary and Secondary standards. Principles of volumetric analysis. Preparation of normal, molal and molar solutions. Principle of acid - base titrations. **Water treatment**: Hardness of water. Temporary and permanent hardness. Units of hardness. Disadvantages of hard water in boiler. Softening of hard water – Zeolite process, reverse osmosis, electro dialysis and De-mineralization process – Purification of water for domestic use – Disinfection by Chlorine, Ozone and UV light.	**18**
Unit III	**Aromatic compounds**: Benzene - Resonance, Huckel's rule, resonance energy and structure, Electrophilic substitution in benzene. Mechanism of nitration, halogenation, alkylation, acylation and sulphonation. **Heterocyclic compounds** - Aromaticity of Heterocyclic compounds - Nomenclature of heterocyclic compounds- synthesis and reactions of furan- pyrrole- thiophene and pyridine.	**18**

Unit IV	**Chemotherapy**: Introduction, Sulphadrugs - sulphanilamide, sulphapyridine, sulphadiazine, sulphaacetamide and sulphathiazole. Mode of action-sulphanilamide **Antimalarials**: Classification and use of ChloroquineandPamaquine. **Antiseptics**: Definition and uses of Chloramines –T, Iodoform and Dettol. **Anaesthetics**: Classification, characteristics and uses of procaine and pentothal sodium. **Antibiotics**: Introduction, use of Penicillin, Chloromycetin, Streptomycin and Tetracyclin. **Vitamins**: Classifications, occurrence anddeficiencydiseases caused by Vitamin A, B complex, C, D, E and K. (Note : Structure of the compounds is not required.)	**18**
Unit V	**Electrochemistry**: Electronic and electrolytic conductors – Faraday's laws of electrolysis – Arrhenius theory of electrolytic dissociation- Transport number - Conductance: Specific and molar conductance, Variation of conductance with dilution. Kohlrausch law and its applications. **Applications of conductance measurements** – determination of degree of dissociation of weak electrolyte. Ionic product of water and conductometric titrations. **pH: Definition, Buffer solutions, Importance of buffer in the living systems.** **Corrosion and its prevention.**	**18**
	Total Contact Hrs/Semester	**90**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Vaidyanathan K.,Venkateswaran A. and Ramasamy R	Allied chemistry	1. 1st Edition. Priya publications.	2005

2	Veeraiyan., V. and Vasudevan, A.N.S	Ancillary chemistry	1st Edition. Einstein publishing house	2001
3	Yadav, M.S,(2001),Electrochemistry	Electrochemistry	2nd Edition. Anmol Publications	2001
4	Jayashree Ghosh	A Text book of Pharmaceutical Chemistry	New Delhi: S . Chand & Co.,	2009

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	B. R. Puri, L. R. Sharma and K. C. Kalia	Principles of Inorganic Chemistry	33rd Edition. Vishal Publishing Co,.	2020
2	2. Jain P.C. and Monica Jain	Engineering Chemistry	17th Edition.Dhanpat Rai Publishing Company(P)Ltd.	2007
3	P. L. Soni	Text Book of Inorganic Chemistry	Sultan Chand & Sons	2013
4	Arun Bahl and B.S. Bahl	Advanced Organic Chemistry	5th Edition. S Chand	2012
5	M.K. Jain and S. C. Sharma	Modern Organic Chemistry	Golden Jubilee Year Vishal	2020

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms. R. Sudha Dr. M. Selladurai Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	ProgrammeTitle :	Bachelor of Chemistry	
Course Code:	22UPS4A5/ 22UBY4A5/ 22UZY4A5	Title	Batch :	2022-2025
		Allied Chemistry Paper – II Inorganic, Organic and Physical Chemistry	Semester	IV
Hrs/Week:	6		Credits:	4

Course Objective

To study about fuels, fertilizers, cement and glass. To learn about the importance of dyes and polymer science. To know about carbohydrates, amino acids, proteins and nucleic acid. To understand the different kinds of colloids and catalysis.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand and apply the basics of fuel, fertilizers, glass and cement	K2, K3
CO2	Recognize the basic ideas on synthetic dyes and synthetic polymers.	K1
CO3	Demonstrate the chemistry of amino acids and proteins.	K3
CO4	Illustrate the carbohydrates, their types and properties	K3
CO5	Explain colloids, catalysis and phase rule	K4

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	-	-
CO2	H	H	H	M	M	M	H	H	-	-
CO3	H	H	H	M	M	M	M	M	-	-
CO4	H	H	H	M	M	M	M	M	-	-
CO5	H	H	H	M	M	M	M	H	-	-

High- H, Medium-M, Low-L

Unit	Content	Hrs
Unit I	**Fuels:** Types of fuels. Characteristics of a good fuel. Calorific value of a fuel. Determination of calorific value of solid fuel using Bomb calorimeter. Advantages of gaseous fuels. Natural gas, water gas, producer gas, oil gas, **LPG and Gobar gas – Composition and uses (manufacturing details not needed)** **Fertilizers:** Manufacture of urea, ammonium sulphate, super phosphate of lime, Triple super phosphate and potassiumnitrate. **Glass:** Manufacture, types of glass – soft glass, hard glass, flint glass, Pyrex glass and Coloured glass. **Cement:** Manufacturing – Wet Process and Dry process- types-setting of cement – role of gypsum.	**18**
Unit II	**Synthetic Dyes**: Definition, classification based on structure and application. Colour and constitution – Chromophore – Auxochrome Theory. Synthesis and uses of the following dyes: Azo dyes – methyl orange Vat dyes – Indigo (from anthranillic acid) Anthraquinone dyes (Alizarin) Phthalein dyes – Phenolphthalein. **Synthetic Polymers**: Classification – Homo and copolymers – Natural, Synthetic, organic, Inorganic polymers. Thermo plastics and thermosetting plastics. Types of polymerization. PVC, Polystyrene, Bakelite, Teflon, Polyester, Nylon–6.6,Buna–S rubber – Preparation and uses.	**18**
Unit III	**Amino acids and Protein**: Classification of amino acids. Preparation and properties of Glycine. Action of heat on amino acids. Peptides. Synthesis of glycylalanine by carbobenzoxy method. **Proteins:** Classification, simple and conjugated proteins. Denaturation and colour reactions of proteins. Primary and secondary structure. Biological functions. Nucleosides - Nucleotides - RNA and DNA – structure.	**18**

Unit IV	**Carbohydrates:** Classification – preparation and properties of Glucose and Fructose. Elucidation of structure of Glucose and fructose. Comparison of properties of Glucose and fructose. Conversion of Glucose to Fructose and Fructose to Glucose. **Sucrose:** Preparation, properties and structure (Elucidation of structure not necessary) Starch and Cellulose: Properties and uses (Elucidation of structure not necessary).	**18**
Unit V	**Colloidal solution**: Types of colloids. Preparation and properties of colloids and applications. **Catalysis**: Characteristics, types, mechanism of catalytic action and Industrial application, Catalytic poisoning. **Phase rule**- Definition of terms involved. Phase diagram of H_2O, Pb-Ag .	**18**
	Total contact Hrs/Semester	**90**

Pedagogy: Direct Instruction, Digital Presentation, Flipped Class

Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Vaidyanathan K.,Venkateswaran A. and Ramasamy R.,	Allied chemistry	1st Edition. Priya publications.	2005
2	B S Bahl and Arun Bahl	Advanced Organic Chemistry	5thEdition. S Chand	2012
3	Monika Jain P. C. Jain,	Engineering chemistry	17th Edition. Dhanpat Rai Publishing Company (P) Ltd,.	2019

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Tyagi O.D., Yadav M	A Text Book of Synthetic Dyes.	1stEdition. Anmol publications Pvt. Ltd,.	2002

2	Soni, P.L	Text book of Organic Chemistry	29th edition. Sultan Chand & Sons	2012
3	Lubs, H.A	Chemistry of Synthetic Dyes and Pigments	1st Edition. Robert E. Krieger publishing company.	1995

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms. R. Sudha Dr. M. Selladurai Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	22UPS 4A6/ 22UBY4A6/ 22UZY4A6	Title	Batch :	2022-2025
		Allied Chemistry Practical	Semester	III & IV
Hrs/Week:	2		Credits:	2

Course Objective

To understand the principles of volumetric analysis. To enable the students to have hands-on training on qualitative analysis of organic compounds.

Course Outcome

On the successful completion of the course, students will be able

CO Number	CO Statement	Knowledge Level
CO1	Learn how to conduct a volumetric estimation process precisely.	K1,K2
CO2	Understand reactions taking place during the experiment.	K2, K5
CO3	Get the idea about organic qualitative analysis	K2, K4
CO4	Distinguish between aliphatic and aromatic, saturated and unsaturated compounds.	K3
CO5	Evaluate the reactivity of various functional groups	K2, K5

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H	H
CO2	H	H	H	H	M	H	M	H	H	H
CO3	H	H	H	H	M	H	M	H	H	H
CO4	H	H	H	H	M	H	M	H	H	M
CO5	H	H	H	H	H	H	M	H	H	H

High- H,Medium-M, Low-L

Unit	Contents	Hours
	Volumetric Analysis: 1. Estimation of sodium carbonate. 2. Estimation of oxalic acid(Acidimetry) 3. Estimation of ferrous ion. 4. Estimation of ferrous sulphate. 5. Estimation of oxalic acid.(Permanganometry) 6. Estimation of potassium dichromate using sodium thiosulphate 7. Estimation of temporary, permanent and total hardness of water 8. Estimation of Zinc using EDTA. 9. Estimation of Mg using EDTA. **Organic analysis:** Detection of elements. Nitrogen, Sulphur and Halogens. **1.** To distinguish between aliphatic and aromatic, saturated and unsaturated compounds. **2.** Functional group tests for : i) Mono and Dicarboxylic acids ii) Phenols iii) Carbohydrates(Reducing and non reducing) iv) Aromatic primary amines and v) Amides.	
	Total contact Hrs/Semester	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	A.I. Vogel	Elementary practical organic chemistry-qualitative organic	2nd Edition.Prentice	2014

		analysis part 2.	Hall.	
2	V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu	Basic Principles of Practical Chemistry.	2nd Edition. New Delhi:Sultan Chand & Sons	2012
3	F. G. Mann. & B. C. Saunders	Practical Organic Chemistry.	4thEdition.Pearson Education India	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Pandey O. P, Bajpai D. N., Giri S.	Practical Chemistry.	S.Chand& Co.	2010
2	G. Svehla	Vogel's Qualitative Inorganic Analysis.	Dorling Kindersley. 7th Edition.	2009
3	A.O. Thomas	Practical Chemistry.	Scientific Book Centre, Cannanore, 3rd Edition.	2003

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms. R. Sudha Dr. M. Selladurai Dr. N. Neelakandeswari Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	22UCY5VA	Title	Batch:	2022 – 2025
		Value Added Course - Biofertilizers	Semester:	V
Lecture Hrs./Week	30 Hrs		Credits:	2*

Course Objective

To acquire the basic knowledge on biofertilizer, microbes, cyanobacteria, mycorrhizal, organic farming, recycling and vermicompost.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the microbial diversity in various agro-ecologies for biofertilizer application in diversified systems.	K1
CO2	Develop the integrated management for better crop production by using microbes	K2
CO3	Identify the different forms of biofertilizers and their uses	K3
CO4	Compare the effect of mycorrhizal symbiosis on the growth and productivity of plants	K1, K2
CO5	Understand the process of green manuring and organic fertilizers	K2

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	M	L	H	M	M	H	-	-
CO2	H	H	M	L	H	M	M	H	-	-
CO3	H	H	M	L	H	M	M	H	-	-
CO4	H	H	M	L	H	M	M	H	-	-
CO5	H	H	M	L	H	M	M	H	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	**Biofertilizer**: General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication and carrier based inoculants.	6
Unit II	**Microbes**: Azospirillum: isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics – crop response to Azotobacter inoculum, maintenance and mass multiplication.	6
Unit III	**Cyanobacteria**: Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth and blue green algae.	6
Unit IV	**Mycorrhizal**: Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence anddistribution, phosphorus nutrition, growth and yield – colonization of Vesicular Arbuscular Mycorrhizal (VAM) – isolation and inoculum production of VAM.	6
Unit V	**Organic farming, Recycling and Vermicompost:** Organic farming – Green manuring and organic fertilizers, Recycling of bio-degradable,municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.	6
	Total Contact Hrs	**30**

Pedagogy: Direct Instruction, Digital Presentation and Flipped Class

Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Vinayakumar, S. & Pawan, K.	Organic farming and bio-fertilizers	New Delhi: Discovery Publishing House Pvt. Ltd.	2018
2	Subbarao, N. S.	Bio-fertilizers in agriculture and forestry.4th edn	Mumbai: Medtech Life Pvt. Ltd.	2017
3	Sathe, T. V.	Vermiculture and organic farming.	New Delhi: Daya Publishing House	2004

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Dubey, R. C.	A textbook of biotechnology, 5th edn.	New Delhi: Sultan Chand and Sons Pvt. Ltd.	2014
2	NIIR Board	The complete technology book on biofertilizer and organic farming, 2nd edn	New Delhi: NIIR Project Consultancy Services.	2012

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of Examination
Name with Signature	**Name with Signature**	**Name with Signature**	**Name with Signature**
Name : Dr. M. Selladurai Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	**ProgrammeTitle :**	Bachelor of Chemistry	
Course Code:	22UCY6VA1	**Title**	**Batch :**	2022 – 2025
		Value Added Course - Chemistry in Every Day Life	**Semester**	VI
Hrs/Week:	30 Hrs		**Credits:**	2*

Course objective:

To provide general information of the chemistry behind these will create awareness as to what is good and what is bad and to be discarded.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know about the soaps.	K1
CO2	Understand about Synthetic Detergents preparation and their applications.	K2
CO3	Find the applications of cosmetics	K2 & K3
CO4	Find the merits and demerits of Plastics and Dyes	K1 & K2
CO5	Understand the application of fertilizers and pesticides	K2

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	-	-
CO2	H	H	H	M	M	M	M	H	-	-
CO3	H	H	H	M	M	M	M	H	-	-
CO4	H	H	H	M	M	M	M	H	-	-
CO5	H	H	H	M	M	M	M	H	-	-

High- H, Medium-M, Low-L

Unit	Content	Hours
Unit I	**Chemistry in Housekeeping:** Soaps: Introduction, Classification and Preparation of Toilet soap, Bathing soap, Washing soaps and Liquid soap. Significance of additives, fillers and flavors. Acidity and alkalinity of soap.	**6**
Unit II	**Synthetic Detergents:** Detergents: Preparation, Types of detergents- cationic, anionic, amphiphilic detergents. Common detergent chemicals. Additives, excipients, colors and flavors. Enzymes used in commercial detergents. Environmental hazards.	**6**
Unit III	**Cosmetics:** Cosmetics-Introduction, classification and general formulation of bathing oils, face creams, toilet powder, skin products, dental cosmetics, hair dyes, shaving cream and shampoo, Toxicology of cosmetics.	**6**
Unit IV	**Plastics and Dyes:** Plastics in everyday life. Brief idea of polymerization-Thermoplastic and thermosetting polymers. Use of PET, HDPE, PVC, LDPE, PP, ABS. Recycling of plastics. Biodegradable plastics. Environmental hazards of plastics. International recycling codes, and symbols for identification. Natural and synthetic dyes(Basic ideas only)	**6**
Unit V	**Chemistry and Agriculture:** Fertilizers: Classification-natural, synthetic, mixed, NPK fertilizers. Excessive use of fertilizers and its impact on the environment. Bio fertilizers. Plant growth hormones. Pesticides: Classification-insecticides, herbicides, fungicides. Excessive use of pesticides- Bio pesticides.	**6**
	Total contact Hrs/Semester	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Reference Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jayashree Ghosh	Applied Chemistry	S Chand & Company	2010
2	S.S Dara	A text book of Environmental Chemistry and Pollution Control.	7th Edition. S Chand & Company.	2004

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature:

Programme code:	B.Sc.	ProgrammeTitle :	Bachelor of Chemistry	
Course Code:	22UCY6VA2	Title	Batch :	2022 – 2025
		Value Added Course – Textile Chemistry	Semester	VI
Hrs/Week:	30 Hrs		Credits:	2*

Course objective:

To provide knowledge about the basics of fibers, impurities present and their purification.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure of natural fibers	K1-K3
CO2	Understand the production, properties and uses of natural fibers	K2-K5
CO3	Know Properties and Uses of Synthetic Fibers	K2 & K3
CO4	Understand the structure of synthetic fibers	K1 & K2
CO5	Identify the impurities present in cotton and silk and know the processes to remove them	K2

Mapping with PO / PSO Vs CO

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	-	-
CO2	H	H	H	M	M	M	M	H	-	-
CO3	H	H	H	M	M	M	M	H	-	-
CO4	H	H	H	M	M	M	M	H	-	-
CO5	H	H	H	M	M	M	M	H	-	-

High- H, Medium-M, Low-L

Unit	Content	Hours
Unit I	**Structure of Natural fibers:** Fiber theory –polymers and polymerization-Morphology of fibres – Molecular arrangements in fibers.	**6**
Unit II	**Classification of fibers:** General classification of fibres-chemical structure, production, properties and uses of the following natural fibres (a)natural cellulosic fibres (cotton and jute) (b) natural protein fibre (wool and silk)	**6**
Unit III	**Properties and Uses of Synthetic Fibers:** Properties and uses of the following synthetic fibers. (i) Man made cellulosic fibers (Rayon, modified cellulosic fibers) (ii) Man made protein fibers (Azions) (iii) Poly amide fibers (different types of nylons) (iv) Poly ester fibers (v) Acrylic fibers and (vi) Olefin fibers.	**6**
Unit IV	**Structure of synthetic fibers :** Chemical structure and production of synthetic fibers – Rayon, Azions, Poly amide fibers (different types of nylons), Poly ester fibers and Olefin fibers.	**6**
Unit V	**Impurities in fibers and their removal:** Impurities in raw cotton and grey cloth, wool and silk- general principles of the removal – Scouring – bleaching – Desizing – Kierboiling- Chemicking –Chemical and machinery useDegumming and Bleaching of silk Scouring and Bleaching of wool.	**6**
	Total contact Hrs/Semester	**30**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Reference Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bruno Nuntak	The Identification of Textile Fibres	1st Edition. Elsevier	2009
2	Maryory L.Joseph	Introduction to Textile Science	3rd Edition. Holt, Rinehart and Winston.	2010
3	F. Sadov, M. Horchagin and A. Matetshy	Chemical Technology of fibrous Materials	Mir Publishers	1978

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Ms.R.Sudha Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr. R. Manicka Chezian Signature: