

DEPARTMENT OF CHEMISTRY
SYLLABUS 2025 - 2028
(OUTCOME BASED EDUCATION)

BOARD OF STUDIES 2025
I - VI SEMESTERS



NALLAMUTHU GOUNDER MAHALINGAM COLLEGE
(AUTONOMOUS)

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

Program Specific Outcomes:

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

Mapping

PEOs POs \ PSOs	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	H	L	L	M	H
PO2	L	M	L	L	L
PO3	H	H	H	H	H
PO4	H	H	H	H	H
PO5	M	H	M	H	H
PO6	H	H	H	H	H
PO7	H	H	M	H	H
PO8	H	H	M	H	H
PSO1	M	M	M	M	H
PSO2	H	H	H	H	H

H – High; M – Medium; L – Low

N.G.M College - Curriculum Development Cell
Scheme of Examination For 2025 –2028
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	25UTL101 / 25UHN101 / 25UFR101 /	Tamil Paper - I / Hindi Paper - I / French Paper – I	6	-	-	3	25	75	100	3
II	25UEN101	Communication Skills – I	5	-	-	3	25	75	100	3
III	25UCY101	CC I : Inorganic and Organic Chemistry	6	-	1	3	25	75	100	5
	25UCY203	CC Lab - I : Inorganic Qualitative Analysis	-	3	-	-	-	-	-	-
	25UCY1A1	GE I –Allied: Mathematics for Chemistry – I	6	-	-	3	25	75	100	4
	25UCY2A3	GE Lab - I Allied: Programming lab for chemistry using MATLAB	-	2	-	-	-	-	-	-
IV	25EVS201	AECC I : Environmental Studies	1		-	-	-	-	-	-
	25HEC101	Human Excellence - Personal Values & Indian Yoga Practice - I	1		-	2	20	30	50	1
V		Extension Activities: Annexure – I								
EC		Online Course (Optional) (MOOC/NPTEL/SWAYAM)	-	-	-	-	-	-	-	Grade
Total			30						450	16

EC – Extra Credic Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – General Elective; AECC – Ability Enhancement Compulsory Course; SEC – Skill Enhancement Course

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	25UTL202/ 25UHN202/ 25UFR202	Tamil Paper - II / Hindi Paper - II / French Paper – II	6	-	-	3	25	75	100	3
II	25UEN202	Communication Skills – II	5	-	-	3	25	75	100	3
III	25UCY202	CC II : Organic and Physical Chemistry	5	-	1	3	25	75	100	4
	25UCY203	CC LAB - I : Inorganic Qualitative Analysis	-	3	-	3	40	60	100	3
	25UCY2A2	GE II - Allied: Mathematics for Chemistry – II	6	-	-	3	25	75	100	4
	25UCY2A3	GE Lab - I Allied: Programming lab for chemistry using MATLAB	-	2	-	3	40	60	100	2
IV	25EVS201	AECC I: Environmental Studies	1		-	2	-	50	50	2
	25HEC202	Human Excellence - Family Values & Indian Yoga Practice – II	1		-	2	20	30	50	1
	25UEL2S1	SEC I: Naan Mudhalvan- Professional Skills (Offered by English Department)	1			2	-	50	50	2
V		Extension Activities - Annexure								
EC	25CMM201	IKS: Manaiyiyal Mahathuvam -	1	-	15	2	-	50	50	Grade
	25CUB201	IKS: Uzhavu Bharatham – I	1	-	15	2	-	50	50	Grade
		Online Course (Optional) (MOOC/NPTEL/SWAYAM)	-	-	-	-	-	-	-	Grade
Total			30						750	24

EC – Extra Credic Course / Certificate Course / Co-scholastic Course / Job Oriented Course

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	25UTL303/ 25UHN303/ 25UFR303	Tamil Paper - III / Hindi Paper - III / French Paper – III	5	-	-	3	25	75	100	3
II	25UEN303	Communication Skills - III	6	-	-	3	25	75	100	3
III	25UCY304	CC III : Inorganic and Physical Chemistry	5	-	2	3	25	75	100	55
	25UCY406	CC Lab - II : Volumetric, Organic Qualitative Analysis and Organic Preparations	-	3	-	-	-	-	-	-
	25UCY3A4	GE III – Allied: Physics for Mathematics & Chemistry I	5	-	-	3	25	75	100	4
	25UCY4A6	GE Lab - II Allied: Physics Lab for Mathematics & Chemistry	-	3	-	-	-	-	-	-
IV	25UCY3N1 / 25UCY3N2	Non Major Elective - I : Introduction to Nanotechnology/ Non Major Elective - I : Chemistry of Consumer Products	2		-	2	-	50	50	2
	25HEC303	Human Excellence - Professional Values & Ethics – III	1		-	2	20	30	50	1
V		Extension Activities - Annexure – I								
	25UHW301	Health and Wellness	2 [#]		-	-	-	-	25 [@]	1
EC	25CMM302	IKS: Manaiyiyal Mahathuvam - II	1	-	-	2	-	50	50	Grade
	25CUB302	IKS: Uzhavu Bharatham – II	1	-	-	2	-	50	50	Grade
	25UCY3VA1	VAC1:Pesticide Chemistry (Optional)			30					2*
Total			30						525	19

EC – Extra Credic Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – General Elective; VAC – Department Specific Value Added Course; * Extra Credits; [#] Outside regular hours;

[@] 100 Marks reduced to 25 Marks.

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	25UTL404/ 25UHN404/ 25UFR404	Tamil Paper – IV / Hindi Paper – IV/ French Paper – IV	5	-	-	3	25	75	100	3
II	25UEN4C4	Communication Skills - IV	6	-	-	3	25	75	100	3
III	25UCY405	CC IV :Inorganic, Organic and Physical Chemistry	4	-	1	3	25	75	100	5
	25UCY406	CC Lab - II :Volumetric, Organic Qualitative Analysis and Organic Preparations	-	3	-	6	40	60	100	5
	25UCY4A5	GE – IV Allied : Physics for Mathematics & Chemistry II	5	-	-	3	25	75	100	4
	25UCY4A6	GE Lab - II Allied : Physics Lab for Mathematics & Chemistry	-	3	-	3	40	60	100	2
IV	25UAP4S1/ 25UCY4S2	SEC II : Naan Mudhalvan : Quantitative Aptitude/ Interview Readiness	1	-	-	2	-	50	50	2
	25UCY4N1/ 25UCY4N2	Non Major Elective - II : Textile Chemistry / Non Major Elective - II : Food Science and Technology	2	-	-	2	-	50	50	2
	25HEC404	Human Excellence - Social Values & Indian Yoga Practice – IV	1	-	-	2	20	30	50	1
V		Extension Activities - Annexure – I	-		-	-	-	50 [#]	25	1
EC	25CMM403	IKS : Manaiyiyal Mahathuvam – III	1	-	-	2	-	50	50	Grade
	25CUB403	IKS : Uzhavu Bharatham – III	1	-	-	2	-	50	50	Grade
	25UCY4VA	VAC-II: Chemistry in Every Day Life			30					2*
Total			30						775	28

EC – Extra Credic Course / Certificate Course / Co-scholastic Course / Job Oriented Course; SEC – Skill Enhancement Course

CC – Core Course; GE – General Elective; VAC – Department Specific Value Added Course; * Extra Credits; [#] 50 Marks reduced to 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	25UCY507	CC V : Coordination and Bioinorganic Chemistry	4	-	1	3	25	75	100	4
	25UCY508	CC VI : Organic Chemistry – I	5	-	1	3	25	75	100	4
	25UCY509	CC VII : Electrochemistry	4	-	1	3	25	75	100	4
	25UCY510	CC - VIII : Dye Chemistry	4	-	1	3	25	75	100	4
	25UCY5E1/ 25UCY5E2/ 25UCY5E3	DSE - I : / Analytical Chemistry – I DSE - I : / Pharmaceutical Chemistry - I DSE - I : Leather Chemistry	4	-	-	3	25	75	100	4
	25UCY511	CC XII : Internship	-	-	-	-	25	75	100	2
	25UCY615	CC Lab - III : Gravimetric Analysis and Physical Chemistry Experiments	-	6	-	-	-	-	-	-
IV	25UCY5S1/ 25UCY5S2	SEC- III : The Indian knowledge system in chemistry SEC- III : Nano Chemistry	2	-	-	2	-	50	50	2
	25HEC505	Human Excellence - National Values & Indian Yoga Practice – V	1	-	-	2	20	30	50	1
EC	25GKL501	General Awareness - Self Study	SS			2	-	50	50	Grade
	25CSD501	Soft Skills Development – I	-		-	-	-	-	-	-
	25UCY5AL	Advanced Learner Course – I: Environmental Chemistry (Optional) Self Study	SS	-	-	2	25	75	100	4*
Total			30						700	25

EC – Extra Credic Course / Certificate Course / Co-scholastic Course / Job Oriented Course; SEC – Skill Enhancement Course

CC – Core Course; DSE – Discipline – Specific Elective; VAC – Department Specific Value Added Course; * Extra Credits

ALC – Advanced Learner Course (Optional), SS – Self Study

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	25UCY612	CC IX : Physical Methods and Chemical Structure	5	-	1	3	25	75	100	4
	25UCY613	CC X : Organic Chemistry – II	4	-	1	3	25	75	100	4
	25UCY614	CC XI : Chemical Kinetics and Quantum Mechanics	4	-	1	3	25	75	100	4
	25UCY6E4 / 25UCY6E5/ 25UCY6E6	DSE - II: Polymer Chemistry DSE - II: Biochemistry DSE - II: Industrial Chemistry	4	-	1	3	25	75	100	4
	25UCY6E7 / 25UCY6E8 / 25UCY6E9	DSE - III : Analytical Chemistry – II DSE - III: Pharmaceutical Chemistry II DSE- III : Agricultural Chemistry and Analytical Techniques for Agrochemicals	4	-	-	3	25	75	100	4
	25UCY615	CC Lab - III : Gravimetric Analysis and Physical Chemistry Experiments	-	6	-	6	40	60	100	6
IV	25UCY6S1/ 25UCY6S2	SEC - IV : Green Chemistry / Clean Energy	2		-	2	-	50	50	2
	25HEC606	Human Excellence - Global Values & Indian Yoga Practice – VI	1		-	2	20	30	50	1
EC	25CSD602	Soft Skills Development – II	-		-	-	-	-	-	Grade
	25UCY6AL	Advanced Learner Course - II: Applications of Spectroscopy (Optional) Self Study	-		-	3	25	75	100	4*
Total			30						700	29

EC – Extra Credic Course / Certificate Course / Co-scholastic Course / Job Oriented Course; SEC – Skill Enhancement Course

CC – Core Course; DSE – Discipline – Specific Elective; VAC – Department Specific Value Added Course; * Extra Credits

ALC – Advanced Learner Course (Optional), SS – Self Study

Grand Total = 3900; Total Credits = 141

Question Paper Pattern (Based on Bloom's Taxonomy)

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

1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 -10)	A (Q1 – 5 MCQ) (Q6–10 Define/Short Answer/MCQ)	$10 * 1 = 10$	MCQ /Define	75
K3 (Q11-15)	B (Either or pattern)	$5 * 5 = 25$	Short Answers	
K4 & K5(Q16 – 20)	C (Either or pattern)	$5 * 8 = 40$	Descriptive/ Detailed	

2. Theory Examinations: 50 Marks (2 Hours Examination) (Part IV)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1-10)	A (Q1 – 5 MCQ) (Q6–10 Define / Short Answer)	$10 * 1 = 10$	MCQ / Define	50
K3, K4 & K5 (Q11-15)	B (Either or pattern)	$5 * 8 = 40$	Short Answers	

3. Practical Examinations: D1, D2, D3 & Allied Practicals

Paper	Maximum Marks	Marks for		Components for CIA		
		CIA	CEE	Model	Skilled	Record Note
Practical (Core / Elective)	100	40	60	20	10	10

4. Project/ Internship:

Paper	Maximum Marks	Marks for		
		CIA	CEE	
			Evaluation	Viva-voce
Project	100	25	50	25

* CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

Components of Continuous Internal Assessment (CIA)

THEORY

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Test 1	75	(75+75+15+10)/7	25
Test 2 / Model	75		
Assignment / Digital Assignment	15		
Others*	10		

*Others may include the following: Seminar / Socratic Seminars, Group Discussion, Role Play, APS, Class participation, Case Studies, Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

INTERNSHIP

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75

Components		Calculation	CIA Total
Identify the research problem and literature survey (Review I)	5	05+05+05+10	25
Experimental Design and work (Review II)	5		
Data analysis and Interpretation (Review III)	5		
Report Submission (Rough Draft)	10		

** 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
8-10	5-7	3-4	0-2

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as an interesting story in a logical, easy-to-follow sequence	Information presented in logical sequence; easy to follow	Most of the information is presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of the 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 a grasp of information; answered only rudimentary Questions & Material not clearly related to the topic OR background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain the 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 the audience	Refers to slides to make points; eye contact the majority of the 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 The voice is clear and steady; the audience can hear well at all times	Incorrectly pronounces a few terms Voice is clear with few fluctuations; the 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
13-15	10-12	7-9	4-6	0-3

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 the writing is interesting	Hits in basic content and writing are 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 the topic * Words convey intended message	* Word choice is basic * Most writing language is appropriate to the topic * Informal language	* Word choice is vague * Writing language is not appropriate to the 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 Internship

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

- ❖ The minimum period of study is for 4 weeks.
- ❖ 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 interested student can undergo internship individually.
- ❖ A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report.
- ❖ Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- ❖ The report constitutes 100 marks, out of which 25 is Internal and 75 is External Marks.

Mark Split Up

Internal	External	Total
25	75	100

S. No	Internal Components	Marks
1	Review – I	5
2	Review – II	5
3	Review – III	5
4	Rough Draft Submission	10
Total		25

Review I:

- * Identify the research problem and literature survey

Review II:

- * Experimental design and work

Review III:

- * Data analysis and Interpretation

S. No	External Components	Marks
1	Report submission	50
2	Presentation	10
3	Viva –voce	15
Total		75

HEALTH AND WELLNESS COURSE

Scheme of Evaluation

Part	Description	Marks
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
	Total	100*

*100 Marks reduced to 25 Marks

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FIRST
SEMESTER

Programme Code:	B.Sc			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY101			Title	Batch:	2025 – 2028
				CC 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. <i>Hydrogen bonding-concept, types and applications - melting and boiling points of hydrides of nitrogen, Oxygen, Fluoride and Lesser density of ice.</i> Intermolecular forces – London forces and van der Waals forces – ion dipole-dipole interactions.	20
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. Types of reaction involving	18

	intermediates - Addition reaction, Substitution reaction, Elimination reaction and Rearrangement reactions (Only one example for each type) 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, sulphuric acid, hydroboration. Oxidation by alkaline KMnO₄ 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 dehydrohalogenation, 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_N¹ 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 –Annulene, 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.	16
	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	Morrison. 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. Indumathy Ramasamy Dr. N. Neelakandeswari Mr. K. Pradeep Signature:	Name: Dr. Indumathy Ramasamy Signature:	Name: Mr. K. Srinivasan Signature:	Name: Mr. K. Srinivasan Signature:



Programme Code:	B.Sc			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY202			Title	Batch:	2025– 2028
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	1	CC II : Organic and Physical Chemistry	Semester:	II
					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 classification and properties of fertilizers	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	M	M	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. Dicarboxylic acids: Preparation and properties of oxalic, malonic, succinic and phthalic acids. 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. <i>Manufacture of ethanol from molasses. Absolute alcohol, methylated spirit and power alcohol.</i>	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, NaHSO₃ and NH₃. Addition with NH₂-NH₂, C₆H₅NHNH₂ 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, SeO₂ and Oppenauer oxidation. 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.	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 -Sommerfeld 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 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 C_p and C_v . 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. Comparison 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	Morrison. 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY203	Title	Batch:	2025–2028
		CCLab – I:Inorganic	Semester:	II
Lecture Hrs./Week	3	Qualitative Analysis	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.,Veeraraswamy. 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	7 th Edn.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	Ramanujam V.V.	Inorganic semi micro qualitative analysis	3 rd 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

THIRD
SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY304			Title	Batch:	2025 – 2028
				CC III :Inorganic and Physical Chemistry	Semester:	III
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	2		Credits:	5

Course Objective

To impart knowledge on basic metallurgical process, alloys, fuels and fertilizers and to expound conceptions on thermodynamics of solutions, phase equilibria 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 understand the basic principles involved in volumetric analysis.	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	M	H	H	H	H	M	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 $(\text{NH})_4\text{MoO}_4$. Alloys: Preparation, properties, composition and uses of some important alloys of Al, Ni, Sn and Pb.	19
Unit II	Volumetric analysis: Principle, Preparation of standard solutions, primary and secondary standard substances, Types of titration and Principles of different types of titrations – Acid base titration (Strong acid – strong base, weak acid – strong base only), Precipitation titration, complexometric titration and redox titration). 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.	17
Unit III	Thermodynamics: Chemical potential -Gibbs – Duhem equation, variation of chemical potential 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 K_p and K_c. 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. Le Chatelier's principle: Application to synthesis of ammonia.	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.	18

	Two component system: Construction of phase diagram by thermal analysis. Simple 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	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. 1 st Edition. Dalal Institute	2018
2	Soni. P.L., Soni.	Text book of Inorganic Chemistry	20 th revised Edition. New Delhi: Sultan Chand & Sons.	2017

3	P.L. and Dharmarha. O.P.,	Text book of Physical Chemistry	23 rd revised Edition. New Delhi:Sultan Chand &Sons	2016
4	Moudgil. H.K.,	Text Book of Physical Chemistry.	2 nd Edition. NewDelhi:PHI learning Pvt. Ltd	2015
5.	A.S.Negi and S.C. Anand	A Text Book of Physical Chemistry.	Reprint 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY3N1	Title	Batch:	2025 – 2028
		Non Major Elective - I	Semester:	III
Lecture Hrs./Week	2	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	3 rd 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	5 th 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	ImperialCollegePress.	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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY3N2	Title	Batch:	2025 – 2028
		Non Major Elective – I	Semester:	III
Lecture Hrs./Week	2	Chemistry of Consumer Products	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 formulation 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

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

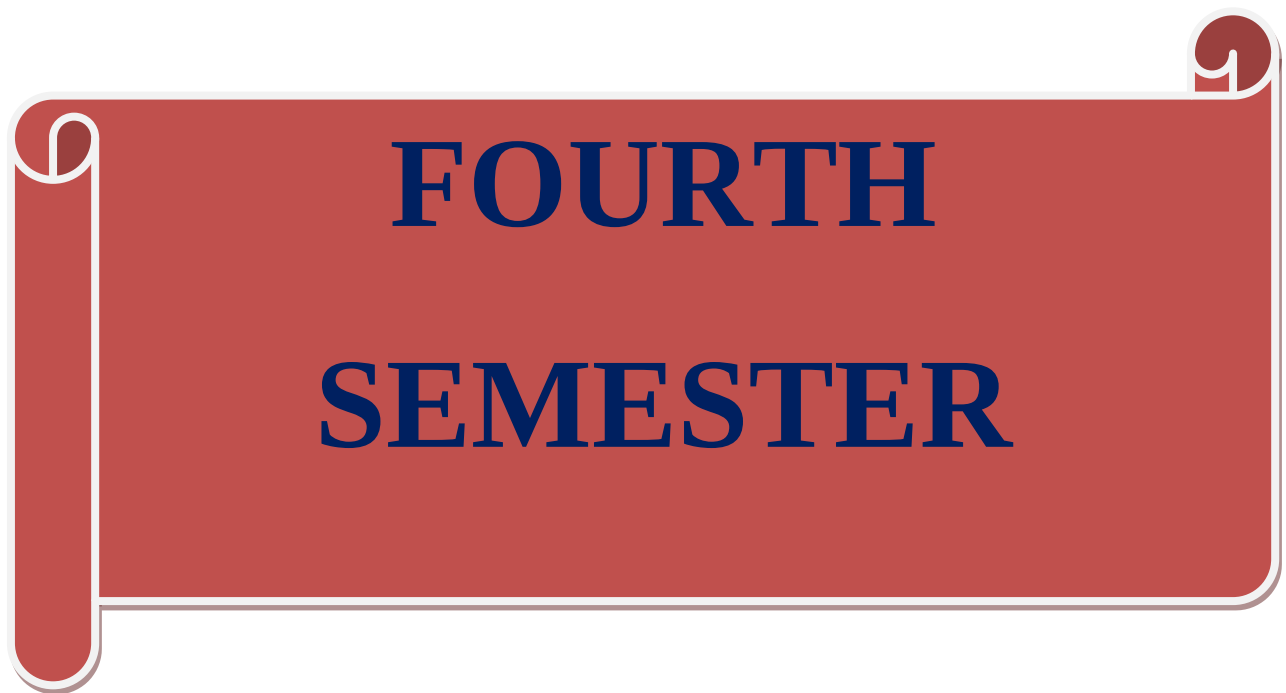
Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Swarnlata Saraf, Shailendra Saraf	Cosmetics: A Practical Manual	3 rd Edn., Bsp Books Pvt. Ltd.	2015
2	P. K. Chattopadhyay	Soaps, Detergents and Disinfectants Technology Handbook	2 nd Edn., NPCS Publication Division.	2019
3	Ajay Kumar Gupta	Soaps, Detergents and Disinfectants Technology Handbook	3 rd 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	4 th Edn, Allured Pub Corp.	2008
2	B. K. Sharma	Industrial Chemistry	19 th Edn., Krishna Prakashan Media P. Ltd	2016
3	Amol A Kulkarni, Vikram Gharge, Indrajeet D Gonjari	Cosmetic Science	1 st Edn., NiraliPrakashan.	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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:



FOURTH SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY405			Title	Batch:	2025 – 2028
				CC IV :Inorganic, Organic and Physical Chemistry	Semester:	IV
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	1		Credits:	5

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.	15
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).	15
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	15
Unit IV	Thermodynamics of Solutions: Nernst distribution law thermodynamic derivation, application to association of benzoic acid and study of $\text{I}_2 + \text{I}^- \rightleftharpoons \text{I}_3^-$. Types of solutions: Solution of liquids in liquids. Ideal solution. Raoult's law, Henry's	15

	law (Statement only). Non-ideal solution-deviation from Raoult's law. Duhem – Margules equation. Fractional distillation of binary liquid solution and azeotropes, Distillation of immiscible liquids: steam distillation. Phase equilibria between condensed phases: Partially miscible liquid system-phenol-water, triethylamine–water and nicotine–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- <i>Application of isotopes in chemistry, agriculture and medicine.</i>	15
	Total Contact Hrs	75

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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY406	Title	Batch:	2025 – 2028
		CC Lab – II:	Semester:	IV
Practical Hrs/week	3	Volumetric, Organic Qualitative Analysis and Organic Preparations	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 Ferrousion. 2. Estimation of Oxalicacid. 3. Estimation of Sodiumnitrite. b) Dichrometry: 1) Estimation of Ferrous ion using internalindicator. 2) Estimation of Ferric ion using externalindicator c) Iodometry: 1) Estimation of Copper.(Demonstrationonly) 2) Estimation of Potassiumdichromate. d) EDTA-Titrations: 1) Estimation ofCalcium. 2) Estimation ofZinc. 3) Estimation ofMagnesium. 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, Esters 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	2 nd 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY4N1	Title	Batch:	2025 – 2028
		Non Major Elective - II	Semester:	IV
Lecture Hrs./Week	2	Textile Chemistry	Credits:	2

Course Objective

To develop basic awareness 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	3 rd Edn., CRC Press.	2006
2	HVS. Murthy	Introduction to Textile Fibres	1 st Edn.,Nabu Press	2016
3	PadmaS.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	1 st 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,	2 nd 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY4N2	Title	Batch:	2025 – 2028
		Non Major Elective - II	Semester:	IV
Lecture Hrs./Week	2	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 adulteration	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 flavouring 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	1 st Edn., Elite Publishing House.	2014
2	Sunil Natha Mhaske	Essentials of Nutrition	1 st Edn, CBS Publication	2015
3	Fellows P.J	Food Processing Technology: Principles and Practice	4 th 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:



FIFTH SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY507			Title	Batch:	2025 – 2028
Lecture Hrs./Week	4	Tutorials/ Sem	1	CC V:	Semester:	V
				Coordination and Bioinorganic Chemistry	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 Bjerrum's method	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, Jahn 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 Bjerrum'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	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. Bioinorganic chemistry: Metals in biology-bulk and trace metals- Metalloporphyrins, Structure and Biological role of hemoglobin and Myoglobin. Metallo enzymes- Enzyme action -sodium and potassium ion pump.	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	20 th 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	33 rd Edition. Milestone Publishers and Distributors	2016
2	Gopalan. R. and RamalingamV	Concise Coordination Chemistry.	Vikas Publishing house. 3 rd Edition	2008
3	Lee. J.D	Concise Inorganic Chemistry	5 th Edition. London: Black Well Science Ltd	2006

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY508			Title	Batch:	2025 – 2028
				CC VI :	Semester:	V
Lecture Hrs./Week	5	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.	15
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.	15
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)	15
Unit IV	Alkaloids: Definition, occurrence and extraction of alkaloids from plants. General methods of determining structure. Determination of structure and synthesis of Coniine, Piperine, Papaverine and Nicotine.	15
Unit V	Terpenoids: Classification, isoprene rule, special isoprene rule and Gemdialkyl rule, Extraction from plants, structural elucidation and synthesis of Citral, Camphor, α - terpineol and Menthol.	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.	Finar, I.L.	Organic Chemistry- Volume II.	Pearson Education, 5 th edn,	2011
2.	Arun, B and Bahl, B.S.	Advanced Organic Chemistry	S. Chand & Co. 5 th 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. 42 nd edn.	2013
3.	Agarwal, O.P.	Organic Chemistry-Natural Products Vol.II.	Meerut:Goel Publishing House. 41 st edn.	2014
4.	Bansal, R. K.	Heterocyclic Chemistry: Syntheses, Reactions and Mechanisms.	New Age International Publishers. 3 rd 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY509			Title	Batch:	2025 – 2028
				CC 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 K_h , K_w 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
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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	44 th 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	35 th Edn. GOEL Publishing House	2014
3	John.O.M. Bockris & A.K.N. Reddy	Modern Electrochemistry (Vol I & II)	2 nd 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY510			Title	Batch:	2025 – 2028
				CC 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 of various azo and nitro dyes	K2, K4
CO3	Utilize the classification, preparation and uses of some important phenyl methane dyes	K3
CO4	Analyze the various anthraquinone 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 fibres	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 – Alizarin 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

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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UCY5E1	Title	Batch :	2025 – 2028
		DSC – I :	Semester	V
Hrs/Week:	4	Analytical chemistry- I	Credits:	4

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 of modern analytical tools such as TGA and DTA	K2, K3
CO3	Have knowledge on application of Polarimetry, Nephelometry and Turbidimetry	K2, K4
CO4	Acquire knowledge and analyze analytical tools like polarography 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 salicylaldehyde.	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. Nephelometry 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. 4 th Edition.	2020
2	Gurdeep R Chatwal Sham K. Anand	Instrumental Methods of Chemical Analysis	Himalaya publishing House. 5th Edition.	2014
3	Arthur. I. Vogel	Inorganic Quantitative Analysis.	4 th Edition. Longmans	1978

Reference Books

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

Programme Code:	B.Sc.	Programme Title:	Bachelor of chemistry	
Course Code:	25UCY5E2	Title	Batch:	2025 – 2028
		DSC – I : Pharmaceutical Chemistry-I	Semester:	V
Lecture Hrs./Week	4		Credits:	4

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	<u>Pathania J S.</u>	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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY5E3	Title	Batch:	2025 – 2028
		DSE – I : Leather Chemistry	Semester:	V
Lecture Hrs./Week	4		Credits:	4

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 its 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 physico-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 tannageinvolving 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 auxiliaries such as levelling, wetting and dispersing agents-Dye fixations.	12
Unit V	Animal Wastes and Treatment Processes: Animal by-products - their collection, handling and preservation methods (such as hair, blood, bones, glands, Keratinous 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
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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	16 th 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.	14 th 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	1 st 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UCY5S1	Title	Batch :	2025 – 2028
		SEC-III The Indian knowledge system in chemistry	Semester	V
Hrs/Week:	2		Credits:	2

Course Objective

To introduce students to the key concepts of Indian Chemistry, including Rasashastra, metallurgy, Ayurvedic chemistry, and alchemy, and their applications.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the origins of Indian chemistry and significance of Rasashastra	K1
CO2	Explain the integration of chemistry with Ayurveda, alchemy, and philosophy.	K2
CO3	Apply ancient practices in the context of modern chemistry, material science, and medicinal chemistry.	K3
CO4	Explain the integration of mind, body, and matter in chemical processes according to Indian thought..	K2
CO5	Apply knowledge of chemical properties in evaluating the effectiveness of Rasas (mercury compounds) in healing practices..	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
I	Introduction to Indian Chemistry and Rasashastra- The concept of Rasa Vidya (Science of Transmutation). Rasashastra texts: Rasa Ratnakara, Bower Manuscript. The role of metals and minerals in Ayurveda. Rasayana: Rejuvenation and the use of metals in medicinal compounds. Philosophical foundations: Panchamahabhuta and their role in chemical transformations. Mercury (Rasa) and its significance in Indian alchemy.	5
II	Metallurgy and Alloys in Ancient India-Wootz steel and its role in making Damascus steel.The Iron Pillar of Delhi: Composition and corrosion resistance. Techniques for gold, silver purification, and alloy preparation.Ancient Indian tools for metal extraction from ores.Advanced metallurgical processes: Distillation, calcination, and purification techniques.	5
III	Ayurvedic Chemistry: Medicinal Compounds and Techniques -Role of Bhasmas : Methods of preparation, significance, and chemical properties.Metal-based preparations in Ayurvedic treatments (e.g., Mercury, Gold). Rasas (Mercury compounds) in healing practices.Chemistry of medicinal plants in Ayurveda and their extraction methods.Nanotechnology in Ayurveda: Micronization of medicinal compounds.	5
IV	Alchemy and Nanotechnology in Ancient India -Nanotechnology in the preparation of Bhasmas and its impact on modern pharmacology.Chemical processes for creating fine particles and their medicinal applications.Understanding Siddha Medicine and its use of alchemy.Techniques used by Indian alchemists to manipulate materials at microscopic levels.The concept of Rasa in achieving transformation at the molecular level.	5
V	Philosophical and Scientific Underpinnings of Indian Chemistry- The concept of Panchamahabhuta and how it relates to modern chemical elements. Indian scientific approach: Integration of mind, body, and matter in chemical processes. The Yoga Sutras and its reference to alchemical practices. Role of Brahman (ultimate reality) in understanding the material world and chemical transformations.Intersection of metaphysics and physical sciences in Indian thought.	5
	Total Contact Hrs	30

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	S. R. K. Sharma	Rasashastra: The Alchemy of Ancient India	Chaukhamba Sanskrit Pratishthan, 1st Edition	2005
2	P. C. Roy	History of Hindu Chemistry	Bhartiya Book Corporation, 2nd Edition	2004
3	Vaidya Yadavji Trikamji Acharya	Rasasastra and Bhaisajyakalpana	Chowkhamba Sanskrit Series, 1st Edition	1981

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	K. N. Bahl & Arun Bahl	The Book of Indian Alchemy	Penguin Books India, 1st Edition	1997
2	S. C. Chatterjee	Science and Philosophy in Ancient India	University of Calcutta Press, 1st Edition	1993
3	Vasantikumar S.	Nanotechnology in Indian Alchemy and Ayurveda	Scientific Publishers, 1st Edition	2015

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UCY5S2	Title	Batch :	2025 – 2028
		SEC-III Nano Chemistry	Semester	V
Hrs/Week:	2		Credits:	2

Course Objective

To develop the skill to aesthetically appreciate Nano chemistry

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Learn about the importance and the basic concepts of Nanochemistry	K1
CO2	Acquire knowledge on carbon nano tubes and its various methods of preparation	K2
CO3	Understand the basics of fabrication techniques	K3
CO4	Know about the quantum dots	K2
CO5	Learn the applications of nanomaterials in various fields	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	Nano and nature -Diversity in Nanosystems. Significance of Nanomaterials.Fullerenes-introduction – Preparation by Pyrolysis and purification of fullerenes Chemistry of fullerenes in the condensed phase.	6
Unit II	Carbon Nanotubes- IntroductionW – Preparation by Chemical Vapour deposition and purification– Tungston Sulphide and Titanium dioxide.	6
Unit III	Fabrication techniques, imaging and manipulation tools at the nanoscale- nanoscale Devices and circuits. (e.g.) FETS, Quantum dots.	6
Unit IV	<i>Nano medicine and its importance in medical diagnostics</i> , molecular therapeutics - Nano electronic – Nano optical and Nano chemical.	6
Unit V	Molecular manufacturing – Nano / molecular communication – Nano navigation – Nano scale manipulation and control Nano robots for medical application.	6
	Total Contact Hrs	30

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	Sulbha Kulkarni	Nanotechnology: Principles And Practice	3 rd Edn., Capital Publishing Company	2017
2	T. Pradeep	Nano: The Essentials: Understanding Nanoscience	McGraw Hill India.	2009

		and Nanotechnology		
3	Daniel Ratner and Mark Ratner	Nanotechnology: A Gentle Introduction to the Next Big Idea	5 th 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	ImperialCollegePress.	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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY5AL	Title	Batch:	2025 – 2028
		Advanced Learner Course – I	Semester:	V
Lecture Hrs./Week	Self Study	Environmental Chemistry (Optional)	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 judiciously 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
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.

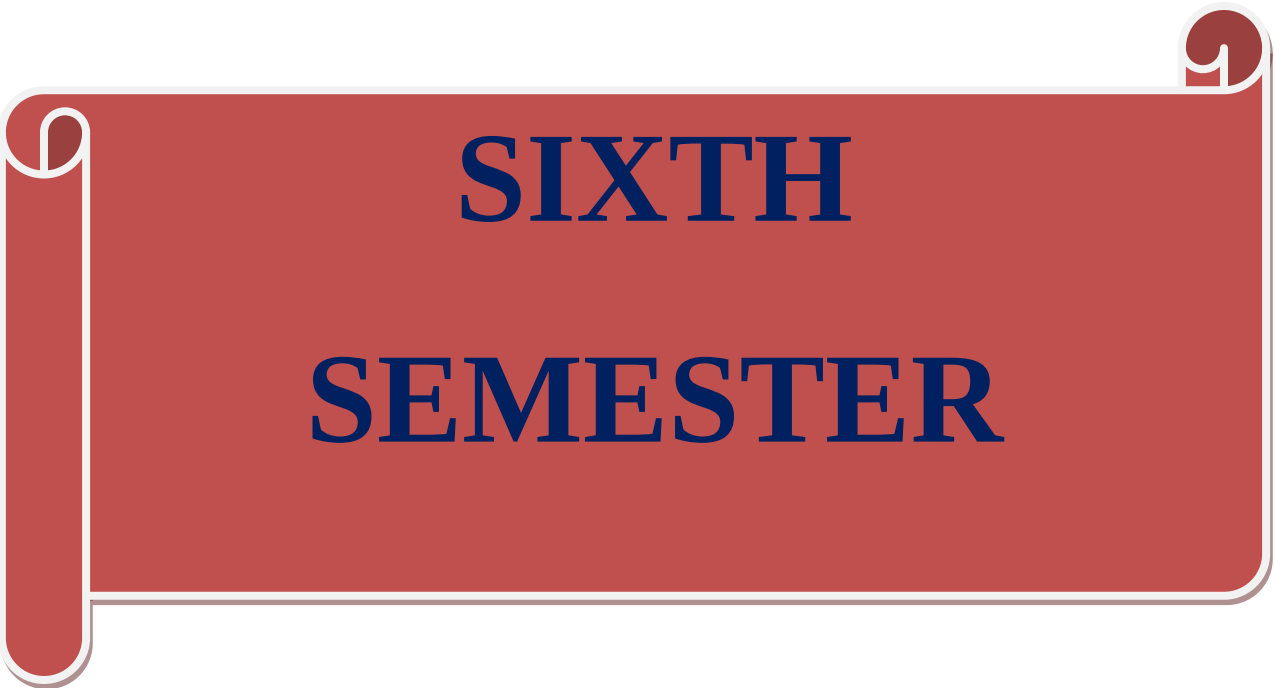
Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Monika Jain and Jain P.C	Engineering Chemistry	17 th Edn., Dhanpat Rai Publishing Company	2019
2	Dana Desonie	Atmosphere: Air Pollution and Its Effects	1 st Edn., Chelsea House Publications	2007
3	Anubha Kaushik	Environmental Science and Engineering	3 rd 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:



SIXTH SEMESTER

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY612			Title	Batch:	2025- 2028
				CC IX: Physical Methods and Chemical Structure	Semester:	VI
Lecture Hrs./Week	5	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.	15
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-Spoooner method of evaluation of dissociation energy from electronic spectra. Woodward Fischer rule for calculation for absorption maxima in dienes.	15
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 CH₃ radical and Mn²⁺ ion.	15
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	15

	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-Scherrer method.	
Unit V	Electrical properties of Molecules: Polar and non-polar molecules, Dipole moment, Meaning of the terms – total molar polarisation, orientation polarisation and distortion polarisation. Effect of temperature on Molar polarization. Determination of dipole moment of polar gas, Application of dipole moment in the study of simple molecules. 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.	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.	Puri, B.R., Sharma L.R., and Pathania, M.S.	Principles of Physical Chemistry.	Vishal Publishing Co. 47 th edn	2017
2.	Sharma, Y.R.	Elementary Organic Spectroscopy	S. Chand & Company Pvt. Ltd. 5 th edn.	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, 4 th edn.	2016
3.	Sharma, B. K	Instrumental Methods of Chemical Analysis.	Goel Publishing House, 24 th 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY613			Title	Batch:	2025 - 2028
				CC X:	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Organic Chemistry - II	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, sulphadru gs , antimalarials, aneas thetics and 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 (Bergmann method).	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. Sulpha drugs: 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	Advanced organic 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY614			Title	Batch:	2025 – 2028
				CC XI :	Semester:	VI
Lecture Hrs./Week	4	Tutorials /Sem	1	Quantum Chemistry and Chemical Kinetics	Credits:	4

Course Objective

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

Course Outcomes

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

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

Mapping with POs / PSOs Vs COs

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

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	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
Unit II	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 order and Zero order reactions. Pseudounimolecular reactions. Half-life time of a reaction – Expressions for $t_{1/2}$ for first, second and nth order reactions. Experimental techniques for measuring reaction kinetics – Volumetry and Polarimetry.	12
Unit III	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. comparison between ARRT and CT.	12
Unit IV	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 V	Photochemistry: Consequence of light absorption – The Jablonski diagram, Laws of Photochemistry - Lambert and Lambert-Beer's laws, Grothus-Draper law, The Stark–	12

	Einstein law of photochemical equivalence, Quantum efficiency and its determination. The photochemical rate law: Kinetics of $H_2 - Cl_2$ reaction, Kinetics of H_2-Br_2 reaction, Comparison of thermal and photochemical reactions. Photosensitization and Quenching, Chemiluminescence. Lasers and their uses (Elementary idea only).	
	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 11 st Edition. Dalal Institute	2018
3	Soni. P.L. and Dharmarha.O.P	Text book of Physical Chemistry	23 rd 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	33 rd Edition. Milestone Publishers and Distributors.	2016
2	Jain. P.C and Monika Jain	Engineering Chemistry	17 th Edition. Dhanpat Rai Publishing Company (P) Ltd.	2015
3	Moudgil. H.K	Text Book of Physical Chemistry	2 nd Edition. Delhi: PHI learning Pvt. Ltd	2015

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY6E4			Title	Batch:	2025 – 2028
				DSE – II :	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: Isotactic, syndiotactic & Atactic. Geometrical isomers. Factors influencing Structural regularity. Ziegler-Natta Catalysts -Bi metallic and Mono metallic mechanisms. Glass transition temperature (T _g) and T _m . Determination of T _g by differential scanning calorimeter. Factors affecting T _g , T _g 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 (case study)- importance of biopolymers. Preparation and Applications of the following polymers: Polyethylene (LDPE & HDPE), P.V.C, Teflon, polystyrene, Nylon-6, Nylon-66, Polyester, Phenol formaldehyde resins, Polymethylmethacrylate, Polyethyleneterephthalate and Polycarbonates.	10
	Total Contact Hrs	60

Pedagogy

Instruction, Digital Presentation, Flipped Class
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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.Billmeyer	Text Book of Polymer Science	2 nd Edn. John Wiley.	2011
2	Gowariker.V.R., Viswanathan. N.V., Jeyadev Sreedhar	Polymer Science	2 nd Edn.New Age International Ltd	2015
3	Sharma B. K.	Polymer chemistry.	4 th 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name:Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY6E5			Title	Batch:	2025 – 2028
				DSE – II :	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Biochemistry	Credits:	4

Course Objective

To learn about composition of Blood, structure and properties of peptides and proteins, biological functions of enzymes, vitamins and hormones and metabolism of lipids.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the relationship between biochemistry and medicine, composition of blood	K2
CO2	Understand the biochemical techniques and types of centrifuge	K2, K3
CO3	Appraise the biological functions of enzymes, vitamins	K4, K3
CO4	Describe the biological functions of hormones	K3
CO5	Acquiring knowledge on metabolism of lipids.	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	H	-	-
CO2	H	H	H	M	M	M	H	M	-	-
CO3	H	H	H	M	M	M	M	M	-	-
CO4	H	H	H	M	M	M	M	H	-	-
CO5	H	H	H	M	M	H	M	M	-	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	Logic of Living Organisms Relationship of Biochemistry and Medicine Blood - Composition of Blood, Blood Coagulation – Mechanism. Hemophilia and Sickle Cell Anaemia, Maintenance of pH of Blood – Bicarbonate Buffer, Acidosis, Alkalosis.	13
Unit II	Biochemical techniques Electrophoresis- principle, factors affecting mobility, instrumentation and applications of paper electrophoresis, agarose gel and SDS-PAGE. Types of centrifuges, Ultracentrifuge- Preparative centrifugation, Differential centrifugation - Separation of cell organelles. Principle, relation between rpm and g, different types of centrifuges and rotors. Principle and description of analytical centrifuge. Determination of molecular weight by sedimentation velocity method.	12
Unit III	Enzymes and Vitamins Nomenclature and classification, characteristics, factors influencing enzyme activity – mechanism of enzyme action – Lock and key hypothesis, Koshland's induced fit model. Proenzymes, antienzymes, coenzymes and isoenzymes; allosteric enzyme regulation. Vitamins as coenzymes – functions of TPP, lipoic acid, NAD, NADP, FMN, FAD, pyridoxal phosphate, CoA, folic acid, biotin, cyanocobalamin.	13
Unit IV	Hormones Thyroid hormone - Name and biochemical actions of thyroid hormones and its regulations. Iodine requirement and deficiency of thyroid hormone. Hormones of adrenals - Aldosterone, renin angiotensin system, cortisol, epinephrine and norepinephrine. (physiological and biochemical actions and their deficiencies) Fight or flight response, stress response.	12
Unit V	Lipids Occurrence, biological significance of fats, classification of lipids. Simple lipids —Oils and fats, chemical composition, properties, reactions— hydrolysis, hydrogenation, trans-esterification, saponification, rancidity; analysis of oils and fats – saponification number, iodine number, acid value, R.M. value. Distinction between animal and vegetable fats. Compound lipids —Lipoproteins - VLDL, LDL, HDL, chylomicrons –biological significance. Cholesterol – occurrence, structure, test,	10

	physiological activity. Metabolism of lipids: β -oxidation of fatty acids.	
	Total Contact Hrs	60

Pedagogy

Instruction, Digital Presentation, Flipped Class
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Assessment Methods

Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bahl, B. S.; Bhal, A.	Advanced Organic Chemistry,	3rd ed.; S. Chand: New Delhi,	2003.
2	Jain, M.K.; Sharma, S.C	Modern Organic Chemistry	Vishal Publications: New Delhi	2017
3	Shanmugam, A.	Fundamentals of Biochemistry for Medical Students,	6th ed.; Published by the author	1999.
4	Veerakumari, L.	Biochemistry,	1st ed.; MJP Publications: Chennai,	2004
5	Jain, J. L.;	Fundamentals of Biochemistry	2nd ed.; S.Chand: New Delhi,	1983.
6	Widmaier, E.P., Raff, H. and Strang, K.T. McGraw Hill	Vander's Human Physiology	11th ed., International Publications, ISBN: 978-0-07-128366-3.	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Conn, E. E.; Stumpf, P. K.	Outline of Biochemistry,	5th ed.; Wiley Eastern: New Delhi,.	2002.
2	West, E. S.; Todd, W. R.; Mason, H. S.; Van Bruggen,	J. T. Text Book of Biochemistry	4th ed.; Macmillan: New York,	1970.
3	Lehninger, A. L.	Principles of Biochemistry	2nd ed.; CBS Publisher:Delhi,.	1993
4	Rastogi, S. C,	. Biochemistry,	2nd ed.; Tata McGraw-Hill: New Delhi	2003.
5	Chatterjea, M. N.; Shinde, R.,	Textbook of Medical Biochemistry	5thed.; Jaypee Brothers: New Delhi,	2002.

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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name:Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY6E6			Title	Batch:	2025– 2028
				DSE – II :	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Industrial Chemistry	Credits:	4

Course Objective

To learn about fuels and its types, impart knowledge about preparation of cosmetics and its application , familiarize intellectual property rights.

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 cement, glass and pollution	K2
CO2	Understand and illustrate the preparation of cosmetics	K2,K3
CO3	Gain knowledge on manufacture of sugar and on food preservation processing	K4, K3
CO4	Know about the applications of abrasives, lubricants and paper	K3
CO5	Acquiring knowledge of intellectual property rights	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	Material Science and Industrial Pollution. Mechanical properties of materials and change with respect to temperature. Cement: Types of cement, composition, manufacturing process, setting of cement. Ceramics: Introduction, types, manufacturing processes, applications, Refractory. Glass: Types, composition, manufacture, physical and chemical properties, applications. Industrial pollution: Pollutants and their statutory limits, pollution evaluation methods. Air pollution – various pollutants .Water pollution – organic/inorganic pollutants.	13
Unit II	Cosmetics Skin care: powders, ingredients; creams and lotion-cleansing,moisturising, all purpose shaving cream, sunscreen; make uppreparations. Dental care: tooth pastes – ingredients. Hair care: shampoos-types, ingredients; conditioners-types, ingredients. Perfumes: natural-plant origin-parts of the plant used, chief constituents; animal origin-amber gries, civetone and musk; synthetic-classificationesters-amylsalicylate alcohols-citronellol; terpeneols-gereniol and nerol;ketones-muskone, coumarin; aldehydes-vanilin. Soaps and Detergents Soaps-properties, manufacture of soap-batch process; types-transparent soap, toilet soap, powder soap and liquid soap – ingredients. Detergents-definition, properties-cleansing action; soapless detergentsanionic, cationic and non-ionic (general idea only); uses of detergents as surfactants. Biodegradability of soaps and detergents.	12
Unit III	Sugar Industry Manufacture from sugar cane; recovery of sugar from molasses; testingand estimation of sugar. Food Preservation and processing Food spoilage – causes; Food preservation - methods – high temperature,low temperature, drying, radiation; Food additives – preservatives,flavours, colours, anti-oxidants, sweetening agents; hazards of using foodadditives; Food standards – Agmark and Codex alimentarius.	13

Unit IV	Abrasives Definition, characteristics, types-natural and synthetic; natural abrasives –diamond, corundum, emery, garnet, quartz – composition, uses; synthetic abrasives – carborundum, aluminium carbide, boron carbide, boron nitride, synthetic graphite – composition and uses. Lubricants Definition, classification-liquid, semi-solid, solid and synthetic; properties-viscosity index, flash point, cloud point, pour point, aniline point and drop point; greases properties, types; cutting fluids, selection of lubricants. Paper Industry Manufacture of pulp - mechanical, chemical processes; sulphate pulp, rag pulp; manufacture of paper- beating, refining, filling, sizing, colouring, calendaring; cardboard.	12
Unit V	Cement Industry Cement – types, raw materials; manufacture-wet process, constituent of cement, setting of cement; properties of cement-quality, setting time, soundness, strength; mortar, concrete, RCC; curing and decay of concrete. Intellectual Property Rights Introduction to Intellectual Property Rights – Patents - Factors for patentability - Novelty, Non obviousness, Industrial applications – Patent offices in India: Trademark - Types of trademarks- Certification marks, logos, brand names, signatures, symbols and service marks	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	Sharma, B.K. Industrial Chemistry	Industrial Chemistry	9th ed.; Goel Publishing House:Meerut.	1998
2	Wilkinson, J.B.E. Moore, R.J. Harry's	Cosmeticology	7th ed.; Chemical Publishers : New York	1982
3	Alex V. Ramani,	Food Chemistry.	MJP publishers Chennai,	2009
4	Jayashree Ghosh,	Applied Chemsitry	S. Chand : New Delhi	2006
5	Srilakshmi, B	Food Science	4th ed.; New Age International Publication,	2005

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jain, P.C.; Jain, M.	Engineering Chemistry,	16th ed.; Dhanapet Rai:Delhi,.	1992
2	George Howard,	Principles and Practice of Perfumes and Cosmetics,	Stanley Therones, Cheltenham: UK	1987
3	Thankamma Jacob,	Foods, Drugs and Cosmetics - A Consumer Guide,	Macmillan : London,	1997
4	ShankuntalaManay, N.; Shadaksharaswamy, M.	Food Facts and Principles,	3rd ed.; New Age Publication,	2008.
5	Neeraj Pandey, KhushdeepDharni,	Intellectual Property Rights,	PHI Learning	2014.

Programme code:	B.Sc.	ProgrammeTitle :	Bachelor of Chemistry	
Course Code:	25UCY6E7	Title	Batch :	2025-2028
		DSC - III : Analytical	Semester	VI
Hrs/Week:	4	Chemistry - II	Credits:	4

Course Objective

To acquire knowledge on basic concepts in separation techniques, various types of titrations, introductory AI tools for chemistry, analysis of contaminants in water, food and to understand the basic principles and instrumentation of UV and IR.

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 basics of AI in Chemistry and its implementation of Environmental monitoring.	K2, K4
CO4	Know about precipitation titrations	K3
CO5	Gain knowledge on Analysis of contaminants in water and food	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	M	M	H	H	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 nonaqueous media.	12
Unit III	Introduction to AI in chemistry: Overview of AI and its relevance to chemistry, Historical content and Future trends, Introduction to AI tools and Platforms (Chemguide, ChemSpider, Chem Sketch), Implementation of AI in Environmental monitoring.	12
Unit IV	Redox Titration: Principle, Different types of Redox Titrations, Redox indicators and choice of redox Indicators. Precipitation Titrations: Titration curves for Argentometric titrations, Effect of concentration on titration curves, Effect of reaction completeness on titration curves, Indicators for Argentometric titrations, Estimation of chlorides by Volhard's Method.	12

Unit V	Analytical method in chemistry: Analysis of water Pollutants- Parameters for Water Analysis: Colour, turbidity, total solids, alkalinity, Silica, Phosphate and different forms of nitrogen. Measurement of dissolved oxygen (DO), Measurement of Chemical Oxygen Demand (COD), Measurement of Biological Oxygen Demand (BOD) and Total organic carbon. Analysis of Phosphorous and potassium, Microscopic Examination of Food, Pesticide analysis of Food Products, Extraction, Purification and analysis of Organophosphates in food and Analysis of insecticide in Milk.	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, 4 th Edition.	2020
2	Chatwal and Anand	Instrumental Methods of Chemical Analysis.	Himalaya publishing House, 5 th Edition.	2014
3	Alka L. Gupta	Analytical Chemistry	Pragati Prakasan	2017
4	Svehla. G	Vogel's Qualitative Inorganic Analysis.	Prentice Hall, 7 th Edition.	1996

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	F.J. Holler and S.R. Crouch	Skoog and West's Fundamentals of Analytical Chemistry	Cengage Learning	2018
2	Usharani. S	Analytical Chemistry	Macmillan India Ltd, 1 st Edition	2000
3	Arthur. I.Vogel	Inorganic Quantitative Analysis	Longman, 4 th 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: Dr. N. Neelakandeswari	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY6E8	Title	Batch:	2025–2028
		DSC - III :	Semester:	VI
Lecture Hrs./Week	4	Pharmaceutical Chemistry-II	Credits:	4

Course Objective

To inculcate the basic knowledge on the preparation, properties and uses of some organic, inorganic and radioactive drugs and understand regulatory affairs, pharmaceutical analysis and cardiovascular 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 and regulatory affairs and ethics.	K4
CO5	Understand cardiovascular drugs.	K3

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	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. 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, Regulatory Affairs and Ethics: Drug approval process (FDA, EMA), Good Manufacturing Practices (GMP), Intellectual Property Rights and patents in pharmaceutical industry, Ethics in clinical trials and research, Legal considerations in pharmaceutical practice.	12
Unit V	Cardiovascular Drugs - Blood-composition - grouping-Rh factor-buffers in blood- Functions of plasma proteins-clotting mechanism-blood pressure. Definition & names of following drugs - Coagulants and anticoagulants- Cardiotonic drugs, Antiarrhythmic drugs, Antihypertensive drugs, Antianginal agents, Vasodilators, Lipids lowering agents, Sclerosingagents.	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	1 st Edn., Elsevier.	2006
2	Gundu Rao. P	Pharmaceutical and Medical Inorganic Chemistry and updated version of Inorganic Pharmaceutical Chemistry	1 st Edn., VallabhPrakashan publisher.	2008
3	Ashutosh Kar	Medicinal Chemistry	NewAge International	2005
4	Chatwal. G.R	Pharmaceutical Chemistry-Inorganic	5 th Edn., Himalaya Publishing House.	2017
5	Atherden L.M	Bentley and Driver's Textbook of Pharmaceutical Chemistry	1 st 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	1 st Edn., Longman Higher Education Publisher.	1994
2	G.Patrick	Medicinal Chemistry	Viva Books(Pvt) Ltd.	2002
3	Abhishek Tiwari, Neeraj Upmanyu, Anup K. Chakraborty	Pharmaceutical Organic Chemistry-I	1 st Edn., NiraliPrakashan 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY6E9	Title	Batch:	2025– 2028
Lecture Hrs./Week	4	DSC - III : Agricultural Chemistry and Analytical Techniques for Agrochemicals	Semester:	VI
			Credits:	4

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, Rodenticides and Herbicides and weedicides	K3
CO4	Know the analysis of agrochemicals by Potentiometry and Electrical conductivity	K4
CO5	Know the application of analytical techniques and regulatory compliance in 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	M	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) Integrated 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: Applications of conductivity measurement in the Analysis of Salinity, Halide and Soil moisture.
Unit V	Applications of Analytical Techniques in Agrochemicals Residue Monitoring: Ensuring agrochemicals like pesticides and herbicides do not exceed permissible levels in food, water, and soil. Quality Control: Ensuring the potency, purity, and stability of agrochemical formulations. Environmental Impact Studies: Monitoring the spread and degradation of agrochemicals in ecosystems. Regulatory Compliance: Ensuring agrochemical products meet the standards set by authorities like the FDA, EPA, or WHO.

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.	2019

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, 2 nd Edition.	2017
2	G.T. Austin	Shreve's Chemical Process Industries.	Mc-Graw-Hill, 5 th Edition.	2017
3	Nyle.C.Bready	The nature and properties of soils.	Pearson Education, 14 th Edition.	2012
4	Louis M.Thompson - and Frederick. R.Troch	Soils and soil fertility.	Oxford University Press Inc. 5 th Edition.	1993

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY615	Title	Batch:	2025– 2028
		CC Lab – III :	Semester:	VI
Practical Hrs./Week	6	Gravimetric Analysis and Physical Chemistry Experiments	Credits:	6

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 solution temperature: a) Phenol – Watersystem. b) Effect of NaCl on C.S.T. (between 1 to 2 %) c) Effect of Succinic acid on C.S.T. (between 1 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 (FeSO₄ xKMnO₄)	
	Total Contact Hrs/semester	90

Pedagogy

Demonstration and individual hands on practical.
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Assessment Methods

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

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Venkateswaran, V.Veerawamy, 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, 8 th 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, 5 th edn.	1989

2.	Yadav, J.B.	Advanced Practical Physical Chemistry	Goel Publishing House	2014
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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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UCY6S1	Title	Batch :	2025– 2028
		SEC –IV	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.	6
Unit II	Twelve Principles of Green Chemistry: Explanation with examples. AwardsforGreen Chemistry.	6
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	6
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.	6
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.	6
	Total contact Hrs/Semester	30

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	Indu 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).	1 st 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.	1 st Edition. Books and Allied (P) Ltd., Kolkata	2014
2	Samuel Delvin	Green Chemistry.	1 st Edition. IVY Publishing House, New Delhi.	2006
3	V.K. Ahluwalia	Green Chemistry (Environmentally Benign)	1 st Edition. Ane Books Pvt.Ltd., New Delhi.	2006
4.	Sankar P. Dev, Nayim Sepay	A Text Book of Green Chemistry	Notion Press	2021

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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UCY6S2	Title	Batch :	2025– 2028
		SEC-IV:	Semester	VI
Hrs/Week:	2	Clean energy	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.	6
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.	6
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.	6
Unit IV	Bio – energy: Biomass, Biogas, Source, Composition, Technology for utilization – Biomass direct combustion – Biomass gasifier – Biogas plant – Digesters – Ethanol production., Bio-Diesel production.	6
Unit V	Tidal, ocean and geothermal energy: Wave energy - converting system. Ocean thermal energy -Open and closed cycles. Geothermal energy sources-utilizations- environmental aspects.	6
	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	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: Dr. N. Neelakandeswari	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY6AL	Title	Batch:	2025 – 2028
		Advanced Learner Course –	Semester:	VI
Lecture Hrs./Week	Self study	II: Applications of Spectroscopy (Optional)	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-yne 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, zero field splitting, Kramer'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, 5 th edn.	S. Chand & Company Pvt. Ltd.	2013

2.	Gurdeep, C.& Anand, S.K.	Spectroscopy. 5 th 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 Morrill, T. C.	Spectrometric identification of organic compounds	Wiley India Pvt. Ltd. 6 th edn.	1991
2.	Kalsi, P.S.	Spectroscopy of Organic Compounds.	New Age International Pvt Ltd Publisher, 6 th edn	2007
3.	Pavia, D.L., Lampman, G.M., Kriz, G.S. and Vyvyan, J.R.	Spectroscopy.	Brooks/Cole, Cengage Learning. 1 st 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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr.K.Srinivasan
Signature:	Signature:	Signature:	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	25UPS3A4/ 25UBY3A4/ 25UZY3A4	GE III - ALLIED : INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - I	3	6	25	75	100	4
IV	25UPS4A5/ 25UBY4A5/ 25UZY4A5	GE IV - ALLIED : INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - II	3	6	25	75	100	4
IV	25UPS4A6/ 25UBY4A6/ 25UZY4A6	GE LAB – II ALLIED : ALLIED CHEMISTRY PRACTICAL	3	2	40	60	100	2

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UPS3A4/ 25UBY3A4/ 25UZY3A4	Title	Batch :	2025-2028
		GE III – Allied:Inorganic, Organic and Physical Chemistry – I	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 H₂, N₂, O₂, F₂. VSEPR Theory – postulates, limitations and applications to BeCl₂, BCl₃, H₂O, NH₃, CH₄, PCl₅ and SF₆ 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 Chloroquine and Pamaquine. 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 and deficiency diseases 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. 1 st Edition. Priya publications.	2005

2	Veeraiyan., V. and Vasudevan, A.N.S	Ancillary chemistry	1 st Edition. Einstein publishing house	2001
3	Yadav, M.S,(2001),Electrochemistry	Electrochemistry	2 nd 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	17 th 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: Dr. M. Selladurai Dr. N. Neelakandeswari	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr.K.Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UPS4A5/ 25UBY4A5/ 25UZY4A5	Title	Batch :	2025-2028
		GE IV – Allied :Inorganic, Organic and Physical Chemistry - II	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 H₂O, 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	1 st Edition. Priya publications.	2005
2	B S Bahl and Arun Bahl	Advanced Organic Chemistry	5th Edition. 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.	1 st Edition. Anmol	2002

			publications Pvt. Ltd.,	
2	Soni, P.L	Text book of Organic Chemistry	29 th edition. Sultan Chand & Sons	2012
3	Lubs, H.A	Chemistry of Synthetic Dyes and Pigments	1 st 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: Dr. M. Selladurai Dr. N. Neelakandeswari	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr.K.Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UPS4A6/ 25UBY4A6/ 25UZY4A6	Title	Batch :	2025-2028
		GE Lab – II Allied : 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	2 nd Edition.Prentice	2014

		analysis part 2.	Hall.	
2	V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu	Basic Principles of Practical Chemistry.	2 nd Edition.New Delhi:Sultan Chand & Sons	2012
3	F. G. Mann. & B. C. Saunders	Practical Organic Chemistry.	4 th Edition.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. 7 th Edition.	2009
3	A.O. Thomas	Practical Chemistry.	Scientific Book Centre, Cannanore,3 rd 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: Dr. M. Selladurai Dr. N. Neelakandeswari	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr.K.Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY3VA1	Title	Batch:	2025 – 2028
		Value Added Course -	Semester:	III
Lecture Hrs./Week	30 Hrs	Pesticide Chemistry	Credits:	2*

Course Objective

This course aims to providing the students toknowledge about the various types of pesticides and their toxicity. To understand the accumulation of pesticides in the form of residues and its analysis. To knowledge on choice of alternate and eco-friendly pesticides.

Course Outcomes

On completion of the course the students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Inculcate about the pesticides and their toxicity with respect to structure and category	K2
CO2	Explain the preparation and property of pesticides	K2
CO3	Investigate the pesticide residues, prevention and care	K3
CO4	Demonstrate the analytical methods of pesticide residues	K1 & K2
CO5	Make awareness to the public on bio-pesticides	K2

Mapping with PO / PSO Vs CO

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

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	Chemistry of Pesticides: Brief introduction to classes of pesticides (Chemical class), structures, chemical names, physical and chemical properties.	6
Unit II	Insecticides: Classification and study with respect to structure, chemical name, physical properties, chemical properties, synthesis, degradation, metabolism, formulations, Mode of action, uses, toxicity.	6
Unit III	Pesticides residues: Pesticide residues in atmosphere- entry into atmosphere, action of pesticides, effects on environments. Pesticides residues in water - entry into water systems, action and effect in aquatic environment.	6
Unit IV	Pesticide Residues analysis: Analysis of pesticides residues- sample preparation, extraction of pesticides residues (soil, water and vegetables/fruits) simple methods and schemes of analysis, multi-residue analysis.	6
Unit V	Biopesticides: Pheromones, attractants, repellents - Introduction, types and application (Trimedlure, Cue-lure, methyl eugenol, N,N- Diethyl-m-toluamide). Iron (II) phosphate, Zinc Phosphide, Bromadiolone.	6
	Total Contact Hrs	30

Pedagogy: Direct Instruction, Digital Presentation and Flipped Class

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

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Handa SK	Principles of pesticide chemistry.	Agrobios (India)	2012
2	Matolcsy G, Nádasz M, Andriska V.	Pesticide chemistry.	Elsevier	1989
3	J. Miyamoto and P. C. Kearney	Pesticide Chemistry Human Welfare and the Environment vol. IV Pesticide Residue and Formulation Chemistry	Pergamon Press	1985

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year of Publication
1	Roy N. K	Chemistry of Pesticides	CBS Publisher & Distributors PLtd; 1 st Ed.	2010
2	Nollet L.M., Rathore H.S	Handbook of pesticides: methods of Pesticide residues analysis.	CRC Press	2016
3	Ellerbrock R.H.	Pesticide Residues: Significance, Management and Analysis	Studium Press	2005

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	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr.K.Srinivasan
Signature:	Signature:	Signature:	Signature:

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	25UCY4VA2	Title	Batch :	2025– 2028
		Value Added Course -	Semester	IV
Hrs/Week:	30 Hrs	Chemistry in Every Day Life	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.	7 th 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: Dr. M. Selladurai	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr.K.Srinivasan
Signature:	Signature:	Signature:	Signature:

ProgrammeCode:	UAP			ProgrammeTitle:	B.A., / B.Sc., / B. Com.,	
CourseCode:	25UAP4S1			Title	Batch:	2025-2028
				SEC II: Naan Mudhalvan: Quantitative Aptitude	Semester:	IV
LectureHrs./Week or PracticalHrs./Week	2	Tutorial Hrs./Sem.	5		Credits:	2

Course Objective

- To enable the students to refine their mathematical, logical, and analytical skills.
- The student will be able to answer real-life simple problems by using HCF and LCM.
- The student is able to apply the correct sequence of operations to find out the value of a given mathematical expression.
- The student will be able to solve the problem involving square roots, cube roots, and average.
- To make them prepare for various public and private sector exams and placement drives.
- To understand the functions of tableau for data process and deploy dashboard.

Course Outcomes

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

CO Number	CO Statement	Knowledge
CO1	To have fundamental knowledge of Mathematics about problems of numbers using Mathematical formulae.	K1
CO2	To understand the concepts of profit & loss related processing, simplification, etc.,	K2
CO3	To apply the formulae to real time problems on probability, Areas of surfaces and apply data visualization tool for any data set.	K3
CO4	To analyze the problems solving related to Age, Time and Distance and Time and Work etc. To examine their employability skills.	K4

CO5	Use their logical thinking and analytical abilities to evaluate puzzle and decision making related questions from company specific and other competitive tests / To critically evaluate numerous possibilities related to puzzles.	K5
	To develop their Competitive skills and improve the decision-making skills. To generate analytical reports and presentations using Data Interpretation.	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	M	L	H	M	M	M	M	M	M
CO2	H	L	H	M	M	M	L	M	M	M	M	M
CO3	H	H	M	M	L	H	H	H	L	H	M	H
CO4	H	M	H	H	H	M	H	H	H	H	L	H
CO5	M	M	L	H	M	H	M	M	M	M	H	M

*H-High;M-Medium;L-Low

Units	Content	Hrs
UnitI	Numbers-HCF And LCM of Numbers-Decimal Fractions- Comparison of Fractions - Simplification- Square Root and Cube Roots – Average.	6
UnitII	Time and Work - Time and Distance – Mixtures or Allegations - Problems on Numbers - Problems on Ages –Percentage - Profits and Loss.	6
Unit III	Ratio and Proportion - Time and Work - Time and Distance - Simple Interest - Compound Interest - Area-Volume and Surface Area.	6
UnitIV	Permutation and Combination - Probability, Height and Distances - Boats and Streams - Odd Man Out &Series.	6
UnitV	Interpretation: Tabulation, Bar Graphs, Pie Chart, Line Charts.	6
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

TextBook

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	R.S. Aggarwal	Quantitative Aptitude for Competitive Examinations	S.Chand & Company Ltd., New Delhi.	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dinesh Khattar	The Pearson Guide to Quantitative Aptitude for Competitive Examinations	Pearson's Publications, New Delhi. 2 nd Edition	2013
2	Praveen R.V	Quantitative Aptitude and Reasoning	PHI Learning Pvt. Ltd., New Delhi. 3 rd Edition.	2016
3	Rajesh Varma	Fast Track Objective Arithmetic	Arihant Publications India Limited, New Delhi	2018
4	Abhijit Guha	Quantitative Aptitude for Competitive Examinations	McGraw Hill Education (India) Private Limited. 7 th Edition	2020
5	Sarvesh K Verma	Quantitative Aptitude Quantum CAT	Arihant Publications India Limited, New Delhi; Twelve edition	2022

WebReferences

1. https://www.javatpoint.com/aptitude/quantitative
2. https://www.toppr.com/guides/quantitative-aptitude/
3. https://www.tutorialspoint.com/quantitative Aptitude/index.htm
4. https://www.sscadda.com/quantitative-aptitude/
5. https://prepinsta.com/learn-aptitude/
6. https://www.indiabix.com/
7. https://www.icai.org/post.html?post_id=17790
8. https://tnpsc.news/tnpsc-study-materials
9. http://www.kalvisolai.com/p/kalvisolai-tnpsc-study-materials.html
10. https://byjus.com/free-ias-prep/tnpsc-study-material/

CourseDesignedby	Checkedby	Approvedby
NameandSignature	Co-ordinator CDC	COE
Name: Mr.K.Srinivasan & Dr. V. Indhumathi Signature:	Name: Mr.K.Srinivasan Signature:	Name: Mr.K.Srinivasan Signature:

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	25UCY511	Title	Batch:	2025 – 2028
Lecture Hrs./Week	-	CCXII: Internship	Semester:	V
			Credits:	2

Course Objective

To enable the students to acquire knowledge about the qualitative and quantitative analysis, gain awareness about research, exposure to industrial ecosystem and create research aptitude and solving problems.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To understand the importance of qualitative and quantitative analysis	K3
CO2	To analyze the problems existing in the industry	K2, K3
CO3	To understand the problem and trying to find the solution	K4
CO4	To interpret and compare the results	K1, K4
CO5	To interpret the precautionary measures	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
	The second year students should undergo a project work at the end of semester	-

- ❖ The minimum period of study is for 4 weeks.
- ❖ 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 interested student can undergo internship individually.
- ❖ A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report.
- ❖ Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- ❖ The report constitutes 100 marks, out of which 25 is Internal and 75 is External Marks.

Mark Split Up

Internal	External	Total
25	75	100

S. No	Internal Components	Marks
1	Review – I	5
2	Review – II	5
3	Review – III	5
4	Rough Draft Submission	10
Total		25

Review I:

- * Identify the research problem and literature survey

Review II:

- * Experimental design and work

Review III:

- * Data analysis and Interpretation

S. No	External Components	Marks
1	Report submission	50
2	Presentation	10
3	Viva –voce	15
Total		75

Pedagogy

Instruction, Digital Presentation,

Assessment Methods:

Digital Presentation , 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: Dr. Indumathy Ramasamy	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature:	Signature:	Signature:	Signature: