

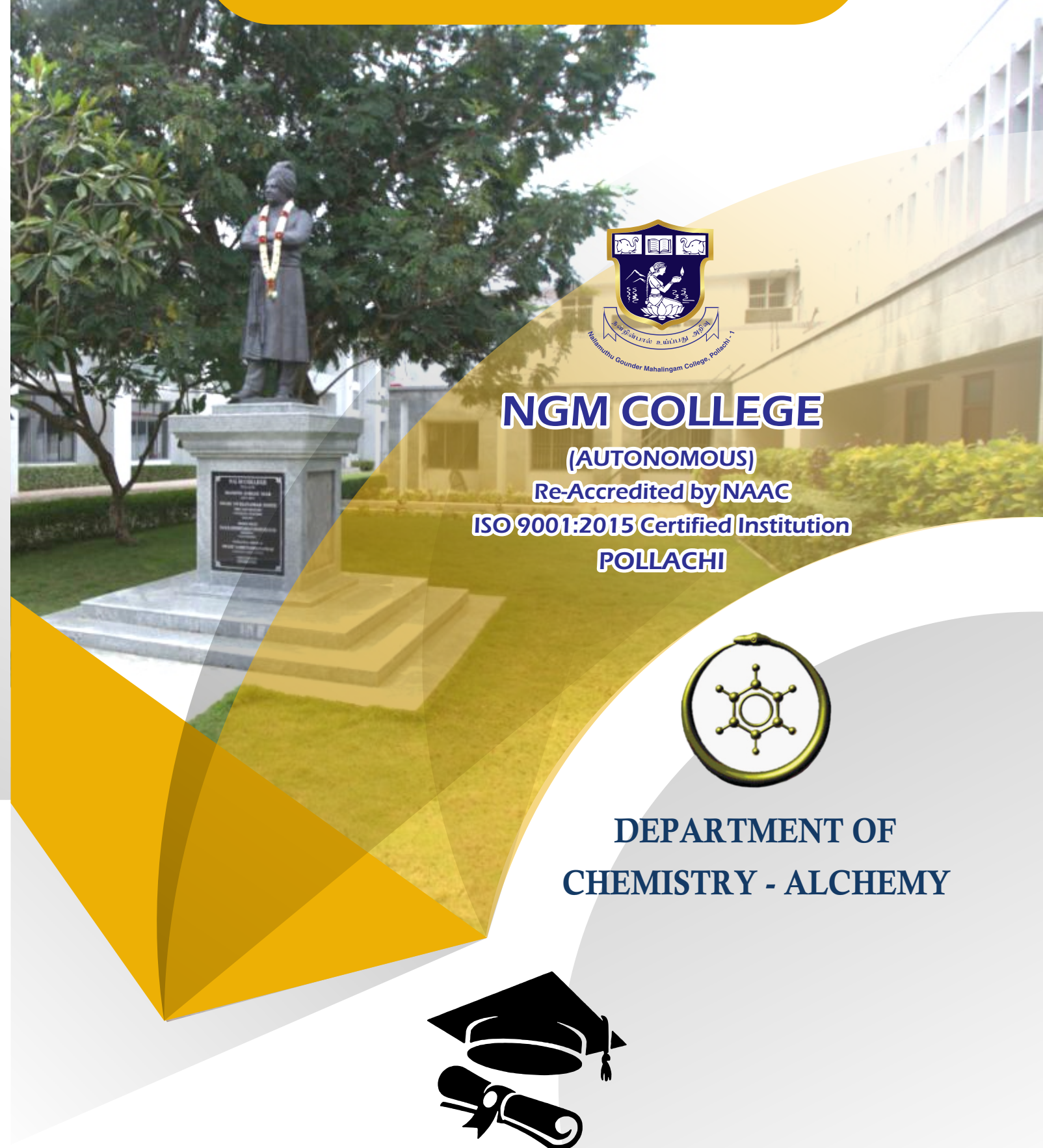


"A College is a temple of wisdom, seed bed of character, model of discipline, training ground of democracy and a nursery of great hearts, strong mind, true faith and willing hands. Hence, education has a pivotal role in harvesting the available resources to contribute to the prosperity of the nation"

- Arutchelvar Dr. N. Mahalingam

Holistic Education for the wholesome development of Human personality for the overall well-being of the Humanity as a whole.

Dr. B. K. Krishnaraj Vanavarayar
President



NGM COLLEGE
(AUTONOMOUS)
Re-Accredited by NAAC
ISO 9001:2015 Certified Institution
POLLACHI



**DEPARTMENT OF
CHEMISTRY - ALCHEMY**



ACADEMIC COUNCIL MEETING

EMPOWER THE YOUTH TO ENRICH THE NATION

11.11.2020

DEPARTMENT OF CHEMISTRY

SYLLABUS 2020-2023

(OUTCOME BASED EDUCATION)

BOARD OF STUDIES 2020

I - VI SEMESTERS



NALLAMUTHU GOUNDER MAHALINGAM COLLEGE

(AUTONOMOUS)

Re-Accredited with 'A' Grade 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)

Scheme of examination

FIRST SEMESTER								
Course Code	PART	Course	Hrs / Week	Hours Exam	Max. Marks		Total Marks	Credits
					Int.	S.E		
20UTL101	I	Tamil / Hindi paper – I	6	3	30	70	100	03
20UEN101	II	Applied English –I	5	3	30	70	100	03
20UCY101	III	Core Paper – I Inorganic and Organic chemistry	7	3	30	70	100	04
20UCY203		Core Practical- I Inorganic Qualitative Analysis	2	--	--	--	--	--
20UCY1A1		Allied Mathematics Paper- I	8	3	30	70	100	04
20UHRI01	IV	Skill Based Elective Human Rights in India	1	2	--	50	50	02
20HEC101		HE – (Personal values & SKY Yoga practice - I)	1	2	25	25	50	01
	V	Extension Activities (NSS, NCC, Sports & Games)						
							500	17

SECOND SEMESTER								
Course Code	PART	Course	Hrs / Week	Hrs/ Exam	Max.Marks		Total Marks	Credits
					Int.	S.E		
20UTL202	I	Tamil paper – II/ Hindi Paper II	6	3	30	70	100	03
20UEN202	II	Applied English – II	5	3	30	70	100	03
20UCY202	III	Core Paper –II Organic and Physical chemistry	6	3	30	70	100	04
20UCY203		Core Practical- I Inorganic Qualitative Analysis	2	3	40	60	100	03
20UCY2A2		Allied Mathematics Paper-II	8	3	30	70	100	04
20EVS201	IV	Environmental studies	2	2	--	50	50	02
20HEC202		HE – (Family values & SKY Yoga practice -II)	1	2	25	25	50	01
	V	Extension Activities (NSS, NCC, Sports & Games						
			600					20

THIRD SEMESTER								
Course Code	PART	Course	Hrs / Week	Hours Exam	Max. Marks		Total	Credits
					Int.	S.E		
20UTL303	I	Tamil paper/ Hindi Paper – III	5	3	30	70	100	03
20UEN303	II	English for Excellence- Paper – I	6	3	30	70	100	03
20UCY304	III	Core Paper – III Inorganic and Physical Chemistry	6	3	30	70	100	04
20UCY406		Core Practical II Volumetric and Organic Qualitative Analysis	3	--	--	--	--	--
20UCY3A1		Allied Physics Paper –I	5	3	30	70	100	04
20UCY4A3		Allied Physics Practical for Mathematics and Chemistry	3	--	--	--	--	--
20HEC303	IV	HE – (Professional values & SKY Yoga practice –III)	1	2	25	25	50	01
20UCY3N1/ 20UCY3N2		Skill Based Non Major ElectiveI Food Science and Technology/ Skill Based Non Major ElectiveI Chemistry of Consumer Products	1	2	--	50	50	02
	V	Extension Activities (NSS, NCC, Sports & Games						
								500
								17

FOURTH SEMESTER								
Course Code	PART	Course	Hrs / Week	Hours Exam	Max. Marks		Total	Credits
					Int.	S.E		
20UTL404	I	Tamil Paper/ Hindi Paper IV	5	3	30	70	100	03
20UEN404	II	English for Excellence Paper –II	6	3	30	70	100	03
20UCY405	III	Core Paper – IV Inorganic, Organic and Physical Chemistry	6	3	30	70	100	04
20UCY406		Core Practical II Volumetric and Organic Qualitative Analysis	3	6	80	120	200	05
20UCY4A2		Allied Physics Paper – II	5	3	30	70	100	04
20UCY4A3		Allied Physics Practical for Mathematics and Chemistry	3	3	40	60	100	04
20HEC404	IV	HE – (Social Values & SKY Yoga practice -IV)	1	2	25	25	50	01
20UCY4N3/ 20UCY4N4		Skill Based Non Major Elective II Water and Water Treatment Processes/ Skill Based Non Major Elective II Diagnostic Chemistry	1	2	--	50	50	02
20UNC401/ 20UNS402/ 20USG403	V	Extension Activities-NCC/NSS/ Sports and Games				50	50	01
			850					27

FIFTH SEMESTER								
Course Code	PART	Course	Hrs / Week	Hrs/ Exam	Max. Marks		Total	Credits
					Int.	S.E		
20UCY507	III	Core Paper – V Coordination and Bioinorganic Chemistry	4	3	30	70	100	05
20UCY508		Core Paper – VI Organic Chemistry- I	4	3	30	70	100	05
20UCY509		Core Paper – VII Electro Chemistry	4	3	30	70	100	04
20UCY510		Core Paper- VIII Dye Chemistry	4	3	30	70	100	04
20UCY5E1		Core Elective I- Analytical Chemistry– I	4	3	30	70	100	05
20UCY615		Core Practical III Gravimetric Analysis and Physical Chemistry	6	--	--	--	--	--
20UCY5S1 / 20UCY5S2	IV	Skill Based Elective –I Network and Information Security/ Skill Based Elective -I Cyber Security-Ethical Hacking	1	2	--	50	50	02
20GKL501		General Knowledge& General Awareness	SS	2	--	50	50	02
20HEC505		HE – (National Values & SKY Yoga practice -V)	1	2	25	25	50	01
							650	28

SIXTH SEMESTER								
Course Code	PART	Course	Hrs / Week	Hrs/ Exam	Max.Marks		Total	Credits
					Int.	S.E		
20UCY611	III	Core Paper – IX Physical Methods and Chemical Structure	4	3	30	70	100	05
20UCY612		Core Paper – X Organic Chemistry-II	4	3	30	70	100	04
20UCY613		Core Paper – XI Chemical kinetics and Quantum mechanics	4	3	30	70	100	05
20UCY614		Core Paper – XII Polymer Chemistry	4	3	30	70	100	05
20UCY6E2		Core Elective II-Analytical Chemistry – II	4	3	30	70	100	04
20UCY615		Core Practical III Gravimetric Analysis and Physical Chemistry	6	6	80	120	200	05
20UCY6S3/ 20UCY6S4	IV	Skill Based Elective –II Green chemistry / Skill Based Elective -II Theory behind practical chemistry	1	2	--	50	50	02
20HEC606		HE – (Global values & SKY Yoga practice -VI)	1	2	25	25	50	01
							800	31
		GRAND TOTAL					3900	140

Bloom's Taxonomy Based Assessment Pattern

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

1. Theory: 70 Marks Part- I, II,III

(i) TEST- I & II andESE:

Knowledge Level	Section	Marks	Description	Total
K1, K2	A(Answer all)	10x1=10	MCQ/Define	70
K3	B (Either or pattern)	5x4=20	Short Answers	
K4& K5	C(Answer 4 out of 6 and Question No. 16 is compulsory, 17-21 Answer any Three)	4x10=40	Descriptive/ Detailed	

2. Theory: 50 Marks Part -IV

Knowledge Level	Section	Marks	Description	Total
K1, K2	A(Answer all)	10x1=10	MCQ/Define	50
K3 K4&K5	B (Answer 5 out of 8)	5 x 8 =40	Descriptive/ Detailed	

3. Practical Examinations Part – III (D1 Core& Allied Practicals)

Knowledge Level	Section	Marks	Total
K3	Practicals & Record work	60	100
K4		40	
K5			

4. Practical Examinations Part – III (D3 Core& D2 CorePracticals)

Knowledge Level	Section	Marks	Total
K3	Practicals & Record work	120	200
K4		80	
K5			

5.Theory - part IV (D3SBE)

Knowledge Level	Section	Marks	Description	Total
K2, K3&K4	Answer any 50	50x1=50	MCQ	50

Components of Continuous Assessment

Components		Calculation	CIA Total
Test 1	70	$\frac{70+70+20+20+20+10}{7}$	30
Test 2	70		
Assignment	20		
Seminar/Tutorial	20		
Knowledge Enhancememnt	20		
Information Acquisition	10		
Total	210		

Components of Continuous Assessment (D3& D2core Practicals)

Components		Calculation	CIA Total
Model	40	40+20+20	80
Skilled	20		
Record	20		

Components of Continuous Assessment (D1 Core & Allied Practicals)

Components		Calculation	CIA Total
Model	20	20+10+10	40
Skilled	10		
Record	10		

Programme Outcomes

The students have to

- PO1** Demonstrate the in-depth knowledge and understanding the scientific principles in chemical science
- PO2** Think intellectually, display professional and practical skills in their career and communicate effectively to the team or society

Programme Specific Outcomes

On successful completion of the programme, the students

- PSO1** have adequate knowledge in the core areas of chemical sciences
- PSO2** understand the underlying principles in every experiment and able to design, carry out, record and analyze the results of chemical experiments carried out in the laboratory
- PSO3** develop critical thinking, problem solving ability and effective oral and written communications
- PSO4** gain exposure and ideas in frontier areas of chemical research
- PSO5** achieve employability in chemical related industries and academic institutions

Head

(Department of Chemistry)

Dr. R. Muthukumaran

(Controller of Examinations)

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY101	Title	Batch :	2020-2023
Hrs/Week:	7	Core Paper – I	Semester	I
		Inorganic and Organic Chemistry	Credits:	4

Course Objective

To enable the students to

- understand basic theoretical concepts on chemical bonding and hybridization
- acquire knowledge on the mechanistic pathway of aliphatic nucleophilic substitutions and aromatic electrophilic substitutions in organic reactions
- gain knowledge on aromaticity

Course Outcome

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

Knowledge Level	CO Number	CO Statement
K4	CO1	interpret the types of chemical bonding present in molecules
K2	CO2	deduce the geometry of the molecules
K2,K3	CO3	understand and apply the concepts in determining the mechanisms of aliphatic nucleophilic substitution reactions
K3, K4	CO4	apply and interpret the factors affecting in determining the orientation and reactivity of substituted benzene

Syllabus

Unit	Content	Hrs
I	Long form of Periodic Table: Main features, advantages and defects. 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- Partial ionic character in covalent bond. Fajan’s rules and their applications in explaining melting points and solubility properties. Co-ordinate covalent bonding: Characteristics. <i>Hydrogen bonding-concept, types and applications - melting and boiling points of hydrides of nitrogen, Oxygen and Fluoride and Lesser density of ice.</i>	19
II	Concept of Hybridization: sp, sp^2 and sp^3 with reference to C_2H_2, C_2H_4 and CH_4. 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. Ozone: Preparation, properties, structure and uses. Ozone depletion: Causes and effects. Sulphur: Peracids of sulphur and Sodium thiosulphate - Preparation, properties, structure and uses.	18

III	ORGANIC CHEMISTRY: 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. Alkenes: Preparations involving dehydrohalogenation, dehydration, reduction of alkynes and Wittig reaction. Mechanism of β-Elimination: 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 KMnO_4 and Ozonolysis.	18
IV	Dienes: 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: SN^1 and SN^2 mechanisms. Effect of structure of substrate, nucleophile and solvent.	18

V	Benzene: Resonance, Resonance energy and structure. Aromaticity: Huckel's rule. Non-benzenoid aromatic compounds. 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.	18
	Total contact hours/Semester	91

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	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	2007
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(s)	Title of the Book	Publisher	Year of Publication
1.	Finar I.L.	Organic Chemistry	Longmans	2006
2.	Morrison. R.T. and Boyd. R.N.	Organic Chemistry	Allyn and Bacon Ltd., NewYork	1976
3.	Wahid U.Malik, G.D, Tuli, and Madan. R.D.	Selected Topics in Inorganic Chemistry	S.Chand & Company, New Delhi	2006

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	H
CO2	M	H	M	H	M
CO3	H	H	H	M	H
CO4	H	M	H	M	M

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.Indumathy Ramasamy	Dr. Indumathy Ramasamy	Mr.K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY202	Title	Batch :	2020-2023
		Core Paper – II	Semester	II
Hrs/Week:	6	Organic and Physical Chemistry	Credits:	4

Course Objective

To make the students to

- acquire knowledge on the mechanisms of naming reactions in carbonyl compounds
- gain knowledge in the synthetic utility of active methylene compounds
- understand basic concepts on quantum mechanics and important laws of thermodynamics

Course Outcome

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

Knowledge Level	CO Number	CO Statement
K1	CO1	recollect the mechanisms of various naming reactions
K2,K3	CO2	understand and apply usage of active methylene compounds in synthesizing different substituted carboxylic acids and ketones
K3	CO3	apply quantum mechanical treatment to sub-atomic particles of atom
K4	CO4	interpret the significance of laws of thermodynamics and its applications in deriving various other laws of physical chemistry

Syllabus

Unit	Content	Hrs
I	Alcohols: General methods of Preparation and its chemical properties. Distinction among primary, secondary and tertiary alcohols. <i>Manufacture of ethanol from molasses. Absolute alcohol, methylated spirit and power alcohol.</i> 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. 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.	16
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 and Reformatsky reactions. Reduction: Wolff-Kishner, Clemmensen, MPV reductions. Reduction with reagents: Lithium Aluminium Hydride and	16

	Sodium Borohydride. Oxidation of aldehydes and ketones using Tollen's reagent, Fehling's solution, SeO_2 and Oppenauer oxidation.	
III	Quantum Theory: Failure of classical theory in explaining the black body radiation. Planck's radiation theory, Quantisation of energy. Einstein's theory of Photoelectric effect. Atomic Structure Rutherford atomic model – Bohr theory of hydrogen atom – Sommerfeld theory - Particle and wave character of electrons. De-Broglie's equation. Davison and Germer experiment. Heisenberg's uncertainty principle - Compton effect. Schrodinger wave equation and significance of Ψ and Ψ^2 (Derivation not required).	16
IV	Thermodynamics: Importance, Limitations and Thermodynamic terms. Types of Thermodynamic equilibrium and processes. First law of Thermodynamics: Law of conservation of energy, internal energy. Enthalpy and Heat capacity: Relation between 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. Joule- Thomson Experiment: Joule-Thomson Effect, Joule – Thomson coefficient for an ideal gas, Inversion Temperature. Zeroth law of thermodynamics. Absolute zero of temperature.	15

V	Second law of thermodynamics: Limitations of First law. Need for Second law of thermodynamics. Various statements of Second law of thermodynamics. Thermo chemistry: Definition – Standard Enthalpy of formation and Enthalpy of neutralization. Bond energy and its applications Measurement of enthalpy of reactions by Bomb Calorimeter. 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 hours/Semester	78

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, Experience Discussion, Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	2007
2.	Soni. P.L	Text book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	2012

3.	Puri B.R.,Sharma L.R and Madan S. Pathania	Principles of Physical Chemistry	Vishal Publishing House	2013
4.	Negi. A.S., and AnandS.C.	A text book of physical chemistry	New Age International PVT Ltd	2009

Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Finar I.L.	Organic Chemistry, Vol.I and II	Pearson Education, Singapore	2003
2.	Soni. P.L. and Dharmarha O.P.	Text book of Physical Chemistry	Sultan Chand & Sons, New Delhi	2005

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	M	H
CO2	M	M	M	H	M
CO3	H	H	M	M	H
CO4	H	M	H	M	M

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.T.Gowrani	Dr.Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY203	Title	Batch :	2020-2023
		Core Practical-I Inorganic Qualitative Analysis	Semester	II
Hrs/Week:	2		Credits:	3

Course Objective

To enable the students to

- gain knowledge in the identification of given two acidic and basic radicals
- develop analytical skill in inorganic qualitative analysis

Course Outcomes

Knowledge Level	CO Number	CO Statement
K3	CO1	To remember the procedure for the analysis of given acid and basic Radicals
K4	CO2	To understand the chemical reactions responsible for the precipitation or other reactions leading to identification of the given radicals
K4	CO3	To apply the theoretical knowledge/concept studied to their practical Sessions

Syllabus

Unit	Content	Hrs
	1. Inorganic mixture analysis a) Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. b) Reactions of the following ions: Lead, Copper, Nickel, Bismuth, Cadmium, Iron, Manganese, Zinc, Calcium, Strontium, Barium, Magnesium and Ammonium. Carbonate, Nitrate, Fluoride, Sulphate, Chloride, Oxalate, Phosphate and Borate.	
	Total hours/Semester	26

Teaching Methods

Lab activity, Quiz, Assignment, Discussions, Demonstration

Text Books for Study

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Venkateswaran, V., Veeraswamy. R and Kulandaivelu. A.R.	Basic Principles of Practical Chemistry	S.Chand Publications, New Delhi	2004

Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Thomas, A.O.,	Practical Chemistry	Scientific Book Center, Cannanore	2003

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	H
CO2	M	H	M	H	M
CO3	H	H	H	M	H

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.T.Gowrani	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY304	Title	Batch :	2020 - 2023
		Core Paper- III Inorganic and Physical Chemistry	Semester	III
Hrs/Week:	6		Credits:	4

Course Objective

To learn the industrial aspects of inorganic materials and thermodynamics of solution

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To remember the basic metallurgical operations for extraction
K2	CO2	To understand the concept of thermodynamics of solution
K3	CO3	To apply the concept of law of mass action to various equilibria
K4	CO4	To acquire knowledge in colligative properties

Syllabus

Unit	Content	Hours
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.	15

II	Fuels: Classification of fuels, calorific value and characteristics of good fuel. Gaseous Fuels: Advantages, Composition and uses of natural gas, water gas, producer gas, oil gas, LPG, CNG and Gobar gas. Liquid fuels: Petroleum-composition and classification. Refining of crude petroleum and uses of various fractions. Anti-Knocking agents, Octane and Cetane numbers. Synthetic Petrol – Catalytic Cracking of Petroleum. Fertilizers: Important nutrients and their functions. Primary and secondary nutrients. Manufacture of urea, ammonium sulphate, super phosphate of lime, triple super phosphate and calcium ammonium nitrate.	16
III	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. 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.	15
IV	Thermodynamics of Solutions: Types of solutions: Solution of liquids in liquids. Ideal solution. Raoult's law, Henry's law (Statement only). Non-ideal solution-deviation from Raoult's law. Duhem – Margules equation. Fractional distillation and azeotropes. Phase equilibria between condensed phases: Partially miscible liquid system-phenol-water triethylamine-water and nicotine-water system. Completely immiscible liquids: steam distillation. Nernst distribution law thermodynamic derivation, application to association of benzoic acid and study of $I_2 + I^- \rightleftharpoons I_3^-$.	16
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	16

	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. Berkeley and Hartley method of determination of osmotic pressure. Abnormal molecular weight and van't Hoff factor.	
	Total contact Hrs/Semester	78

Teaching Methods

Lecture by Chalk and Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri and Sharma and Kalia. K.C.	Principles of Inorganic Chemistry, 31st Edition.	Milestone Publishers and Distributors	2013
2	Soni. P.L.	Text book of Inorganic Chemistry, 20th Edition.	Sultan Chand & Sons	2002
3	Puri, Sharma and Pathania.	Principles of Physical Chemistry, 46th Edition.	Vishal Publishing Co., Jalandar	2013

References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Jain. P.C and Monaka Jain	Engineering Chemistry, 15 th Edition	Dhanpat Rai Publishing Company (P) Ltd.,	2005
2	Soni. P.L. and Dharmarha. O.P	Text book of Physical Chemistry, 7th Edition	Sultan Chand & Sons, New Delhi.	2005

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	H	H	H	M	H
CO4	H	M	M	H	M

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name withSignature	CDC	COE
Dr. M. Selladurai	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY3N1	Title	Batch :	2020-2023
		Non Major Elective- I	Semester	III
Hrs/Week:	1	Food Science and Technology	Credits:	02

Course Objective

To create an awareness regarding food and nutrition.

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To remember the sources of food and its function
K2	CO2	To get the idea about food preservation methods
K3	CO3	To deploy the food adulterants and their effects
K4	CO4	To interpret the functions of food corporation of India

Syllabus

Unit	Content	Hours
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
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

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
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.	2
V	Packaging hazards. Food poisoning and food borne diseases. Food Laws: FSSAI Food Standard: ISI standards and the Agmark standards. <i>Functions of Food Corporation of India.</i>	2
	Total contact Hrs/Semester	13

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Swaminathan M	Essentials of Food and Nutrition, Volume I and II, 2 nd Edition	Ganesh Publishers, Madras	2002
2	Sumati R. Mudambi and Rajagopal M.V	Fundamentals of Foods and Nutrition, 3 rd Edition	Wiley Eastern Ltd., New Delhi	1990

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Jayashree Ghosh	Applied Chemistry, 1st Edition	S.Chand and company Ltd., New Delhi	2006
2	Srilakshmi B	Food Science, Third Edition	New Age International Publishers, New Delhi	2006

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	H	M	M	H	M
CO3	M	H	H	H	M
CO4	H	H	H	H	M

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Selladurai	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY3N2	Title	Batch :	2020-2023
		Non Major Elective- I Chemistry of Consumer Products	Semester	III
Hrs/Week:	1		Credits:	02

Course Objective

To acquire the basic knowledge in consumer product chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recollect the ingredients present in consumer products
K2	CO2	To get the idea about action of soaps and detergents
K3	CO3	To update the knowledge relevant to modern trends in the industry.
K4	CO4	To analyze the hazards of cosmetics

Syllabus

Unit	Content	Hours
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
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
III	COSMETICS: Introduction and classification Face creams: cold cream, vanishing cream, cleansing and bleaching cream-ingredients, formulation and uses. <i>Face powder: Requirements and ingredients.</i> Hand cream: Formulations, Ingredients and uses. Nail preparations: Nail bleach, nail lacquers, nail lacquers and nail removers – requirements ingredients and formulations.	3
IV	MAKE UP PREPARATIONS : Lipstick, Rouge, Mascara – characteristics and ingredients Dentifrices: Tooth paste and tooth powder -Essential and special ingredients and their functions.	2
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.	2
	Total contact Hrs/Semester	13

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

TextBook

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thangamma Jacob	Text book of Applied Chemistry, 1 st Edition	Macmillan	1987

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Gobala Rao, .S	Outlines of chemical technology	Affiliated EastWest press	1998

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	M
CO2	H	M	H	M	H
CO3	H	M	H	H	H
CO4	H	H	H	M	H

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Selladurai	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY405	Title	Batch :	2020-2023
		Core Paper – IV Inorganic, Organic and Physical Chemistry	SEMESTER	IV
Hrs/Week:	6		Credits:	04

Course Objective

To study the periodic properties of elements, reactions of organic compounds, phase rule, radioactivity and nuclear reactions

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recollect the properties of transition and inner transition elements
K2	CO2	To understand the mechanisms of naming reactions
K3	CO3	To execute the concept of isomerism in various compounds
K4	CO4	To figure out the phase diagram of various systems and to understand radioactivity, transmutation, nuclear reactions and the applications of isotopes.

Syllabus

Unit	Contents	Hours
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, redox properties, formation of complexes, spectral and magnetic properties. f-block elements: electronic configuration, ionization energies, 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.	16
II	Phenol: Preparation of phenol from aryl halide and Grignard reagent. Reactions of Phenol: Nitration, sulphonation, halogenation, Kolbe's Schmidt reaction, Friedel Crafts reaction, Reimer Tiemann reaction, Duff's reaction, Lederer –Manasse reaction and Gattermann aldehydes synthesis. Nitro Compounds: Aliphatic nitro compounds: Nitromethane and Nitroethane- preparation and properties. Nitro-Acinitroautomerism. Aromatic nitro compounds: Reduction of Nitrobenzene in neutral, acidic and alkaline media and electrolytic reduction. Preparation of ortho, meta and paradinitrobenzenes and T.N.T.	16
III	Amines: Aliphatic amines: separation of mixture of amines, Basicity of amines. Aromatic amines: Preparation and properties of Aniline, Diazotisation and Coupling with mechanism. Conformational analysis of Ethane, n- Butane and Cyclohexane. Distinction between Conformation and Configuration. Stereoisomerism: Types, R-S configuration, optical isomerism in lactic acid and tartaric acid, racemisation, methods of resolution and asymmetric synthesis. Geometrical isomerism: cis and trans isomerism in maleic and fumaric acid and E-Z notation	16
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	15

	and sulphur system. 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.	
V	Nuclear Chemistry: Radioactivity- types of radioactivity- types of radioactive rays -nuclear stability-n/p ratio -magic numbers- nuclear binding energy- mass defect- nuclear shell model - groups displacement law - decay constant – half- life period - radioactive equilibrium- transmutation-artificial transmutation- applications of artificial transmutation-radioactive series. Nuclear reactions types: fission and fusion reactions-principle and working of nuclear reactors. Isotopes: Separation of isotopes- identification of isotopes- isotopes of hydrogen-isotope effect- application of isotopes in chemistry, agriculture and medicine.	16
	Total contact Hrs/Semester	78

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Soni. P.L.,	Text book of Inorganic Chemistry, 20 th edition	Sultan Chand & Sons	2002
2	Bahl, B.S and Arun Bahl	A textbook of Organic Chemistry, 18 th Edition	Sultan Chand & Sons	2007
3	Soni P.L	Text book of Organic Chemistry, 29 th Revised Edition	Sultan Chand & Sons, New Delhi	2012
4	Puri B.R., Sharma. LR and Madan S. Pathania	Principles of Physical Chemistry, 46 th Edition	Vishal Publishing House, Jalandar	2013

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Finar, I.L	Organic Chemistry, Vol. I	Pearson Education, Singapore	2003
2	Morrison, R.T. and Boyd	Organic Chemistry, 6th Edition	Pearson Education, Singapore	2003

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	H	M	H	M	H
CO4	M	M	M	H	M

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Amutha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc	Programme Title :	CHEMISTRY	
Course Code:	20UCY406	Title	Batch :	2020-2023
		Core Practical II	Semester	IV
Hrs/Week:	3	Volumetric and Organic Qualitative Analysis	Credits:	5

Course Objective

To develop the analytical skills in volumetric and organic qualitative analysis.

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the apparatus used in volumetric analysis and correct titrimetric procedure
K2	CO2	To develop preparative skills in the organic preparations
K3	CO3	To get the idea about organic qualitative analysis
K4	CO4	To analyse the elements and functional groups of organic compounds.

Syllabus

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 a) Systematic qualitative analysis of organic compounds containing one functional group: Aldehydes, Ketones, Primary amines, Nitrocompounds, Amides, Anilides, Carbohydrates, Carboxylic acids and Phenols. b) Organic Preparations: 1) Acetylation of aniline to acetanilide. 2) Hydrolysis of benzamide to benzoic acid. 3) Hydrolysis of ester (ethylbenzoate to benzoic acid). 4) Nitration of acetanilide to p-nitroacetanilide.	
	Total hours/Semester	39

Teaching Methods

Group discussions, Assignment and Experience Discussion.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran, V., R. Veeraswamy and A.R. Kulandaivelu	Basic Principles of Practical Chemistry.	S.Chand Publications, New Delhi	2004

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas, A.O.	Practical Chemistry	Scientific Book Centre	2003

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	H	H	M	H	M
CO3	H	H	H	L	H
CO4	H	M	H	H	M

Low-L, Medium-M, High-H

Compiled by	Verified by		
Name with Signature	HOD Name with Signature	CDC	COE
Dr.M.Amutha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc	Programme Title :	CHEMISTRY	
Course Code:	20UCY4N3	Title	Batch :	2020-2023
		Non Major Elective -II	Semester	IV
Hrs/Week:	1	Water and Water Treatment Processes	Credits:	02

Course Objective

To develop the knowledge in industrial waste water treatment

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recollect the source and nature of water
K2	CO2	To understand the concept of soft water and hard water
K3	CO3	To apply the various softening methods of hard water
K4	CO4	To analyze the nature, effect and treatment of industrial wastes

Syllabus

Unit	Content	Hours
I	Hardness of water – Hard water and Soft water. Types of hardness, Units of hardness, Equivalents of Calcium carbonate. Estimation of hardness of water by EDTA method. Total hardness, temporary hardness and permanent hardness.	3

II	<i>Disadvantages of hard water in domestic and industrial use.</i> Scales and Sludge formation, prevention of scales. Internal conditioning and external conditioning. Caustic embrittlement – boiler corrosion – priming and foaming.	3
III	Softening of hard water: Lime soda process, Cold and Hot process. Zeolite process : Natural and synthetic zeolites. Ion exchange process :Cationexchange and anion exchangeresins. Regeneration of cation and anion exchangers.	2
IV	Purification of water for municipal purposes: Filtration, Sedimentation and Coagulation, Sterilization, Physical and Chemicalmethods. Sea water as a source of drinking water: Desalting, electrodialysis and reverse osmosis.	3
V	Industrial wastewater treatment: Removal of Iron and Silica . Water for boiler use. Industrial wastes and treatment processes: Types of industrial wastes, The nature, effect and treatment ofpaper,pulp and foodprocessing industrial wastewater.	2
	Total contact Hrs/Semester	13

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Jain. P.C. and Monika Jain	Engineering Chemistry, 15 th Edition	Dhanpat Rai Publishing Company (P) Ltd.	2005
2	Sharma, B.K	Environmental chemistry, 2 nd Edition	Goel Publishing Company(P)Ltd.	2000

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Ravishanker. N	Applied chemistry, 3 rd Edition	National Pathippaham	2002

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	M
CO2	H	H	H	H	H
CO3	M	H	M	H	H
CO4	H	M	H	M	H

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Selladurai	Dr.Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY4N4	Title	Batch :	2020-2023
		Non Major Elective - II	Semester	IV
Hrs/Week:	1	Diagnostic Chemistry	Credits:	02

Course Objective

To develop their knowledge in diagnosis process

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To remember the basic concepts of metabolism of carbohydrates
K2	CO2	To get the idea about hemoglobin, renal, and liver function
K3	CO3	To familiarize with mechanism of regulations of blood sugar and the clinical tests
K4	CO4	To analyze and execute the clinical laboratory techniques

Syllabus

Unit	Content	Hours
I	Enzymes: classification and properties of enzymes. Co-enzymes and examples Digestion and absorption of carbohydrates, fats and proteins.	3
II	Metabolism of carbohydrates. Glycolysis, Glycogenesis. Regulation of blood sugar : Mechanism of maintaining blood sugar level. Glycosuria, Glucose tolerance test, Normal GTT curves. GTT curves in Diabetes mellitus Diabetes Mellitus –symptoms and control measures.	3
III	Blood lipids, Ketogenesis, ketolysis and ketosis Urine: composition of urine . <i>General characteristics, Normal and abnormal constituents of urine.</i>	2
IV	Formation of urine: Glomerular filtration and tubular reabsorption. Renal function tests: Inulin clearance test, urea concentration test and dye test. Haemoglobin: Functions and properties of Haemoglobin. Conversion of Haemoglobin to Bilepigments. Jaundice –Types and diagnosis.	3
V	Liver : Functions of liver. Liver function tests: Tests based on excretory functions, metabolic function and the capacity for detoxication.	2
	Total contact Hrs/Semester	13

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Ambika Shanmugam	Fundamentals of Biochemistry for Medical Students, Seventh, Indian Edition,	Lippincott Williams & Wilkins	2012

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Soni. P.L	Text book of Organic Chemistry, 29 th revised edition	Sultan Chand & Sons, New Delhi	2012

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	M
CO2	M	H	H	H	H
CO3	H	M	M	H	H
CO4	H	H	H	M	H

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Selladurai	Dr.Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title:	CHEMISTRY	
Course Code:	20UCY507	Title	Batch:	2020-2023
Hrs/Week	4	Core Paper –V Coordination and Bioinorganic Chemistry	Semester	V
			Credits:	5

Course Objective:

To develop the skill to aesthetically appreciate Coordination and Bioinorganic chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the basic concepts of coordination chemistry
K2	CO2	To understand different theories and applications of coordination compounds
K3	CO3	To understand the properties of coordination compounds
K4	CO4	To gain knowledge in Bioinorganic chemistry and metal carbonyls

Syllabus

Unit	Content	Hrs
I	Introduction to coordination chemistry: Double salts- complex compounds- complex ion and coordination number- Ligands and their classification- chelates and their uses- coordination number and stereochemistry of complexes- IUPAC Nomenclature of coordination compounds. Isomerism: ionization, hydrate, ligand, linkage, coordination, position, geometrical and optical isomerism.	10
II	Theories of coordination compounds: 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.	11
III	Theories of coordination compounds: Factors affecting crystal field splitting, John Teller distortion- Crystal field stabilisation energy- calculation and uses- Limitations of crystal field theory. Applications of coordination compounds: Applications of copper and silver complexes in qualitative analysis. Applications of Ca-EDTA and Ni-DMG complexes in quantitative analysis.	11
IV	Properties of complexes: Color of transition metal complexes-visible spectrum of aqueous Ti (III) ion. Stability of complexes-overall and stepwise formation constants. Factors affecting stability-Determination of stability constant by Job's and Bjerum's method. Reaction Mechanism in Complexes: Ligands substitution in octahedral complexes: Inert and Labile complexes Nucleophilic ligands substitution reactions, SN1 and SN2 mechanisms. Substitution reactions without breaking Metal-Ligand bond. Trans effect in square planar complexes: Definition, trans effect series and uses of trans effect.	10
V	Bioinorganic chemistry: Metals in biology-bulk and trace metals- Structure and function of Metalloporphyrins-Chlorophyll- Vitamin B12- Structure and Biological role of Myoglobin and hemoglobin. Metallo enzymes- carboxy peptidase and peroxidase-sodium and potassium ion pump. Biological functions and toxicity of chromium, manganese,	10

	cobalt, nickel, copper, arsenic, iodine and mercury. Metal Carbonyls : Mono and Binuclear carbonyls of Ni(CO) ₄ , Fe(CO) ₅ , Fe ₂ (CO) ₉ , Co ₂ (CO) ₈ and Cr(CO) ₆ - synthesis, properties, structure and EAN.	
	Total contact Hrs/Semester	52

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, experience Discussion, brain storming, in-house lab Activity, Models.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri and Sharma and Kalia. K.C.	Principles of Inorganic Chemistry, 31 st Edition	Milestone Publishers and Distributors	2013
2	Soni. P.L.	Text book of Inorganic Chemistry, 20 th Edition	Sultan Chand & Sons	2012
3	Madan, Malik and Tuli.	Selected Topics in Inorganic Chemistry	Sultan Chand & Sons	2006

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Lee. J.D	Concise Inorganic Chemistry, 5 th Edition	Black Well Science Ltd, London.	2006
2	Jain. P.C. and Monika Jain	Engineering Chemistry, 15 th Edition	Dhanpat Rai Publishing Company	2005
3	Gopalan. R. and Ramalingam V.	Concise Coordination Chemistry, 3 rd Edition	Vikas Publishing house	

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	H	H	H	H	M
CO4	H	M	M	H	M

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Amutha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY508	Title	Batch :	2020-2023
		Core Paper – VI	Semester	V
Hrs/Week:	4	Organic Chemistry-I	Credits:	5

Course Objective

To make the students to

- understand the mechanisms of molecular rearrangements
- acquire knowledge on heterocyclic compounds
- gain knowledge in carbohydrate chemistry
- acquire knowledge on structural elucidation of natural products

Course Outcome

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

Knowledge Level	CO Number	CO Statement
K1, K4	CO1	recollect and interpret the mechanisms of molecular rearrangements
K2	CO2	understand the significance of heterocyclic compounds
K2	CO3	understand the importance of carbohydrate chemistry
K3,K4	CO4	apply and interpret various chemical methods in deducing the structures of natural products

Syllabus

Unit	Content	Hrs
I	Molecular Rearrangements: Pinacol - Pinacolone. Beckmann, Hoffmann, Curtius, Schmidt, Benzidine, Benzilic acid, Fries, Baeyer Villiger, Cope and Claisen rearrangements.	10
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.	10
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], Mutarotation and epimerization. Analysis of carbohydrates. <i>Sucrose, Maltose, Lactose, and Saccharin – Preparation, Properties and uses [Structural elucidation is not needed].</i>	11
IV	Alkaloids: Definition, occurrence and extraction of alkaloids from plants. General methods of determining structure. Determination of structure of Coniine, Piperine, Papaverine and Nicotine	11
V	Terpenoids: Classification, isoprene rule, special isoprene rule and Gemdialkyl rule, Extraction from plants, structural elucidation of Citral, Camphor, α - terpineol and Menthol.	10
	Total hours/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, experience Discussion, brain storming, Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Finar. I.L.	Organic Chemistry	ELBS Edition	2006
2.	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	2010
3.	Soni. P.L.	Text book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2012

Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Gurtu. J.N. and Kapoor. R.	Organic Reactions and Reagents	S.Chand & Company, Newdelhi	1998
2.	Gurdeep. R. Chatwal	Organic Chemistry of Natural Products, Volume I and II	Goel Publishing House	2004

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	H	M	H
CO3	H	H	H	H	M
CO4	M	H	M	H	H

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.Indumathy Ramasamy	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY509	Title	Batch :	2020-2023
		Core Paper – VII	Semester	V
Hrs/Week:	4	Electro Chemistry	Credits:	4

Course Objective

- (i) To understand the concepts between electrochemistry and thermodynamics.
- (ii) To apply electro chemical principles to fuel cells, batteries and mechanism of corrosion.

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	Able to write balanced half –cell reactions, determine overall cell reactions and calculate the standard reduction potential
K2	CO2	To understand the principles and applications of conductance Measurements
K3	CO3	To describe and understand the operation of electrochemical systems for the production of electric energy, i.e. batteries and fuel cells
K4	CO4	To describe general corrosion in terms of electrochemistry and methods for minimizing corrosion

Syllabus

Unit	Content	Hrs
I	Electrolytic Conduction and Electrolysis: Faradays Laws of electrolysis. Measurement of conductivity in electrolytic solution. Variation of specific and equivalent conductances with dilution. 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.	10
II	Applications of conductance measurements: Determination of degree of dissociation of weak electrolytes, determination of ionic product of water and conductometric titrations. Electrochemical cells: 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.	11
III	Electrodes for the measurement of pH: Hydrogen gas electrode, Quinhydrone electrode and glass electrode Buffer solution: Buffer action, Henderson's equation and the evaluation of the dissociation constant. Acid-Base Indicators: Theories of Acid-Base Indicators. Acid-Base Titrations. Hydrolysis of Salts: Degree of hydrolysis, Relationship between K_h, K_w and	10

	the dissociation constant for salts such as sodium acetate, ammonium chloride and ammonium acetate. Determination of Degree of hydrolysis- indirect method and Electrical Conductance method.	
IV	Electrochemical cells: Concentration cells with and without transference. Liquid junction potential - Formation and elimination. Applications of EMF measurements: Calculation of valency of ions in doubtful cases ($\text{Hg}^+/\text{Hg}^{2+}$), determination of solubility of sparingly soluble salts. Electrochemical instrumentation and techniques: Potentiostatic and galvanostatic experiments. Cyclic voltammetry, chronoamperometry, chronopotentiometry.	11
V	Batteries: Dry Cell, Lead-Acid storage cell and Nickel- Cadmium, Nickel-Zinc accumulator. Fuel Cell: Hydrogen - Oxygen fuel cell. Hydrogen over voltage: Measurement and its application to metal deposition. Electrochemical corrosion: Mechanism, Galvanic and differential aeration corrosion. <i>Prevention of corrosion: Proper designing, using pure metal, using metal alloys, and uses of inhibitor (Brief account only).</i> Metallic coatings: Anodic and cathodic coatings. Method of application of metallic coatings: Hot dipping and electro plating (Nickel and chromium plating).	10
	Total hours/semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri and Sharma and. Pathania	Principles of Physical Chemistry	Milestone Edition, Vishal Publishing House	2007
2	Soni. P.L., and Dharmarha. O.P.	Text book of Physical Chemistry, 7 th Edition	Sultan Chand & Sons,	2005
3	Jain. P.C. and MonicaJain.,	Engineering Chemistry, 17 th Edition	Dhanpat Rai Publishing Company(P) Ltd	2005

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Samuel H.Maroon. and CarlF.Prutton.,	Principle of Physical Chemistry, 4 th Edition	Amerind publishing Co.Pvt.Ltd	1972
2	Negi. A.S. and Anand.S.C	A Text book of Physical Chemistry, 4 th Edition	New Age International (P) Ltd.	1995
3	Atkins. P.W.,	Physical Chemistry	ELBS/ Oxford University Press	1987

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	H	H	H	M	H
CO4	H	M	M	H	M

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.T.Gowrani	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme Code	B.Sc.	Programme Title	CHEMISTRY	
Course Code	20UCY510	Title	Batch:	2020 -2023
		Core Paper – VIII Dye Chemistry	Semester	V
Hrs/Week	4		Credits:	4

Course Objective

To encourage the students to opt their career as dye chemists in dyeing and textile industry

Course Outcome

Knowledge Level	CONumber	CO Statement
K1	CO1	To learn the basic concepts and theories of colour and its constitution
K2	CO2	To understand the preparation and properties of various types of dyes
K3	CO3	To know the classification and application of different dyes
K4	CO4	To learn about types of fibres and dyeing processes

Syllabus

Unit	Content	Hrs
I	Electromagnetic spectrum: Various regions. Relationship of colour observed to wavelength of light absorbed. Complementary colours. Terms used in dye chemistry - Chromophores, Auxochrome, Bathochromic shift, Hypsochromic shift, Hypochromic shift and Hyperchromic shift. Requisites of a true dye: Classification of dyes according to their chemical constitution and mode of applications. Theories of colour and constitution: Otto Witt's theory, Quinonoid theory and Molecular orbital theory of various transitions.	10
II	Nitro dyes: Picric acid, Martius yellow, Naphthol Yellow S – synthesis and applications. Nitroso dyes: Fast Green O, Naphthol Green Y - synthesis and applications Azo dyes: Diazotisation, Mechanism of diazotization, Effects of substituent on diazotization. Diazo coupling and coupling with phenols and Amines. Classification of azo dyes as monoazo and bisazo dyes. Synthesis and applications of important azo dyes: Methyl orange, Orange I, Orange II, Metanil yellow, Eriochrome Black – T, Bismark brown and Congo red.	10
III	Diphenyl methane dyes: Auramine O, Auramine G - synthesis and uses. Triphenyl methane dyes: Malachite green, Rosaniline, Crystal violet - Synthesis and uses. Phthalein and Xanthene dyes: Phenolphthalein and Rhodamine B - Synthesis and uses. Indigoid dyes: Indigotin – Synthesis and application to fibre. Indigosol O – Synthesis.	10
IV	Anthroquinone dyes: Anthraquinone acid dyes – Alizarin cyanine green and Solway ultra 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, Toners. Ionic and non-ionic Pigments - Phthalocyanines. Fluorescent brightening agents. Classification and properties. Fluorescent brighteners for a). Cellulosic fibers b). Acrylic fibers.	10

V	Textile fibres: Classification of fibres - Natural, Synthetic and Semi synthetic fibres). Structure of textile fibres: Cotton, wool, silk, nylon, polyester and polyacrylamide. Natural fibres: Physical, chemical properties and uses of cellulose fibre(cotton), protein fibre (silk and wool). Synthetic fibres: Preparation, properties and Uses of Nylon 6, Nylon (6,6), Polyester and poly acryl amide. Semi synthetic fibres: Rayon - manufacture of viscose rayon and cuprammonium rayon. Dye - fibre Interactions - Ionic forces, Hydrogen bonds, Vander Waals forces, Covalent bonds. Various methods of dyeing - Direct dyeing, Mordant dyeing, Vat dyeing, Disperse dyeing. Non-textile uses of dyes in leather, paper, foods and drugs, colour photography and indicators.	12
	Total contact Hrs/Semester	52

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Tyagi. O.D. andYadav. M.A.	Text Book ofSynthetic Dyes	Anmol publicationsPvt. Ltd.	2001
2	Bahl and ArunBhalB.S.	Advanced OrganicChemistry	S.Chand&Company Ltd.	2007

References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Rao. R.S., VidyaChawathe and Shah. S.J.	An Introduction to Synthetic Drugs and Dyes	Himalaya Publishing House	1997
2	Lubs. H.A.	The Chemistry of Synthetic Dyes and Pigments	Robert E.Krieger Publishing Company	1997
3	Arora. M.G.	A Text Book of Synthetic Dyes	Anmol Publication	1996

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	M	H	H	H	H
CO4	H	H	M	H	M

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Selladurai	Dr.Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY5E1	Title	Batch :	2020-2023
		Core Elective Paper – I	Semester	V
Hrs/Week:	4	Analytical chemistry- I	Credits:	5

Course Objective

To develop the skill to aesthetically appreciate Analytical chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To learn instrumentation and basic principles and applications of modern analytical tools such as thermogravimetry and polarography
K2	CO2	To have knowledge on uses of nephelometry and flame photometry
K3	CO3	To understand the polarography, electrogravimetry and chromatography
K4	CO4	To acquire knowledge and applications of various analytical tools

Syllabus

Unit	Content	Hrs
I	<i>Data Analysis: Definition and terms – absolute and relative error. Precision and accuracy. Classification of errors. Sources and minimisation of errors. Significant figures.</i> Gravimetric Analysis: Precipitation methods. Conditions of precipitation, co-precipitation and post precipitation. Precipitation from homogeneous solution. Washing of the precipitate. Organic precipitants – DMG, Cupron, Cupferron, oxine and salicylaldoxime.	10
II	Thermogravimetric Analysis (TGA): Principle, factors affecting thermogravimetric curves. Applications: Evaluation of gravimetric precipitation, curie point determination and study of organic compounds. Electrogravimetry- principle only. Differential thermal analysis (DTA): Principle, factors affecting the DTA curve. Applications: heat of reaction, specific heat and quality control. Thermometric titrations (TTA): Principle and applications.	10
III	Polarimetry: Theory and instrumentation. Comparison of acid strength using polarimeter. Nephelometry and Turbidimetry: Theory, principles and applications in Inorganic analysis, turbidimetric titrations and phasetitrations. Flame photometry: Theory, principle and applications in Qualitative and Quantitative analyses.	10
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 end point method. Advantages and disadvantages of amperometric titrations.	11
V	Chromatographic techniques: Paper Chromatography: Principle, RF value and experimental details. Applications in qualitative and quantitative analyses.	11

	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.	
	Total contact Hrs/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Chatwal and Anand	Instrumental Methods of Chemical Analysis, 5 th Edition	Himalaya publishing House	2005
2	Arthur. I. Vogel	Inorganic Quantitative Analysis, 3 rd Edition	Longmans	1964
3	Khopkar	Basic concepts of Analytical Chemistry, 3 rd Edition	Wiley Eastern Ltd	1992

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Usharani. S.	Analytical Chemistry, 1 st Edition	Macmillan India Ltd	2000

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	M	H	H	M
CO3	H	H	M	H	H
CO4	M	H	H	M	H

Low-L, Medium-M, High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Mrs.R.Sudha	Dr.Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.,	Programme Title :	CHEMISTRY	
Course Code:	20 UCY5S1	Title	Batch :	2020-2023
		Network and Information Security	Semester	V
Hrs/Week:	1		Credits:	2

Course Objective

- To impart knowledge of Network security, Wi-Fi security, hackers, secure networking and password managers.

Course Outcomes (CO)

K1	CO1	To remember the basic concepts of network
K2	CO2	To understand the network hacking techniques
K3	CO3	To deploy information and network security
K4	CO4	To interpret the common threats today in computer network

Syllabus

Unit	Content	Hrs
Unit I	Basics of Network – Network Media – Various Operating Systems – Basics of Firewalls on all Platforms including Windows, MacOS and Linux.	3
Unit II	Security Vulnerabilities across an entire network – Network Hacking techniques and Vulnerability scanning.	3
Unit III	Configure and architect a small network for physical and wireless security – Firewalls configuration on Windows platform and Linux platform. Network privacy issues	2
Unit IV	Network monitoring to discover and identify potential hackers and malware using tools like WIRESHARK and SYSLOG. Online tracking by hackers	2

Unit V	Best methods of authentication including passwords, multifactor authentication including soft tokens and hard tokens. Best passwordmanagerstouse–howpasswordsarecracked–howto mitigate the password attacks.	3
Total Contact Hrs		13

Google classroom

Reference:

Course Materials will be made online through NGM Open source learning platforms

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	H	H
CO2	H	M	H	H	H
CO3	M	H	M	M	M
CO4	M	H	H	H	H

Low-L,Medium-M,High- H

Course Designed by Name and Signature	Verified by HOD Name and Signature	Checked by CDC	Approved by COE
Ms.R.Sudha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.,	Programme Title :	CHEMISTRY	
Course Code:	20UCY5S2	Title	Batch :	2020-2023
		Cyber security – Ethical Hacking	Semester	V
Hrs/Week:	1		Credits:	2

Course Objective

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

Course Outcomes (CO)

K1	CO1	To remember the basic concepts of cyber security
K2	CO2	To understand the knowledge about ethical hacking
K3	CO3	To deploy the use of hacking tools
K4	CO4	To analyze the details about internet connection

Syllabus

Unit	Content	Hrs
Unit I	To Understand how websites work, how to discover and exploit web application vulnerabilities and to gain full control over websites. Secure systems from all the known attacks. Secret tracking and hacking infrastructure.	3
Unit II	Ethical hacking in Cyber space - its fields and the different types of hackers. Hack & secure both Wi-Fi & wired networks	3
Unit III	Discover vulnerabilities & exploitation of hacking in cyber network servers. How secure systems are hacked using client-side and social engineering attacks. Use of hacking tools suchas Metasploit, Aircrack-ng, SQLmap.....etc.	2

Unit IV	Network basics & how devices interact inside a network - Network Penetration. Control connections of clients in network by password cracking. Fake Wi-Fi network creation with internet connection and spy on clients. To Gather detailed information about clients and networks like their OS, opened ports...etc.	2
Unit V	Explore the threat landscape - Darknets, dark markets, zero day vulnerabilities, exploit kits, malware, phishing and much more. Master defenses against phishing, SMShing, vishing, identity theft, scam, cons and other social engineering threats.	3
Total Contact Hrs		13

Google classroom

Reference:

Course Materials will be made online through NGM Open source learning platforms

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	H	H
CO2	H	M	H	M	H
CO3	M	H	M	M	M
CO4	M	M	H	H	H

Low-L,Medium-M,High- H

Course Designed by Name and Signature	Verified by HOD Name and Signature	Checked by CDC	Approved by COE
Mrs.R.Sudha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY611	Title	Batch :	2020-2023
		Core Paper – IX	Semester	VI
Hrs/Week:	4	Physical Methods and Chemical Structure	Credits:	5

Course Objective

To make the students to

- acquire knowledge on basic concepts in spectroscopy
- gain basic knowledge in various spectroscopic techniques like rotational, vibrational, Raman, UV-visible, NMR and EPR
- understand the electrical and magnetic properties of molecules

Course Outcome

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

Knowledge Level	CO Number	CO Statement
K1, K2	CO1	recollect and understand the basic theoretical concepts in various types of spectroscopy
K4	CO2	interpret the structure of the unknown molecules from the given spectra
K4	CO3	evaluate various parameters like bond length, vibrational frequency from spectroscopic techniques
K3	CO4	apply electrical and magnetic properties in solving the structures of the molecules

Syllabus

Unit	Content	Hrs
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.	10
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-Spinner method of evaluation of dissociation energy from electronic spectra. Woodward Fischer rule for calculation for absorption maxima in dienes.	11
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).	10

	ESR: Theory, 'g' factor, derivative curves. Hyperfine splitting, line width. Applications of $\bullet\text{CH}_3$ and Mn^{2+} ion.	
IV	Mass Spectra: Theory, basic principle, isotope abundance, base peak, molecular ion peak, Determination of molecular ion peak, meta stable ion, McLafferty rearrangement and Nitrogen rule. Fragmentation of saturated hydrocarbons – Methane, Neopentane and n - butane 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 in crystals: Point defects, Schottky defects, Frenkel defects, metal excess defects and metal deficiency defects. The radius-ratio rule. X-ray examination of crystals by Debye-Scherrer method.	11
V	Electrical properties of Molecules: <i>Polar and non-polar molecules, Dipolemoment, Meaning of the terms – total molar polarisation, orientation polarisation and distortion polarisation. Effect of temperature on Molar polarization. Determination of dipolemoment of polar gas, Application of dipolemoment in the study of simplemolecules.</i> Magnetic properties of molecules: Meaning of the terms – magnetic susceptibility, magnetic permeability and magnetic moment. Diamagnetism, Paramagnetism and Ferromagnetism. Curie-Weiss Law. Determination of magnetic susceptibility of paramagnetic substance using Guoy balance. Application of magnetic properties in identifying the geometry of simple and complex molecules.	10
	Total hours/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & talk, power point presentations, group discussions, seminar, quiz, assignment, experience Discussion, brain storming, in-house lab Activity, Models.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Puri, Sharma and Pathania	Principles of Physical Chemistry	Millennium Edition, Vishal Publishing House	2007
2.	Sharma. Y.R.	Elementary Organic Absorption Spectroscopy	Sultan Chand & Sons	2007
3.	Gurdeep Chatwal & Sham K.Anand	Instrumental Methods of Analysis	Himalaya Publishing House	2005

Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Soni. P.L.	Text book of Organic Chemistry	Sultan Chand & Sons	2002
2.	William kemp	Organic Spectroscopy	ELBS edition	1985
3.	Manas Chanda	Atomic Structure and Chemical bonding	Tata McGraw Hill Company	1988

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	M	H	M
CO3	H	H	H	H	H
CO4	M	M	H	H	M

L-Low;M-Medium; H-High

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.Indumathy Ramasamy	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY612	Title	Batch :	2020-2023
		Core Paper – X	Semester	VI
Hrs/Week:	4	Organic chemistry-II	Credits:	4

Course Objective

To develop the skill to aesthetically appreciate Organic chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To develop the knowledge in solving the problems in organicchemistry
K2	CO2	To understand the structure and properties of proteins,DNA, Vitamins and lipids
K3	CO3	To create awareness regarding chemotherapy
K4	CO4	To help the students to opt their career as biotechnologists, pharmacologists or medical representative

Syllabus

Unit	Content	Hrs
I	Solving problems of structures of organic compounds based on reactions of the following: Aldehydes, Ketones, Amines, Nitro-compounds, Phenols and Acids. Polynuclear hydrocarbons: Condensed systems – Naphthalene, Anthracene and phenanthrene-Preparation, properties and uses. Structural elucidation of Naphthalene and Anthracene.	11
II	Amino acids: Classification, Glycine and Alanine: Properties and synthesis by the following methods: Amination of α - halo acids, Gabriel's phthalimide synthesis and Strecker synthesis. Synthesis of polypeptides by carbobenzoxy method.(Bergmann method) Proteins: Classification, primary and secondary structures of proteins, denaturation and biological functions of proteins. Terminal residual Analysis: N-Terminal end by Sanger's method. C-Terminal end by reduction method.	10
III	Nucleic Acids: Carbohydrates present in nucleic acids. Nitrogen bases present in nucleic acids. Nucleosides and Nucleotides with examples. Functions of nucleotides. Nucleotide as energy carriers. Structure, replication and functions of DNA. Lipids: Classification according to Bloor. Sources, extraction. Properties and analysis of oils and fats.	11
IV	Vitamins: Definition and classification as fat and water soluble vitamins, occurrence, deficiency diseases. Constitution and Synthesis of the following: Vitamin A1 (retinol), Vitamin B1, Pyridoxine and Ascorbic acid	10

V	Chemotherapy: Introduction, Definition and classification of drugs. Sulphadugs: Structure and uses of sulphanilamide, sulphapyridine, sulphadiazine, sulphaacetamide, sulphathiazole and sulpha guanidine. Mode of action. <i>Antimalarials: Classification, structure and uses of chloroquine and pamaquine.</i> <i>Antiseptics: Definition, structure and uses of chloramine-T and Iodoform .</i> 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)	10
	Total contact Hrs/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk&Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Soni.P.L. and Chawla	Text Book of Organic Chemistry	Sultan Chand & Sons, New Delhi	1992
2	Gurdeep R. Chatwal	Organic Chemistry of Natural Products, Volume II. Edition	Himalaya Publishing House	2006
3	Bahl. B.S and Arun Bhal	Advanced Organic Chemistry, 1 st Edition	Advanced Organic Chemistry	2007

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Finar I.L	Organic Chemistry. Volume I	Longmans	2006

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	M	H
CO2	M	H	M	H	H
CO3	M	H	H	H	M
CO4	H	M	M	M	M

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. M. Selladurai	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc	Programme Title:	CHEMISTRY	
Course Code:	20UCY613	Title	Batch:	2020-2023
Hrs/Week	4	Core Paper –XI Chemical kinetics and Quantum mechanics	Semester	VI
			Credits:	5

Course Objective

To develop the skill to aesthetically appreciate Chemical Kinetics, photochemistry and Quantum mechanics

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the basic terminologies of chemical kinetics
K2	CO2	To understand the theories of reaction rates and catalysis
K3	CO3	To understand the basics and concepts of photochemistry
K4	CO4	To become familiar with the quantum mechanical functions and operators

Syllabus

Unit	Content	Hrs
I	Chemical Kinetics-I: The concept of Reaction Rate, Rate law and Rate equation. Factors influencing rates of chemical reactions. Order and Molecularity of a reaction. Setting and solving simple differential equations for first order, Second 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.	11
II	Chemical Kinetics-II: Methods of determining order of a reaction – Differential rate expressions, Integral rate expressions and Half-life method. Equilibrium approximation and Steady state approximation. Effect of Temperature on	10

	reaction rates –Temperature co-efficient, The Arrhenius equation – Derivation, activationenergy and its determination. Theories of reaction rates: Lindemann theory of Unimolecular reactions, Collision theory and Absolute reaction rate theory (Derivation not necessary).	
III	Catalysis: General characteristics of Catalytic reactions. Types of catalysis – Theories of Homogeneous and Heterogeneous catalysis- Kinetics of acid base catalysed 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.	10
IV	Photochemistry: Consequence of light absorption – The Jablonski diagram, Laws of Photochemistry - Lambert and Lambert-Beer's laws, Grothus–Draper law, The Stark–Einstein law of photochemical equivalence, Quantum efficiency and its determination. The photochemical rate law: Kinetics of 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).	10
V	Quantum Mechanics: 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).	11
	Total contact Hrs/Semester	52

Teaching Methods

Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri. B.R., Sharma. L.R. and Madan S.Pathania	Principles of Physical Chemistry, Millennium Edition	Vishal Publishing House	2007
2	Gurdeep Raj	Chemical Kinetics, 6 th Revised Edition	Goel publishing house	1997
3	Jain and Jain	Engineering Chemistry, 5 th Edition	Dhanpat Rai Publishing Company (P) Ltd.	2005

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Samuel H. Maron and Carl F. Prutton	Principles of Physical Chemistry, Millennium Edition	Amerind publishing Co. Pvt. Ltd.	1972
2	Negi. A.S. and Anand.S.C	A Text book of Physical chemistry, 4 th Edition	New Age International (P) Ltd	1995
3	Chakrabarty. D.K	An introduction to Physical Chemistry	Narosa Publishing House	1996

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	H	H	H	H	H
CO4	H	M	M	H	M

Low-L, Medium-M, High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Amutha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY614	Title	Batch :	2020-2023
		Core paper – XII	Semester	V I
Hrs/Week:	4	Polymer Chemistry	Credits:	5

Course Objective

- (i) To highlight the commercially important polymers and their various forms
- ii) To understand various industrial polymerization processes

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recognize the principles of polymer recycling and can select appropriate recycle or reuse methods to balance economics and environmental responsibility
K2	CO2	To describe the mechanisms of chain polymerizations, and can predict reaction rates
K3	CO3	To identify the repeat units of particular polymers and specify the isomeric structures which can exist for those repeat units
K4	CO4	To estimate the number- and weight-average molecular masses of polymer samples given the degree of polymerisation and mass fraction of chains present

Syllabus

Unit	Content	Hrs
I	Basic Concepts: 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. Thermal stabilisers- Antioxidants- photostabilisers. Polymerization Techniques: Bulk, Solution, Suspension and Emulsion Polymerization.	11
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) Co-Polymerisation: Random - Alternating – Block and Graft copolymers. Miscellaneous Polymerization reactions- Electrochemical Polymerization.	10
III	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.	11

IV	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 and Viscosity method and End group Analysis.	10
V	Polymer processing techniques: Calendaring, film casting, compression moulding, blow moulding, extrusion moulding foaming and filament winding technique Preparation and uses of the following polymers: <i>Polyethylene (LDPE & HDPE), P.V.C, Teflon, polystyrene, Nylon-6, Nylon-66, Polyester, Phenol formaldehyde resins and Polycarbonates.</i> Recent Advances in Polymers : Polymer and environmental effect- introduction- disposal of polymer waste- recycling system- importance of biopolymers.	10
	Total hours/Semester	52

***Italics denotes self study topics**

Teaching Methods

Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Gowariker.V.R. Viswanathan. N.V, Jeyadev Sreedhar	Polymer Science, 13th reprint	New Age International (P) Limited, Publishers	1999
2	Fred.W.Billmeyer, Jr	Text Book of Polymer Science, 2nd edition	Wiley –Interscience and Sons.Inc	2011
3	Madan.R.L., and Tuli.G.D.	Physical chemistry, I Edition	S.Chand and Company Ltd	1999

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Misra. G.S.	Polymer Chemistry, 2nd Reprint	New ageInternational(P) Ltd	1989
2	Charles G.Geberlein, Brown. Wm.C	Chemistry and Our World	Publishers(Singapore), ISBN069716574-4	1997
3	M.GopalaRao and Marshall Sitig	Drydens Outlines of Chemical Technology for the 21 st Century, 3 rd Edition	East-West Press	1997

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	H	H	H	M	H
CO4	H	M	M	H	M

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.T.Gowrani	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY6E2	Title	Batch :	2020-2023
		Core Elective – II	Semester	VI
Hrs/Week:	4	Analytical chemistry-II	Credits:	4

Course Objective

To make the students to

- acquire knowledge on basic concepts involumetric analysis
- gain basic knowledge in various types of titrations
- gain knowledge in separation techniques
- understand the basic principles of instrumentation

Course Outcome

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

Knowledge Level	CO Number	CO Statement
K1, K2	CO1	recollect and understand the basic theoretical concepts in inorganic qualitative analysis
K4	CO2	Understand the basic principles involved in volumetric analysis
K4	CO3	Apply separation techniques for the extraction of solvents
K3	CO4	Understand the basic principles of instrumentation

Syllabus

Unit	Content	Hrs
I	Instrumentation: Basic principles of UV-visible spectrophotometer, Lambert- Beer's Law and its limitations. Instrumentation consisting of source, monochromator, grating and detector. Applications of UV-vis spectroscopy. Basic principles of IR spectrophotometer, Instrumentation consisting of source, monochromator grating and various detector. Spectrophotometric determination. Applications of infrared spectroscopy.	10
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.	11
III	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.	10
IV	Volumetric analysis: Principle, Preparation of standard solutions, primary and secondary standard substances, Types of titration and Principles of different types of titrations. Acid base Titrations: Principles of titrimetric analysis, titration curves for strong acid-strong base, weak acid-strong base, strong acid-weak base titrations, Indicators: Theory and the choice in acid –base titration.	11

V	Redox Titration: Principle, Different types of Redox Titrations, Redox indicators and choice of redox Indicators. Complexometric Titrations: Types of complexometric titrations, determination of total hardness of water by complexometric titration with EDTA. Precipitation Titrations: Indicators for Argentometric titrations, Estimation of chlorides by Volhard's Method.	10
	Total hours/Semester	52

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Svehla, G.	Vogel's Qualitative Inorganic Analysis	7th Edition, Prentice Hall	1996
2.	Chatwal and Anand	Instrumental Methods of Chemical Analysis, 5 th Edition	Himalaya publishing House	2005

Reference Books

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Vogel, A. I	Qualitative Inorganic Analysis,	Longman	1972
2.	D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch	Fundamentals of Analytical Chemistry	Cengage Learning	2018

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	H
CO2	H	M	H	M	H
CO3	H	H	M	H	M
CO4	H	H	H	M	H

Low-L, Medium-M, High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Mrs.R.Sudha	Dr.Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY615	Title	Batch :	2020-2023
		Core Practical – III	Semester	VI
Hrs/Week:	6	Gravimetric analysis and physical chemistry	Credits:	5

Course Objective

To develop analytical skills in gravimetric analysis and Physical Chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the basic concept of gravimetric analysis
K2	CO2	To get the idea about Physical chemistry experiments
K3	CO3	To enable the students to acquire analytical skills (qualitative and quantitative skills)
K4	CO4	To develop practical skills in analytical and Physical chemistry experiments

Syllabus

Unit	Content	Hrs
	I: Gravimetric Estimations: 1. Lead as Lead Chromate 2. Barium as Barium Chromate 3. Barium as Barium Sulphate 4. Calcium as Calcium oxalate 5. Lead as Lead sulphate 6. Magnesium as Magnesium oxinate 7. Nickel as dimethyl glyoxime 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 – Water system. b) Effect of NaCl on C.S.T. (between 1 to 2.0%) c) Effect of Succinic acid on C.S.T. (between 1 to 2.0%) iv) Molecular weight: Rast's method Solvents – Naphthalene and diphenyl. 2. Kinetics: a) Acid catalysed hydrolysis of methyl acetate b) Potassium persulphate oxidation.	

	3. Conductivity Experiments: a) Cell constant b) Verification of Debye – Huckel Onsager Equation. c) Conductometric Acid – Base titrations (HCl x NaOH). 4. Potentiometric Titrations a) Acid – Base titration (HCl x NaOH). b) Redox titrations (FeSO ₄ x K ₂ Cr ₂ O ₇)	
	Total Hrs/semester	78

Teaching Methods

Demonstration, Seminar, discussions, Assignment

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran. V., Veeraswamy.R.and Kulandaivelu.A.R	Basic principles of Practical chemistry	Sultan Chand & Sons	1997

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas. A.O.	Practical Chemistry for B.Sc., Main Students	Scientific Book Centre	1985

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	M	H	M	H
CO3	H	H	M	H	M
CO4	M	H	H	H	H

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.Indumathy Ramasamy	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY6S3	Title	Batch :	2020-2023
		Skill Based Elective –II	Semester	VI
Hrs/Week:	1	Green Chemistry	Credits:	2

Course Objective

To develop the skill to aesthetically appreciate Green Chemistry.

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To recollect the principles of green chemistry
K2	CO2	To understand the awareness on environment friendly technologies and working conditions
K3	CO3	To apply eco-friendly and less wasteful manufacturing process for the sustainable development of our country
K4	CO4	To acquire awareness about research in the field of green chemistry

Syllabus

Unit	Content	Hrs
I	The need for green chemistry: Sustainability and cleaner production. Green chemistry and Eco- efficiency. Environmental Protection Laws. Challenges ahead for a chemist. Green chemistry education.	3
II	<i>Twelve Principles of Green Chemistry- Explanation with examples. Awards for Green Chemistry.</i>	2
III	Water as greener solvent. An alternative approach to solvent chemistry: Solvent free reactions. Solvent free microwave assisted organic synthesis. Ionic Liquids: Prospects and retrospects	3
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.	2
V	Green Techniques: Use of Bio- catalysis, Transition metal catalysts, Supported metal catalysts for green synthesis. Solventless synthesis. Oxidation technology for waste water treatment. Agrochemicals from nature. Chitin – Green polymer.	3
	Total contact Hrs/Semester	13

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Rashmi Sanghi and M.M. Srivastava	Green Chemistry, (Environment Friendly Alternatives), First Edition	Narosa Publishing House, New Delhi.	2007

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	V.K. Ahluwalia	GreenChemistry, (Environmentally Benign Reaction), First Edition	Ane Books Pvt.Ltd., New Delhi	2006
2	Samuel Delvin	Green Chemistry, First Edition	IVY Publishing House, New Delhi.	2006
3	Asim K. Das	Environmental Chemistry with Green Chemistry, First edition	Books and Allied (P) Ltd., Kolkata.	2010

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	M	H	H	H
CO3	H	H	M	H	H
CO4	H	H	M	M	H

Low-L, Medium-M, High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Ms.R.Sudha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	20UCY6S4	Title	Batch :	2020-2023
		Skill Based Elective-II	Semester	VI
Hrs/Week:	1	Theory behind practical chemistry	Credits:	2

Course Objective

To develop the theoretical knowledge in practical chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To remember the basic chemical principles in analysis
K2	CO2	To understand the theoretical concepts pertaining to practical chemistry
K3	CO3	To develop reasoning ability in practical chemistry
K4	CO4	To ensure

Syllabus

Unit	Content	Hrs
I	The students get their hands on training in Inorganic Qualitative Analysis using Semi-Micro Techniques during their first year programme. In the second year, the students are trained in volumetric Estimations and Organic qualitative analysis. During their final year programme, the students are skilled in performing estimations using Gravimetric analysis and Physical Chemistry experiments. Therefore, the students have been trained well in both qualitative and quantitative chemical analysis. This course aims to bring out the students understanding and reasoning ability, and application of their practical knowledge gained during their programme.	
	Total contact Hrs/Semester	13

***Italics denotes self study topics**

Teaching Methods

Online MCQ , online test

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran. V., Veeraswamy. R.and Kulandaivelu. A.R	Basic principles of Practical chemistry	Sultan Chand & Sons	1997

References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas. A.O.	Practical Chemistry for B.Sc., Main Students	Scientific Book Centre	1985

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	M
CO2	H	M	H	H	H
CO3	M	H	M	H	H
CO4	H	H	H	M	H

Low-L, Medium-M, High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Ms.R.Sudha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

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	20UPS3A3/ 20UBY3A4/ 20UZY3A4	ALLIED CHEMISTRY PAPER – I INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY	3	6	30	70	100	4
IV	20UPS4A4/ 20UBY4A5/ 20UZY4A5	ALLIED CHEMISTRY PAPER – II INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY	3	6	30	70	100	4
IV	20UPS4A5/ 20UBY4A6/ 20UZY4A6	ALLIED CHEMISTRY PRACTICAL	3	2	40	60	100	2

Programme code:	B.Sc.	Programme Title :	PHYSICS/BOTANY/ ZOOLOGY	
Course Code:	20UPS3A3/ 20UBY3A4/ 20UZY3A4	Title	Batch :	2020-2023
		Allied Chemistry Paper – I Inorganic, organic and physical chemistry	Semester	III
Hrs/Week:	6		Credits:	4

Course Objective

To develop the skill to aesthetically appreciate General Chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the principles of coordination chemistry and applications to biologically important molecules
K2	CO2	To gain knowledge on industrially important materials and water treatment
K3	CO3	To understand the principles of volumetric analysis
K4	CO4	To know the basic principles of electro chemistry

Syllabus

Unit	Content	Hrs
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. 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.	16
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. Softening of hard water – Zeolite process and De-mineralization process – Purification of water for domestic use – Disinfection by Chlorine, Ozone and UV light.	16
III	Aromatic compounds: Electrophilic substitution in benzene. Mechanism of nitration, halogenation, alkylation, acylation and sulphonation. Heterocyclic compounds - Huckel's rule – Aromaticity of Heterocyclic compounds - Nomenclature of heterocyclic compounds- synthesis and reactions of furan- pyrrole- thiophene and pyridine.	15
IV	Chemotherapy :Introduction, Sulphadugs- 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.	16

	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.)	
V	Electrochemistry: Electronic and electrolytic conductors – Faraday's laws of electrolysis – Arrhenius theory of electrolytic dissociation - 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. <i>pH: Definition, Buffer solutions, Importance of buffer in the living systems. Corrosion and its prevention.</i>	15
	Total contact Hrs/Semester	78

***Italics denotes self study topics**

Teaching Methods

Lecture by Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Yadav, M.S	Electrochemistry, 2 nd Edition	Anmol Publications	2001
2	Veeraiyan., V. and Vasudevan, A.N.S.	Ancillary chemistry, 1 st Edition	Einstein publishing house	2001
3	Vaidyanathan,K., Venkateswaran,A. and Ramasamy,R	Allied chemistry, 1 st Edition	Priya publications.	2005

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Puri, Sharma and Pathania	Principles of Physical Chemistry	Vishal Publishing House	2007
2	Jain, P.C. and Monica Jain	Engineering Chemistry, 17 th Edition	Dhanpat Rai Publishing Company(P) Ltd.	2005

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	M	H	H	L	H
CO4	H	M	M	H	M

Low-L,Medium-M,High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Selladurai Mrs.R.Sudha	Dr. Indumathy Ramasamy	Mr.K. Srinivasan	Dr.R.Muthukumaran

Programme Code:	B.Sc.	Programme Title :	PHYSICS/BOTANY/ ZOOLOGY	
Course Code:	20UPS4A4/	Title	Batch :	2020-2023
	20UBY4A5/ 20UZY4A5	Allied Chemistry Paper – II Inorganic, Organic and Physical Chemistry	Semester	IV
	Hrs/Week:	6	Credits:	4

Course Objective

To develop the skill to aesthetically appreciate General Chemistry

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To have a basic ideas on synthetic dyes
K2	CO2	To understand the chemistry of biologically important molecules
K3	CO3	To know the common drugs and their use
K4	CO4	To have a basic idea in polymers & Fuels

Syllabus

Unit	Content	Hrs
I	Fuels: Types of fuels. Characteristics of a good fuel. Calorific value of a fuel. Advantages of gaseous fuels. Natural gas, water gas, producer gas, oil gas, <i>LPG and Gobar gas – Composition and uses (manufacturing details not needed)</i> 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	16
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,Nylon-6.6,Buna-S rubber – Preparation and uses.	16
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. Biologicalfunctions.	16
	Carbohydrates: Classification – preparation and properties of Glucose and Fructose. Elucidation of structure of Glucose. Comparison of properties of	

IV	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).	15
V	Colloidal solution: Types of colloids. Preparation and properties of colloids and applications. Catalysis: Characteristics, types, mechanism of catalytic action and Industrial application Phase rule- Definition of terms involved. phase diagram of H ₂ O, Pb-Ag .	15
	Total contact Hrs/Semester	78

***Italics denotes self study topics**

Teaching Methods

Lecture by chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, Assignment.

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Vaidyanathan, K., Venkateswaran, A. and Ramasamy, R	Allied chemistry, 1 st Edition	Priya publications, Karur	2005
2	Bahl, B.S. and Arun Bhal	Advanced Organic Chemistry 1 st Edition	S.Chand & Company Ltd.	2007

References

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Tyagi, O.D., Yadav,M.	A Text Book of Synthetic Dyes, 1 st Edition	Anmol publications Pvt. Ltd.	2001
2	Soni, P.L.	Text book of Organic Chemistry, 28 th Revised Edition	Sultan Chand & Sons	2002
3	Lubs, H.A.	Chemistry of Synthetic Dyes and Pigments, 1 st Edition	Robert E. Krieger publishingcompany	1995

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	M	H	H	H	M
CO4	H	M	M	H	M

Low-L,Medium-M,High-H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Selladurai Ms.R.Sudha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	PHYSICS/BOTANY/ ZOOLOGY	
Course Code:	20UPS 4A5/	Title	Batch :	2020-2023
	20UBY4A6/ 20UZY4A6	Allied Chemistry Practical	Semester	III & IV
			Credits:	2

Course Objective

To develop analytical skills in volumetric and organic qualitative analysis

Course Outcome

Knowledge Level	CO Number	CO Statement
K1	CO1	To understand the basic concept of volumetric analysis
K2	CO2	To get the idea about organic qualitative analysis
K3	CO3	To distinguish between aliphatic and aromatic, saturated and unsaturated compounds.
K4	CO4	To analyze the functional groups of organic compounds

Syllabus

Unit	Contents	Hours
	Volumetric Analysis: 1. Estimation of sodium carbonate. 2. Estimation of oxalic acid (Acidimetry) 3. Estimation of ferrous ion. 4. Estimation of oxalic acid. (Permanganometry) 5. Estimation of potassium dichromate using sodium thiosulphate 6. Estimation of temporary, permanent and total hardness of water 7. Estimation of Zinc using EDTA. 8. 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	26

Teaching Methods

Demonstration, Group discussions, Quiz, Experience discussion.

Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Venkateswaran. V, Veeraswamy. R and Kulandaivelu. A.R	Basic principles of Practical chemistry, 1 st Edition	Sultan Chand & Sons	1997

Reference

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Thomas.A.O	Practical Chemistry for B.Sc., Main Students,. 3 rd Edition	Scientific Book Centre	1985

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	M	H	M	H	M
CO3	H	H	H	M	M
CO4	M	H	M	H	M

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Selladurai Mrs.R.Sudha	Dr. Indumathy Ramasamy	Mr.K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc., B.A., B.Com.,	Programme Title :	For all UG Degree Programmes	
Course Code:	20UCYV01	Title: Value added course - Food chemistry	Batch :	2020-2023
Hrs/Week:	1		Semester	IV
			Credits:	

Course Objective:

To develop the skill to aesthetically appreciate Food Science

Unit	Content	Hrs
I	Food: Definition for food and nutrition. Functions of food and nutrients. Energy values of foods. Recommended dietary intake, functions and deficiency of the following: Carbohydrate, fat, proteins, vitamins, minerals.	4
II	Food Preservation: Principles and importance of food preservation. Methods of food preservation: Bacterostatic Methods: Dehydration, pickling and salting Bacterocidal Methods: Canning and cooking.	4
III	Milk Processing - Pasteurisation. Brief account of dairy products- Butter, cream, cheese, condensed milk and milk powder. Food Additives: Food preservatives, food colours, food enzymes and antioxidants.	4
IV	Food adulteration: Adulterants and their effects. Incidental and intentional adulterants, metallic contamination. Simple physical and chemical tests for detection of food adulterants. Packaging hazards. Food poisoning and food borne diseases.	4
V	Packaging hazards. Food Laws: FSSAI Food Standard: ISI standards and the Agmark standards. <i>Functions of Food Corporation of India.</i> Outlines of Preparation and bottling of Fruit squashes, fruit juices, pickles, jams and jellies.	4
	Total contact Hrs/Semester	20

Text Books

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Swaminathan M	Essentials of Food and Nutrition	Ganesh Publishers, Madras	1977
2	Sumati R. Mudambi and Rajagopal M.V	Fundamentals of Foods and Nutrition	Wiley Eastern Ltd., New Delhi.	–

References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Subbulakshmi.G. and Shobha A. Udipi	Food Processing and Preservation	New Age International Publishers, New Delhi	–
2	Jayashree Ghosh	Applied Chemistry	S.Chand and company Ltd., New Delhi	2006
3	Mahindru S.N	Food Additives	Tata Mc Graw Hill Publishing Company Ltd	2000

FOOD CHEMISTRY PRACTICAL 10Hrs

Qualitative Analysis:

1. Qualitative analysis of Carbohydrates (Mono, Di and Poly saccharides), Amino acids, Proteins and Lipids.
2. Determination of food adulterants in the following i) Milk ii) Coffee powder, iii) Coconut oil iv) Turmeric powder
3. Preparation of jam and jellies
4. Preparation of pickle
5. Preparation of tomato sauce

References:

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Beedu Sashidhar Tao, Vijay Deshpande	Experimental Biochemistry- A student companion	I. K. nternational (P)m Ltd	2007, First edn.
2	David T Plummer	An Introduction to Practical Biochemistry	Tata McGraw Hill	2007, third edn

Mapping with Programme Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	H	H
CO2	H	M	H	H	H
CO3	M	H	M	H	M
CO4	H	H	H	M	H

Low-L,Medium-M,High- H

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Mrs.R.Sudha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Programme code:	B.Sc., B.A., B.Com.,	Programme Title :	For all UG Degree Programmes	
Course Code:	20UCYV02	Title: Value added course - Chemistry In Every Day Life	Batch :	2020-2023
Hrs/Week:	1		Semester	II
			Credits:	

Course objective:

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

Unit	Content	Hours
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
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
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
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
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-environmental hazards. Bio pesticides.	6
	Total contact Hrs/Semester	30

References:

S.N o.	Author(s)	Title of the Book	Publisher	Year of Publication
1	S.S Dara	A text book of Environmental Chemistry and Pollution Control	S.Chand & Company Ltd.	—
2	Jayashree Ghosh	Applied Chemistry	S.Chand and company Ltd., New Delhi	--
3	Gowariker V.R.Viswanathan N.V. and Jayadev Sreedhar	Polymer Science,	Wiley Eastern Ltd., New Delhi.	--
4	Thangamma Jacob	Applied Chemistry	Macmillan, Home Science and Allied Science Edition	1987
5.	Buchel, K.H.	Chemistry of pesticides	John Willy and Sons, New York.	1983

Mapping with Programme Outcomes

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
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Mrs.R.Sudha	Dr. Indumathy Ramasamy	Mr. K. Srinivasan	Dr.R.Muthukumaran

Question paper pattern for major and allied for the academic year 2020-2023 batch

Duration of Examination – 3 Hours, Total Marks: 70

Section-A— 10 x 1 = 10 marks

Q.No 1-5- Multiple choice questions with four choices, one question from each unit Q.No-6-10-

Short answer- one question from each unit

Section-B- 5 x 4 = 20 marks

Q.No. 11-15 Either / (or) type (like 1.a (or) b) Short answers - two questions from each unit

Section-C— 4 x 10 = 40 marks

Essay type

Q.No. 16-21 Four out of Six. Out of which the Q.No. 16 is compulsory.