DEPARTMENT OF CHEMISTRY

SYLLABUS 2018 - 2021

(OUTCOME BASED EDUCATION)

BOARD OF STUDIES 2018

I, II, III, IV, V & VI SEMESTER

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE

(AUTONOMOUS)

Re-Accredited with 'A' Grade by NAAC

An ISO 9001: 2008 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**		
18UTL101	I	Tamil / Hindi paper – I	6	3	25	75	100	03
18UEN101	II	Applied English -I	5	3	25	75	100	03
18UCY101	III	Core Paper – I Inorganic and Organic chemistry	7	3	25	75	100	04
18UCY203		Core Practical- I Inorganic Qualitative Analysis	2	--	--	--	--	--
18UCY1A1		Allied Mathematics Paper- I	8	3	25	75	100	04
18UHRI01	IV	Skill Based Elective Human Rights in India	1	2	--	50	50	02
18HEC101		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**		
18UTL202	I	Tamil paper – II/ Hindi Paper II	6	3	25	75	100	03
18UEN202	II	Applied English - II	5	3	25	75	100	03
18UCY202	III	Core Paper –II Organic and Physical chemistry	6	3	25	75	100	04
18UCY203		Core Practical- I Inorganic Qualitative Analysis	3	3	40	60	100	03
18UCY2A2		Allied Mathematics Paper-II	8	3	25	75	100	04
18EVS201	IV	Environmental studies	2	2	--	50	50	02
18HEC202		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**		
18UTL303	I	Tamil paper/ Hindi Paper – III	5	3	25	75	100	03
18UEN303	II	English for Excellence- Paper - I	6	3	25	75	100	03
18UCY304	III	Core Paper – III Inorganic and Physical Chemistry	6	3	25	75	100	04
18UCY406		Core Practical II Volumetric and Organic Qualitative Analysis	3	--	--	--	--	--
18UCY3A1		Allied Physics Paper -I	5	3	25	75	100	04
18UCY4A3		Allied Physics Practical for Mathematics and Chemistry	3	--	--	--	--	--
18HEC303	IV	HE – (Professional values & SKY Yoga practice –III)	1	2	25	25	50	01
18UCY3N1/ 18UCY3N2		Skill Based Non Major Elective I Food Science and Technology/ Skill Based Non Major Elective I 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**		
18UTL404	I	Tamil Paper/ Hindi Paper IV	5	3	25	75	100	03
18UEN404	II	English for Excellence Paper -II	6	3	25	75	100	03
18UCY405	III	Core Paper – IV Inorganic, Organic and Physical Chemistry	6	3	25	75	100	04
18UCY406	III	Core Practical II Volumetric and Organic Qualitative Analysis	3	6	80	120	200	05
18UCY4A2	III	Allied Physics Paper - II	5	3	25	75	100	04
18UCY4A3	III	Allied Physics Practical for Mathematics and Chemistry	3	3	40	60	100	04
18HEC404	IV	HE – (Social Values & SKY Yoga practice -IV)	1	2	25	25	50	01
18UCY4N3/ 18UCY4N4	IV	Skill Based Non Major Elective II Water and Water Treatment Processes/ Skill Based Non Major Elective II Diagnostic Chemistry	1	2	--	50	50	02
18UNC401/ 18UNS402/ 18USG 403	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**		
18UCY507	III	Core Paper – V Nuclear and Co-ordination Chemistry	4	3	25	75	100	04
18UCY508		Core Paper – VI Organic Chemistry- I	4	3	25	75	100	04
18UCY509		Core Paper – VII Electro Chemistry	4	3	25	75	100	04
18UCY510		Core Paper- VIII Dye Chemistry	4	3	25	75	100	05
18UCY511		Core Elective I- Analytical Chemistry	4	3	25	75	100	05
18UCY617		Core Practical III Gravimetric Analysis and Physical Chemistry	6	--	--	--	--	--
18UCY5S1 / 18UCY5S2	IV	Skill Based Elective -I Food Chemistry/ Skill Based Elective -I Nano chemistry	1	2	--	50	50	02
18GKL501		General Knowledge& General Awareness	SS	2	--	50	50	02
18HEC505		HE – (National Values & SKY Yoga practice -V)	1	2	25	25	50	01
							650	27

SIXTH SEMESTER								
Course Code	**PART**	**Course**	**Hrs / Week**	**Hrs/ Exam**	**Max.Marks**		**Total**	**Credits**
					Int.	**S.E**		
18UCY612	III	Core Paper – IX Physical Methods and Chemical Structure	4	3	25	75	100	05
18UCY613		Core Paper – X Organic Chemistry-II	4	3	25	75	100	04
18UCY614		Core Paper – XI Chemical Kinetics and Photo Chemistry	4	3	25	75	100	05
18UCY615		Core Elective II- Polymer Chemistry	4	3	25	75	100	05
18UCY616		Project work	6	-	25	75	100	05
18UCY617		Core Practical III Gravimetric Analysis and Physical Chemistry	6	6	80	120	200	05
18UCY6S3/ 18UCY6S4		Skill Based Elective -II Green chemistry / Skill Based Elective -II Clean energy	1	2	--	50	50	02
18HEC606		HE – (Global values & SKY Yoga practice -VI)	1	2	25	25	50	01
							800	32
		GRAND TOTAL					3900	140

Bloom's Taxonomy Based Assessment Pattern

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

1. Theory: 75 Marks Part- I, II, III

(i) TEST- I & II and ESE:

Knowledge Level	Section	Marks	Description	Total
K1	A(Answer all)	10x1=10	MCQ/Define	75
K2	B (Either or pattern)	5x5=25	Short Answers	
K3& K4	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	A(Answer all)	10x1=10	MCQ/Define	50
K2 K3& K4	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 (D2 & D3 Core Practicals)

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

5. Project Part – III (D3 Core Paper)

Knowledge Level	Section	Marks	Total
K3	Project & Dissertation	60	100
K4		40	
K5			

Components of Continuous Assessment

Components		Calculation	CIA Total
Test 1	75	$\frac{75+75+25}{7}$	25
Test 2	75		
Assignment/Seminar	25		

Components of Continuous Assessment (D3 & D2 Core Practicals)

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

Components of Continuous Assessment (D1 & Allied Practicals)

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

Programme Outcomes

The students will be able 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 will be able to

PSO1 have adequate knowledge in the main 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 communication both written and oral

PSO4 gain exposure and ideas in frontier areas of chemical research

PSO5 achieve employability in chemical related industries and as academicians

HOD- Chemistry	**Dr.M. Durairaju**	**Dr. R. Muthukumaran**
	(CDC-Co-ordinator)	**(Controller of Examinations)**

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY101	**Title**	**Batch :**	2018-2021
		Core Paper – I	**Semester**	I
Hrs/Week:	6	**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. Octet rule. Characteristics of covalent compounds. Partial ionic character in covalent bond. - Fajan's rules & its application in explaining properties like melting points and solubility. Co-ordinate covalent bonding: Characteristics. ***Hydrogen bonding-types-application of concept of hydrogen bonding -melting and boiling points of hydrides of Nitrogen, Oxygen and Fluoride, Lesser density of ice.***	**19**
II	Concept of Hybridization: sp, sp^2 and sp^3 with reference to C_2H_2, C_2H_4 and CH_4 . Application 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:**	**18**

	Polar Effects : Inductive, mesomeric, steric inhibition of resonance, electromeric and hyperconjugative effects. Homolytic and Heterolytic fission :Free radicals, carbocation, carbanion, stability. Electrophiles and nucleophiles with examples. Alkenes: Preparations involving dehyrohalogenation, dehydration, dehalogenation, reduction of alkynes and Wittig reaction. Mechanism of β-Elimination: E1 and E2 . Saytzeff and Hofmann rules. Reactions of Alkenes: Addition of hydrogen halide, hypohalous acid, sulphuric acid, water, hydroboration, oxidation by alkaline $KMnO_4$, HIO_4 and Ozonolysis.	
IV	Dienes: Classification and stability. 1,2 and 1,4 addition of Butadiene. Diels-Alder reaction. Alkynes: Preparation of alkynes by dehydrohalgenation, dehalogenation and electrolysis. Reaction: Hydroboration, addition of hydrogen halides, water, formation of acetylides and Ozonolysis. Grignard reagent - Preparation and its synthetic utility of Ethyl magnesium iodide. Aliphatic Nucleophilic Substitution: S_N1 and S_N2 mechanism. 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.	**17**

	Total contact hours/Semester	**90**

***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.	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.	Morrision. 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

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	H	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	S
CO4	S	H	S	H	H

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.Indumathy Ramasamy	Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY202	**Title**	**Batch :**	2018-2021
		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 basics 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**: Distinction between primary, secondary and tertiary alcohols. ***Manufacture of ethanol from molasses. Absolute alcohol, methylated spirit and power alcohol.*** **Dicaboxylic acids** : Preparation and properties of oxalic, malonic, succinic and phthalic acid. **Acetoacetic ester :** Preparation and its application in the synthesis of acetone, adipic acid, crotonic acid and 4-methyl uracil. Keto-enol tautomerism. **Malonic ester**: Preparation and its application 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.	**18**
II	**Carbonyl compounds**: Preparation by Rosenmund reduction, Stephen reaction and dry distillation of calcium salt of fatty acids. Mechanism of Nucleophilic addition reaction in aldehydes and ketones: Addition of Grignard reagent, HCN, $NaHSO_3$ and NH_3. Addition with NH_2-NH_2, $C_6H_5NHNH_2$, NH_2OH, $H_2NCONHNH_2$ and ROH. Mechanism of Aldol, Perkin, Benzoin condensation, Cannizzaro reactions and Reformatsky reaction. Reduction: Wolff-Kishner, Clemmensen, MPV, Lithium Aluminium Hydride and Sodium Borohydride.	**18**

	Oxidation of aldehydes and ketones using Tollen's reagent, Fehling's solution, SeO_2, CrO_3, PCC, PDC 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. Wave mechanics: Characteristics of wave motion. De-Broglies equation. Davison and Germer experiment. Heisenberg's uncertainty principle. Schrodinger wave equation and significance of Ψ and Ψ^2 (Derivation not required)	**18**
IV	Thermodynamics: Importance, Limitations and Thermodynamic terms. Types of Thermodynamic equilibrium and processes. First law of Thermodynamics: Law of conservation of energy, internal energy. Enthalpy and Heat capacity: Relation between Cp and Cv. Work done in an isothermal reversible expansion of an ideal gas. Reversible adiabatic expansion of an ideal gas: Relation between temperature and volume/ pressure. Joule- Thomson Experiment: J-T -Effect, Joule –Thomson coefficient for an ideal gas, Inversion Temperature. Zeroth law of thermodynamics. Absolute zero of temperature.	**18**
V	Second law of thermodynamics: Limitations of First law. Need for Second law of thermodynamics. Various statements of Second law of thermodynamics.	**18**

	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).	
	Total hours/Semester	**90**

***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.	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 Anand S.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

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

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.Indumathy Ramasamy	Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY203	**Title**	**Batch :**	2018-2021
		Core Practical-I Inorganic Qualitative Analysis	**Semester**	II
Hrs/Week:	3		**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
	a) 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. b) Analysis of a mixture containing two cations and two anions of which one will be an interfering ion.	
	Total hours/Semester	30

Teaching Methods

Lab activity, Quiz, Assignment, Experience 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

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	H	S	S
CO2	H	S	H	S	H
CO3	S	S	S	H	S

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.T.Gowrani	Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY304	**Title**	**Batch :**	2018-2021
		Core Paper- III	**Semester**	III
Hrs/Week:	6	**Inorganic and Physical Chemistry**	**Credits:**	04

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	Basic Metallurgical operations**:** Concentration, calcination, roasting, reduction and refining. Alloys: Preparation and properties. Composition and uses of some important alloys of Al, Ni, Sn and Pb.	**18**

	Fertilizers: Important nutrients and their functions. Primary and secondary nutrients**.** Manufacture of urea, ammonium sulphate, super phosphate of lime, triple super phosphate and potassium nitrate.	
II	Cement: Types of cement, composition, manufacture and setting of cement. Glass: Manufacture, types and coloured glass. Inorganic Polymers: Silicones-Preparation, properties and applications. ***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. Petroleum industries in India. Anti-Knocking agents, Octane and Cetane numbers. Synthetic Petrol – Catalytic Cracking of petroleum.	**18**
III	Chemical potential, Gibbs – Duhem equation, variaton 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 Kp and Kc .Van't Hoff's reaction isotherm and isochore. Dedonders concept of chemical equilibria. Hydrogen – Iodine equilibrium, dissociation of PCl_5 and N_2O_4. Lechatelier's principle : Application to synthesis of ammonia .	**18**
IV	Thermodynamics of solutions: Types of solutions: Solution of liquids in liquids. Ideal solution. Raoult's law, Henry's law (Statement only). Non-ideal solution-deviation from Raoults law. Duhem – Margules equation. Fractional distillation and azeotropes.	**18**

	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 $I_2+I^-=I^-_3$.	
V	Colligative properties of solutions: Lowering of vapour pressure: Determination of lowering of vapour pressure by Static method and molecular weight. Elevation of Boiling point: Thermodynamic derivation .Cottrell's method of determination of molecular weight. Depression of freezing point: Thermodynamic derivation .Beckmann's method of determination of molecular weight. Osmotic pressure: Berkley and Hartley's method of determination. Laws of Osmotic pressure. Van't Hoff's equation for osmotic pressure of dilute solution. Abnormal molecular weight and Van't Hoff's factor.	**18**
	Total contact Hrs/Semester	**90**

***Italics denotes self study topics**

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, 15th 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

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

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. T. Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY3N1	**Title**	**Batch :**	2018-2021
		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-	**3**

	Bacterostatic Methods: Dehydration, pickling and salting Bacterocidal Methods: Canning and cooking.	
III	Milk Processing – Pasteurisation and milk products Food Additives : Antioxidants , Food Colours, Food enzymes, Spices and flovouring agents. Merits and demerits of additives and preservatives.	**3**
IV	Food adulteration: Common adulterants and their effects. Intentional and incidental adulterants. Metallic contamination, contamination by pests and pesticide residues. Simple physical and chemical tests for detection of food adulterants.	**3**
V	Packaging hazards. Food poisoning and food borne diseases. Food Laws: FSSAI Food Standard: ISI standards and the Agmark standards. ***Functions of Food Corporation of India*.**	**3**
	Total contact Hrs/Semester	**15**

***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, 2nd Edition	Ganesh Publishers, Madras	2002
2	Sumati R. Mudambi and Rajagopal M.V	Fundamentals of Foods and Nutrition, 3rd 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	H	S	S	H	S
CO2	S	H	H	S	H
CO3	H	S	S	S	H
CO4	S	S	S	S	H

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.T.Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY3N2	**Title**	**Batch :**	2018-2021
		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. Their functions. Medicated soaps. Herbal soaps. Mechanism of action of soap. 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. ***Face powder: Requirements and ingredients*.** Hand cream: Formulations, Ingredients and uses. Nail preparations: Nail bleach, nail lacquers, nail lacquers and nail removers – requirements ingredients and formulations.	**3**
IV	**MAKE UP PREPARATIONS :** Lipstick, Rouge, Mascara – characteristics and ingredients Dentifrices: Tooth paste and tooth powder -Essential and special ingredients and their functions.	**3**
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 hair dyes. Hair removers: Temporary and permanent removal of hair. Quality control of cosmetics in India. Hazards of cosmetics.	**3**
	Total contact Hrs/Semester	**15**

***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	Thangamma Jacob	Text book of Applied Chemistry, 1st Edition	Macmillion	1987

Reference

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

Mapping with Programme Outcomes

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

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.T.Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY405	**Title**	**Batch :**	2018-2021
		Core Paper – IV	**Semester**	IV
Hrs/Week:	6	**Inorganic,Organic and Physical Chemistry**	**Credits:**	04

Course Objective

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

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

Syllabus

Unit	Contents	Hours
I	Transition Elements: Characteristics of transition elements. Trends in periodic properties- electronic configuration, Atomic and ionic sizes, oxidation states, ionization potentials, magnetic behaviour, colour, magnetic properties, catalytic properties and ability to form complexes. Extraction and uses of Ti,V,Mo,W and Co. Platinum Metals: Metallurgy of platinum. ***Platinum black, Platinised asbestos, colloidal platinum -preparation and uses*.** Group Discussions: (i) Cr ,Mo and W (iii) 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 , $FeSO_4$, ammonium molybdate and Platinic chloride.	**18**
II	Inner Transition Elements: Lanthanides and Actinides: Occurrence, electronic structure, oxidation states, colour and absorption spectra, magnetic properties. Lanthanide contraction and its consequences. Separation of Lanthanide elements by ion exchange method. Comparison of Lanthanides and Actinides. Extraction of Uranium from Pitch blende.	**18**
III	Preparation of phenols- from aryl halide and grignard reagent. Reactions of Phenols: Nitration. sulphonation , halogenation, Kolbes schimid reaction, Friedel Crafts reaction, Reimer Tiemann reaction, Duff's reaction, Lederer –Manasse reaction and Gattermann aldehyde synthesis. Nitro Compounds: Aliphatic nitro compounds: Nitromethane and Nitroethane- preparation and properties. Nitro-Acinitro tautomerism. Aromatic nitro compounds : Reduction of Nitrobenzene in neutral, acidic and alkaline media and electrolytic reduction. Preparation of ortho, meta and para dinitrobenzenes, T.N.T.	**18**

IV	**Amines:** Aliphatic amines: separation of mixture of amines, Basicity of amines. Aromatic amines: Preparation and properties of Aniline Diazotisation – Coupling with mechanism Conformational analysis of Ethane, n- Butane and Cyclohexane. Distinguish between Conformational and Configuration. Stereoisomerism.: Types, R-S -configuration, optical isomerism in lactic acid and tartaric acid, racemisation, methods of resolution, asymmetric synthesis. Geometrical isomerism in maleic and fumaric acid. E-Z notation,	**18**
V	Phase rule and phase equilibria: Concept of phase, components and degrees of freedom with examples. Thermodynamic derivation of Gibbs-Phase Rule. One component system: Phase diagram and discussion of water and sulphur system. Two component system : Construction of phase diagram by thermal analysis. Simple 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.	**18**
	Total contact Hrs/Semester	**90**

***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	Soni. P.L.,	Text book of Inorganic Chemistry, 20th edition	Sultan Chand & Sons	2002
2	Bahl, B.S and Arun Bahl	A textbook of Organic Chemistry, 18th 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	PuriB.R.,Sharma.L.R and Madan S. Pathania	Principles of Physical Chemistry, 46th 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	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	H	S	H	S
CO4	H	H	H	S	H

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.T. Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY406	**Title**	**Batch :**	2018-2021
		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 Ferrous ion. 2. Estimation of Oxalic acid. 3. Estimation of Sodium nitrite. 4. Estimation of calcium (Demonstration only). **b) Dichrometry:** 1) Estimation of Ferrous ion using internal indicator. 2) Estimation of Ferric ion using external indicator **c) Iodometry:** 1) Estimation of Copper.(Demonstration only) 2) Estimation of Potassium dichromate. **d) EDTA-Titrations:** 1) Estimation of Calcium. 2) Estimation of Zinc. 3) Estimation of Magnesium. 4) Estimation of hardness of water-temporary and permanent 5)	

	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) Acetylation of Salicylic acid to acetyl salicylic acid. 3) Hydrolysis of benzamide to benzoic acid. 4) Nitration of nitrobenzene to m-dinitrobenzene. 5) Hydrolysis of ester. (ethylbenzoate to benzoicacid)	
	Total hours/Semester	**45**

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 Cente	2003

Mapping with Programme Outcomes

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

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.M.Amutha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY4N3	**Title**	**Batch :**	2018-2021
		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	***Disadvantages of hard water in domestic and industrial use***. 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 : Cation exchange and anion exchange resins. Regeneration of cation and anion exchangers.	**3**
IV	Purification of water for municipal purposes: Filtration, Sedimentation and Coagulation, Sterilization, Physical and Chemical methods. 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 of paper, pulp and food processing industrial wastewater.	**3**
	Total contact Hrs/Semester	**15**

***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, 15th Edition	Dhanpat Rai Publishing Company (P) Ltd.	2005
2	Sharma, B.K	Environmental chemistry, 2nd 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, 3rd Edition	National Pathippaham	2002

Mapping with Programme Outcomes

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

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.T.Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY4N4	**Title**	**Batch :**	2018-2021
		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 . ***General characteristics, Normal and abnormal constituents of urine.***	**3**
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.	**3**
	Total contact Hrs/Semester	**15**

***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

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	H	S
CO2	S	S	H	S	H
CO3	H	S	S	H	S
CO4	H	H	H	S	H

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.T.Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY507	**Title**	**Batch :**	2018-2021
		Core Paper- V **Nuclear chemistry and Co-ordination chemistry**	**Semester**	V
Hrs/Week:	4		**Credits:**	4

Course Objective

To develop the skill to aesthetically appreciate Nuclear and Co-ordination chemistry

Course Outcome

Knowledge Level	**CO Number**	**CO Statement**
K1	CO1	To understand the theory of radioactivity
K2	CO2	To have knowledge on uses of radio-active elements in various fields
K3	CO3	To understand various theories of bonding in coordination compounds and their importance
K4	CO4	To know the chemistry of carbonyls, basic knowledge on metallic bonding and semiconductors

Syllabus

Unit	Content	Hrs
I	Radio activity. Mass defect, packing fraction. Nuclear binding energy, n/p ratio and stability of the nucleus. Differences between nuclear and chemical reactions. Half- life period. Applications of artificial radioactivity : Age of the earth and C^{14} dating, medical field applications Isotopes: Detection of isotope by Aston Mass Spectrograph. Separation of isotopes by Electromagnetic, Thermal diffusion and Electrolytic techniques. Nuclear fission and fusion. Types of nuclear wastes and different methods of disposal of High and low radioactive wastes.	**11**
II	Co-ordination chemistry: Basic concepts of Co-ordination Chemistry. Definitions of the terms: Ligands and Co-ordination number. Classification of ligands. Nomenclature of Co-ordination compounds. Theories of Co-ordination compounds: Werner's Theory: Designation of Cobalt (III)-ammine complexes. Sidgwick's Theory: Electronic interpretation of Co-ordination bond - Effective atomic number rule. Pauling's valence bond theory: Postulates and its applications in the determination of geometry and magnetic property of the complexes.	**13**
III	Crystal field theory: Postulates. C.F.T- splitting of d-orbital in tetrahedral and Octahedral complexes. C.F.T.stabilization energy. Spectrochemical series. Chelates: Definition, classification, stability factors ,sequestration and sequestering agents. Detection and structure determination of Complexes: Solubility method, change in colour, pH measurements and conductance measurements.Molecular orbital theory –concepts and Molecular orbital energy level diagram for $[Co(NH_3)_6]Cl_2$ complex.	**13**
	Isomerism in Co-ordination compounds: Structural isomerism: Ionisation, Hydrate and Linkage isomerism.	

IV	Stereo isomerism: Geometrical isomerism in 4 and 6 - Co-ordination complexes. Optical isomerism in 4 -and 6- Co-ordination compounds. Applications of complexes in quantitative analysis: Estimation of Ni using D.M.G. and Mg using Oxine. Ligands substitution in octahedral complexes: Inert and Labile complexes Nucleophilic ligands substitution reactions, S_N^1 and S_N^2 mechanisms. Substitution reactions with out breaking Metal-Ligand bond. Tran's effect in square planar complexes: Definition , trans effect series and uses of trans effect **.**	**12**
V	Carbonyls Compounds: 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. Metallic bond: Electron Sea model, Valence bond theory and Band theory. ***Semiconductors: Intrinsic and Extrinsic Semi Conductors - n-type and p-type - Properties and uses.*** Structures of alloys: Interstitial, substitutional and intermetallic alloys	**11**
	Total contact Hrs/Semester	**60**

***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.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	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,5th Edition	Black Well Science Ltd, London.	2006
2	Jain. P.C. and Monika Jain	Engineering Chemistry,15th Edition	Dhanpat Rai Publishing Company	2005
3	Gopalan. R. and Ramalingam V.	Concise Coordination Chemistry,3rd Edition	Vikas Publishing house	2006

Mapping with Programme Outcomes

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	S	H
CO4	S	H	H	S	H

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.N. Karpagam	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY508	**Title**	**Batch :**	2018-2021
		Core Paper – VI	**Semester**	V
Hrs/Week:	4	**Organic Chemistry-I**	**Credits:**	4

Course Objective

To make the students to

- understand the mechanisms in 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 - Pinacone. Beckmann, Hoffmann, Curtius, Schmidt, Benzidine, Benzilic acid, Fries, Baeyer Villiger, Cope and Claisen rearrangements.	**12**
II	Heterocyclic Compounds: Chemistry of Furan, Pyrrole, Thiophene, Pyridine, Quinoline, Isoquinoline and Indole. Pyrazole - Preparation and properties	**10**
III	Carbohydrates: Classification, chemistry and structural elucidation of Glucose and Fructose, configuration of Monosaccharides and interconversion in sugar series. [Glucose to Fructose and vice versa, Glucose to Arabinose and vice versa] Mutarotation and epimerization. ***Sucrose, Maltose, Lactose, and Saccharin – Preparation, Properties and uses [Structural elucidation is not needed]***.	**12**
IV	Alkaloids: Definition, occurrence and extraction of alkaloids from plants. General methods of determining structure. Determination of structure of Conine, Piperine, Papaverine and Nicotine	**13**
V	Terpenoids: Classification, isoprene rule and Gemdialkyl rule, Extraction from plants, structural elucidation of Citral, Camphor, α - terpineol and Menthol. Stereochemistry of Menthol.	**13**
	Total hours/Semester	**60**

***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

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	H	S
CO2	S	S	S	S	H
CO3	S	S	H	H	S
CO4	S	H	S	H	H

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.Indumathy Ramasamy	Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY509	**Title**	**Batch :**	2018-2021
		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: Determination of transport number by the Hittorf's method and the Moving Boundary Method. Arrhenius theory of electrolytic dissociation and the Ostwalds dilution law. Kohlrausch's law of independent migration of ions and its applications. Debye -Huckel theory of strong electrolytes. Explanation and Debye Huckel Onsager equation for the equivalent conductivity of strong electrolytes.(Derivation not required).Wein and Debye Falkenhagen effects.	**15**
II	Applications of conductance measurements: Determination of degree of dissociation of weak electrolytes, determination of ionic product of water, determination of solubility of sparingly soluble salts 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.	**12**
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: Theory of Acid-Base Indicators. Acid-Base Titrations and use of Indicators.	**11**

	Hydrolysis of Salts: Degree of hydrolysis, Relationship between K_h, K_w and the dissociation constant for salts such as sodium acetate, ammonium chloride and ammonium acetate.	
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 doubt- ful cases (Hg^{+}/Hg^{2+}), equilibrium constant of a electrochemical reaction, determination of transport number, determination of solubility of sparingly soluble salts.	**11**
V	Batteries: Dry Cell, Lead-Acid storage cell and Nickel- Cadmium 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. ***Prevention of corrosion: Proper designing, using pure metal, using metal alloys, cathodic protection, modifying the environment and uses of inhibitors. (Brief account only)*** Metallic coatings: Anodic and cathodic coatings. Method of application of metallic coatings: Hot dipping and electro plating. (Nickel and chromium plating).	**11**
	Total hours/semester	**60**

***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 Monica Jain.,	Engineering Chemistry, 17th 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.,	Principle of Physical Chemistry, 4th Edition	Amerind ublishing Co. Pvt.Ltd	1972
2	Negi. A.S. and Anand. S.C	A Text book of Physical Chemistry, 4th Edition	New Age International (P) Ltd.	1995
3	Atkins. P.W.,	Physical Chemistry	ELBS/ Oxford University Press	1987

Mapping with Programme Outcomes

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	S
CO4	S	H	H	S	H

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

Compiled by Name with Signature	**Verified by HOD Name with Signature**	**CDC**	**COE**
Dr.M.Amutha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title:**	CHEMISTRY	
Course Code:	18UCY510	**Title**	**Batch:**	2018-2021
		Core Paper – VIII	**Semester**	V
Hrs/Week:	4	**Dye Chemistry**	**Credits:**	4

Course Objective

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

Course Outcome

Knowledge Level	**CO Number**	**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 acquire knowledge in process and applications of dyes

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: Witt's theory, Quinonoid theory and Molecular orbital theory of various transitions.	**11**
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 substitutents 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.	**13**
III	Diphenyl methane dyes: Auramine O and Auramine G - synthesis and uses. Triphenyl methane dyes: Malachite green, Rosaniline, and 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.	**13**
	Anthroquinone dyes: Anthraquinone acid dyes – Alzarin cyanine green and Solway ultra blue B, Mordant dyes – Alizarin and Alizarin Blue, Vat dyes- CI Vat Blue 43 and Carbazole and Disperse dyes - Disperse Red 15.	

IV	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. cellulosiic fibers b. acrylic fibers.	**12**
V	Types of textile fibres: Natural, Semisynthetic and Synthetic fibres – Cotton, Wool, Silk, Cellulose acetate, Viscose rayon, polyamides, polyacrylonitrile and polyester. Binding of dyed with fibre- Ionic forces, Hydrogen bonds, Vander Waals forces, Covalent bonds. Selection of dyes for different fibre, Fastness properties of dyes. Process of dyeing: A simple treatment, various methods of dyeing - Direct dyeing, Mordant dyeing, Vat dyeing, Disperse dyeing. Formation of dye on the fibre. ***Pollution problems in dyeing industry***. Non-textile uses of dyes: Uses of dyes in leather, paper, foods and drugs, colour photography and indicators.	**11**
	Total contact Hrs/Semester	**60**

***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	Tyagi. O.D. and Yadav. M.A.	Text Book of Synthetic Dyes	Anmol publications Pvt. Ltd.	2001
2	Bahl and Arun Bhal B.S.	Advanced Organic Chemistry	S.Chand & Company Ltd.	2007

References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Rao. R.S., Vidya Chawathe 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	H	S	S	H	S
CO2	H	S	H	S	H
CO3	H	S	S	S	S
CO4	S	S	H	S	H

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

Compiled by Name with Signature	**Verified by HOD Name with Signature**	**CDC**	**COE**
Dr.T.Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY511	**Title**	**Batch :**	2018-2021
		Core Elective Paper – I	**Semester**	V
Hrs/Week:	4	**Analytical chemistry**	**Credits:**	4

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 nephlometry 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	***Data Analysis: Definition and terms – absolute and relative error. Precision and accuracy. Classification of errors. Sources and minimisation of errors. Significant figures.*** Gravimetric Analysis: Precipitation methods. Conditions of precipitation, coprecipitation and post precipitation. Precipitation from homogeneous solution. Washing of the precipitate. Organic precipitants – DMG, Cupron, Cupferron, oxine and salicylaldoxime.	**12**
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.	**12**
III	Polarimetry: Theory and instrumentation. Comparison of acid strength using polarimeter. Nephlometry and Turbidimetry: Theory, principles and applications in Inorganic analysis, turbidimetric titrations and phase titrations. Flame photometry: Theory, principle and applications in Qualitative and Quantitative analysis.	**11**
IV	Polarography: Principle, dropping mercury electrode – advantages and disadvantages Experimental assembly, current – voltage curves. Significance of Ilkovic equation. (derivation not required) Half wave potential. Application in qualitative and quantitative analysis. Amperometric Titrations: Principle, apparatus and technique. Dead stop end point method. Advantages and disadvantages of amperometric titrations.	**11**
	Chromatographic techniques:	

V	Paper Chromatography: Principle, RF value and experimental details. Applications in qualitative and quantitative analysis. Thin Layer Chromatrography: Principle, brief account of experimental details and its advantages. Applications in the separation of amino acids Coloumn Chromatography: Principle, experimental details, factors affecting the column efficiency and applications. Ion Exchange Chromatography: Principle, resins, action of resins and applications in softening of hard water.	**14**
	Total contact Hrs/Semester	**60**

***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, 5th Edition	Himalaya publishing House	2005
2	Arthur. I.Vogel	Inorganic Quantitative Analysis,3rd Edition	Longmans	1964
3	Khopkar	Basic concepts of Analytical Chemistry, 3rd Edition	Wiley Eastern Ltd	1992

Reference

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

Mapping with Programme Outcomes

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

S-Strong; H-High; M-Medium

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.A.Ayyasamy	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY5S1	**Title**	**Batch :**	2018-2021
		Skill Based Elective-I	**Semester**	V
Hrs/Week:	1	**Food Chemistry**	**Credits:**	02

Course Objective

To develop the skill to aesthetically appreciate Food Science

Course Outcome

Knowledge Level	**CO Number**	**CO Statement**
K1	CO1	To learn about the importance and the basic principles of food processing
K2	CO2	To understand the practical methods of home preservation of foods
K3	CO3	To know about awareness on safety of food supply
K4	CO4	To encourage the students to opt their career as Food chemists in Food industry

Syllabus

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.	**3**
II	Food Preservation: Principles and importance of food preservation. Methods of food preservation: Bacterostatic Methods: Dehydration, pickling and salting Bacterocidal Methods: Canning and cooking.	**3**
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.	**3**
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.	**3**
V	Packaging hazards. Food Laws: FSSAI Food Standard: ISI standards and the Agmark standards. ***Functions of Food Corporation of India.*** Outlines of Preparation and bottling of Fruit squashes, fruit juices, pickles, jams and jellies.	**3**
	Total contact Hrs/Semester	**15**

***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	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

Mapping with Programme Outcomes

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

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE

Ms. R. Sudha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY5S2	**Title**	**Batch :**	2018-2021
		Skill Based Elective-I	**Semester**	V
Hrs/Week:	1	**Nano Chemistry**	**Credits:**	2

Course Objective

To develop the skill to aesthetically appreciate Nano chemistry

Course Outcome

Knowledge Level	**CO Number**	**CO Statement**
K1	CO1	To learn about the importance and the basic concepts of Nanochemistry

K2	CO2	To acquire knowledge on carbon nano tubes and its various methods of preparation
K3	CO3	To know about the quantum dots
K4	CO4	To learn the applications of nanomaterials in various fields

Syllabus

Unit	Content	Hrs
I	Nano and nature -Diversity in Nanosystems. Significance of Nanomaterials.Fullerenes-introduction – Preparation by Pyrolysis and purification of fullerenes Chemistry of fullerenes in the condensed phase.	**3**
II	Carbon Nanotubes- IntroductionW – Preparation by Chemical Vapour deposition and purification– Tungston Sulphide and Titanium dioxide.	**3**
III	Fabrication techniques, imaging and manipulation tools at the nanoscale-nanoscale Devices and circuits. (e.g.) FETS, Quantum dots.	**3**
IV	***Nano medicine and its importance in medical diagnostics***, molecular therapeutics - Nano electronic – Nano optical and Nano chemical.	**3**
V	Molecular manufacturing – Nano / molecular communication – Nano navigation – Nano scale manipulation and control Nano robots for medical application.	**3**
	Total contact Hrs/Semester	**15**

***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	Sulabha. K.K	Elements of Nanotechnology	M/S IBD Publications New Delhi	2007

Reference

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Pradeep.T	Nano: The essentials	Tata McGraw Hill Publishing Co. Ltd. New Delhi	2007

Mapping with Programme Outcomes

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

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Ms.R.Sudha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY612	**Title**	**Batch :**	2018-2021
		Core Paper – IX	**Semester**	VI
Hrs/Week:	5	**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	**Absorption Spectroscopy:** Types of changes induced by the interaction of electromagnetic radiation with matter. Types of Electromagnetic spectrum, theory, selection rules and principles. **Theoretical principles of spectroscopy:** **Microwave Spectroscopy:** Theory, Rigid and non-rigid rotar 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 model. Force constant, Vibrational frequency, factors affecting carbonyl stretching frequency (inductive and mesomeric effects), hydrogen bonding. Pattern of spectral lines of harmonic oscillator, Overtones, combination bands, Fermi resonance and fingerprint region.	**15**
II	**Raman spectroscopy:**	**15**

	Origin of Raman lines - stokes and anti-stokes line. Characteristics of Raman lines, Mechanism of Raman effect, Differences between Raman and Infrared spectra. **UV and Visible Spectroscopy:** Theory, types of electronic transition, chromophore, auxochrome, intensity shifts, absorption bands and intensity. Franck – Condon principle, pre-dissociation spectra, Birge-Spooner method of evaluation of dissociation energy from electronic spectra. Woodward Fischer rule of calculation of absorption maxima in dienes.	
III	**NMR:** Theory and principles, chemical shift, factors affecting chemical Shift,Anisotropy and inductive effect, reference standard TMS and solvents used. Splitting of signals, spin-spin coupling, coupling constant (elementary ideas). Application of NMR in the study of simple molecules (Ethanol, Ethyl bromide, Benzene, Toluene, Xylene and Mesitylene). **ESR:** Theory, 'g' factor, derivative curves. Hyperfine splitting, line width. Application to $^{\bullet}CH_3$ and Mn^{2+} ion.	**15**
IV	**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) structure – crystal structures of ionic and covalent compounds like 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-Scherer method.	**15**
V	**Electrical properties of Molecules:** ***Polar and non-polar molecules, Dipolemoment, Meaning of the terms – total molar polarisation, orientation polarisation and distortion polarisation. Effect of temperature on Molar polarization. Determination***	**15**

	of dipolemoment of polar gas, Application of dipolemoment in the study of simple molecules. **Magnetic properties of molecules:** Meaning of the terms – magnetic susceptibility, magnetic permeability, magnetic moment. Diamagnetism, Paramagnetism and Ferromagnetism.Curie-Weiss Law. Determination of magnetic susceptibility of paramagnetic substance using Guoy balance. Application of magnetic properties in solving structural problems involving in simple and complex molecules.	
	Total hours/Semester	**75**

***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 Mc Graw Hill Company	1988

Mapping with Programme Outcomes

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

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.Indumathy Ramasamy	Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	Programme Title :	CHEMISTRY	
Course Code:	18UCY613	Title	Batch :	2018-2021
		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 organic chemistry
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, pharamacologists or medical representative

Syllabus

Unit	Content	Hrs
I	Solving problems of structures of organic compounds based on reactions of the following: Aldehydes, Ketones, Amines, Nitrocompounds, Phenols and Acids. ii) Polynuclear hydrocarbons: Condensed system – Naphthalene , Anthracene and phenanthrene-Preparation, properties and uses. Structural elucidation of Naphthalene and Anthracene.	**13**
II	Amino acids: Classification, Glycine and Alanine: Properties and synthesis by the following methods: Amination of α - halogen acids, Gabriel's phthalimide synthesis and Strecker synthesis. Synthesis of polypeptides by carbobenzoxy method.(Berg method)	**12**

	ii) Proteins: Classification, primary and secondary structure of proteins, denaturation and biological functions of proteins.	
III	Nucleic Acids: Carbohydrates present in nucleic acids. Nitrogen bases present in nucleic acids. Nucleosides-Examples. Nucleotides- Examples .Functions of nucleotides. Nucleotide as energy carriers. Structure of DNA. Replication of DNA. Functions of DNA. ii) Lipids: Classification according to Bloor. Sources, extraction. Properties and analysis of oils and fats.	**13**
IV	Vitamins: Introduction , Definition and classification of fat and water soluble vitamins, occurrence, deficiency diseases. Synthesis of the following: Vitamin A1(retinol), Vitamin B1, Pyridoxine and Ascorbic acid	**12**
V	Chemotherapy: Introduction, Definition and classification of drugs. i) Sulphadrugs: Mode of action. Structure and uses of sulphanamide , sulphapyridine, sulphadiazine, sulphaacetamide, sulphathiazole and sulpha guanidine. ***ii) Antimalarials: Classification, structure and uses of chloroquine and pamaquine.*** ***iii) Antiseptics: Definition, structure and uses of chloramine-T and Iodoform*** . iv) Anaesthetics: characteristics, structure and uses of Procaine and Pentothal sodium. v) Antibiotics: Introduction, structure and uses of Penicillin and Tetracycline. (Note: Structural elucidation of drugs not required	**10**
	Total contact Hrs/Semester	**60**

***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, 1st 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	S	S	S	H	S
CO2	H	S	H	S	S
CO3	H	S	S	S	H
CO4	S	H	H	M	H

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

Compiled by Name with Signature	**Verified by HOD Name with Signature**	**CDC**	**COE**
Dr.A.Ayyasamy	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY		
Course Code:	18UCY614	**Title**		**Batch :**	2018-2021
		Core Paper – XI		**Semester**	VI
Hrs/Week:	4			**Credits:**	4

		Chemical kinetics and photochemistry		

Course Objective

To develop the skill to aesthetically appreciate Chemical Kinetics and Photochemistry

Course Outcome

Knowledge Level	**CO Number**	**CO Statement**
K1	CO1	To understand the concept of rate of reaction
K2	CO2	To derive rate equations of various orders
K3	CO3	To understand the effect and consequence of radiation on molecular level
K4	CO4	To get basic knowledge in adsorption theories

Syllabus

Unit	**Content**	**Hrs**
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 t½ - for first, second and n^{th} order reactions.	**13**

	Experimental techniques for measuring reaction Kinetics – Volumetry and Polarimetry.	
II	Methods of determining order of a reaction – Differential rate expressions, Integral rate expressions and Half-life method. Equilibrium approximation and Steady state approximation. Effect of Temperature on reaction rates – Temperature co-efficient, The Arhenius equation – Derivation, activation energy and its determination. Theories of reaction rates: Lindemann theory of Unimolecular reactions, Collision theory and Absolute reaction rate theory. Comparision of ARRT with Collision theory.	**13**
III	Catalysis: General characteristics of Catalytic reactions. Types of catalysis – Theories of Homogeneons and Heterogeneons 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 – Laugmuir adsorption isotherms.	**12**
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 experimental 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).	**11**
V	***Colloids: Classification, preparation and application of colloids*** Properties of colloids: ***Optical properties: Tyndall effect and Brownian movement*** Electrical properties: Charge on colloidal particle, Electrical double layer and Zetapotential. Electrokinetic properties: ElectroOsmosis and Electrophoresis.	**11**

	Emulsions: Preparation, Properties and Applications. Gels: Properties and Applications.	
	Total contact Hrs/Semester	**60**

***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	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,4th 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	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	S	S
CO4	S	H	H	S	H

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.M.Amutha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY

Course Code:	18UCY615	Title	Batch :	2018-2021
		Core Elective – II	Semester	V I
Hrs/Week:	4	Polymer Chemistry	Credits:	4

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:	**15**

	Plastics: Definition – Thermoplastic, Thermosetting plastics, Reinforced Plastic. Elastomers: Definition – Natural & synthetic rubber – smoked rubber Reclaimed rubber – Foam rubbers – Spongy rubber – Laminate rubber. Adhesives: Definition – thermosetting – thermo resins. Fibres: Definition –Natural and synthetic. Classification: comfort – safety – Industrial fibres. Thermal stabilisers- Antioxidants-photostabilisers. Polymerization Techniques: Bulk, Solution, Suspension and Emulsion Polymerization.	
II	Different types of polymerisation: Addition Polymerization & 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 co polymers.	**11**
III	Stereo Regular Polymers: Isotatic, syndiotactic & Atactic. Geometrical isomers. Factors influencing Structural regularity. Ziegler – Natta Catalysts – Bi metallic and Mono metallic mechanisms. Glass transition temperature (Tg) and Tm. Determination of Tg by differential scanning calorimeter. Factors affecting Tg Tg of copolymers. Degradation - Types of degradation - Thermal., Photo, High energy radiation and Oxidative	**12**
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	**11**

V	Polymer processing techniques: Calendaring, film casting, compression moulding, injection moulding, blow moulding, extrusion moulding foaming and filament winding technique Preparation and uses of the following polymers: ***Polyethylene (LDPE & HDPE), P.V.C, Teflon, polystyrene, Nylon-6, Nylon-66,Polyester, Phenol formaldehyde resins and Polycarbonates.***	**11**
	Total hours/Semester	**60**

***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.Billmeyor, 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 age International(P) Ltd	1989

2	Charles G.Geberlein, Brown. Wm.C	Chemistry and Our World	Publishers(Singapore), ISBN 069716574-4	1997
3	M.Gopala Rao and Marshall Sitig	Drydens Outlines of Chemical Technology for the 21 st Centuary, 3rd Edition	East-West Press	1997

Mapping with Programme Outcomes

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	S
CO4	S	H	H	S	H

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

Compiled by Name with Signature	**Verified by HOD Name with Signature**	**CDC**	**COE**
Dr.T.Gowrani	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY616	**Title**	**Batch :**	2018-2021
		Core Elective Paper-III Project	**Semester**	VI
Hrs/Week:	6		**Credits:**	5

Course Objective

To enable the students to

- acquire knowledge about the qualitative analysis of potable water
- gain awareness about research
- create research aptitude

Course Outcome

Knowledge Level	CO Number	CO Statement
K4	CO1	To understand the importance of analyzing the quality of potable water
K4, K3	CO2	To analyse, compare and interpret the results of water quality in all the locations
K4, K5	CO3	To decide and interpret the precautionary measures to be taken to save and improve the quality of water in different locations

Syllabus

Unit	Content	Hrs
	To test the quality of potable water in and around Pollachi taluk and assign the geochemical type of water available. To create awareness among the people about the quality of drinking water presently used by them and to take necessary precautionary measures to save and improve the quality of water in their area.	
	Total Hrs/semester	**78**

Teaching Methods

Field work, lab analysis, Power point presentations, Group discussions, Seminar, Lab activity, Quiz, Assignment, Experience Discussions, Demonstration,

Text Book

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Satinder Ahuja	Monitoring water quality, Ist edition	Elsevier Publications	2013

Reference Book

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.		Standard Methods for the Examination of Water and Wastewater, 22nd edition	APHA, AWWA and WEF	2012

Mapping with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	H
CO2	H	S	H	S	S
CO3	S	S	S	H	S

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

Compiled by Name with Signature	**Verified by HOD Name with Signature**	**CDC**	**COE**
Dr.A. Ayyasamy	Dr.A. Ayyasamy	Dr.M. Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY617	**Title**	**Batch :**	2018-2021
		Core Practical – III	**Semester**	VI
Hrs/Week:	8	**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 Physicl chemistry experiments

Syllabus

Unit	Content	Hrs
	I: Gravimetric Estimations: 1. Lead as Chromate 2. Barium as Chromate 3 . Barium as Sulphate 4. Nickel as dimethyl glyoxime complex (for class purpose only) 5 . Calcium as Calcium oxalate. **II: Physical Chemistry:** **1. Heterogeneous Equilibria:** i) Determination of transition temperature (thermometric method) a) Sodium acetate b) Sodium thiosulphate c) Strontium chloride 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 acelate	

	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(Demonstration only)** a) Acid – Base titration (HCl X NaOH). b) Redox titrations ($FeSO_4$X $K_2Cr_2O_7$)	
	Total Hrs/semester	**90**

Teaching Methods

Demonstration, Seminar,Experience 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

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

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.Indumathy Ramasamy	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY6S3	**Title**	**Batch :**	2018-2021
		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	***Twelve Principles of Green Chemistry- Explanation with examples. Awards for Green Chemistry.***	**3**
III	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.	**3**
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	**15**

***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	Green Chemistry, (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

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

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

Compiled by Name with Signature	Verified by	CDC	COE

	HOD Name with Signature		
Ms.R.Sudha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UCY6S4	**Title**	**Batch :**	2018-2021
		Skill Based Elective-II	**Semester**	VI
Hrs/Week:	1	**Clean Energy**	**Credits:**	2

Course Objective

To develop the skill to aesthetically appreciate Clean Energy

Course Outcome

Knowledge Level	**CO Number**	**CO Statement**
K1	CO1	To learn about renewable sources of energy patterns
K2	CO2	To understand the Harvesting technologies for its utilization
K3	CO3	To develop policy objectives of sovereignty, national security and self-sufficiency about awareness on safety of food supply
K4	CO4	To ensure alternative sources of energy that are clean, reliable stable and sustainable

Syllabus

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

***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	Rai, G.D	Non Conventional Energy Sources	Khanna publishers New Delhi	1999

References

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Sukhatme, S.P	Solar Energy	Tata McGraw-Hill Publishing Company Ltd., New Delhi.	1997
2	Asim K Das	Environmental chemistry with Green chemistry	Books and Allied (P) Ltd, Kolkata.	2010

Mapping with Programme Outcomes

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

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

Compiled by Name with Signature	Verified by	CDC	COE

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UPS3A3/ 18UBY3A4/ 18UZY3A4	**Title**	**Batch :**	2018-2021
		Allied Chemistry Paper – I Inorganic, organic and physical chemistry	**Semester**	III
Hrs/Week:	6		**Credits:**	4

	HOD Name with Signature		
Ms.R.Sudha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

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 of H_2, N_2, O_2, F_2, bond order. 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.	**16**
II	Volumetric Analysis: Primary and Secondary standard substances. Principles of volumetric analysis. Preparation of normal, molal and molar solutions. Principle of acid - base titration 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**
	Covalent bond: Orbital overlap, hybridization, geometry of organic molecules – CH_4, C_2H_4, C_2H_2, C_6H_6. Inductive, Electrometric, Mesomeric, Hyperconjugative and Steric effects. Effect in properities of compounds.	

III	Aromatic compounds: Electrophilic substitution in benzene. Mechanism of nitration, halogenation, alkylation, acylation, sulphonation.	**15**
IV	Chemotherapy **:** Introduction, Sulphadrugs : Mode of action. Antimalarials **:** Classification and use of chloroquine and Pamaquine. Antiseptics **:** Definition and uses of chloramines – T, Iodoform and Dettol. Anaesthetics **:** Classification, characteristics and uses of procaine and pentothal sodium. Antibiotics **:** Introduction, use of Penicillin, Chloromycetin, Streptomycin and Tetracyclin. Vitamins **:** Classifications, occurrence and deficiency diseases caused by Vitamin A, B complex, C, D, E and K. **(Note :** In Unit – IV structure of the compounds are not required.)	**16**
V	Electrochemistry: Electronic and electrolytic conductors – Faraday's laws of electrolysis – Arrhenius theory of electrolytic dissociation – Ostwald's dilution law. Conductance: Specific and molar conductance, Variation of conductance with dilution . Determination of molar conductance of an electrolyte, Kohlrausch law and its applications. ***pH: Definition, Buffer solutions, Importance of buffer in the living systems.***	**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, 2nd Edition	Anmol Publications	2001
2	Veeraiyan., V. and Vasudevan, A.N.S.	Ancillary chemistry,1st Edition	Einstein publishing house	2001
3	Vaidyanathan, K., Venkateswaran, A. and Ramasamy, R	Allied chemistry, 1st 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, 17th Edition	Dhanpat Rai Publishing Company(P) Ltd.	2005

Mapping with Programme Outcomes

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

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

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr.N.Karpagam Dr.N.Santhi Ms.R.Sudha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

Programme code:	B.Sc.	**Programme Title :**	CHEMISTRY	
Course Code:	18UPS4A4/ 18UBY4A5/ 18UZY4A5	**Title** **Allied Chemistry Paper – II Inorganic, Organic and Physical Chemistry**	**Batch :**	2018-2021
			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, ***LPG and Gobar gas – Composition and uses (manufacturing details not needed)*** Fertilizers: Manufacture of urea, ammonium sulphate, super phosphate of lime, Triple super phosphate and potassium nitrate. Silicones: Preparation, properties and uses. Glass: Manufacture, typ es of glass – soft glass, hard glass, flint glass, Pyrex glass and Coloured glass.	**16**
	Synthetic Dyes : Definition, classification based on structure and application. Colour and constitution – Chromophore – Auxochrome Theory. Synthesis and uses of the	

II	following dyes : Azo dyes – methyl orange Vat dyes – Indigo (from anthranillic acid) Anthraquinone dyes (Alizarin) Pthalein dyes – Phenophthlein 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. Biological functions.	**16**
IV	Carbohydrates: Classification – preparation and properties of Glucose and Fructose. Elucidation of structure of Glucose. Comparison of properties of glucose and fructose. Conversion of Glucose to Fructose and Fructose to Glucose. Sucrose : Preparation, properties and structure (Elucidation of structure not necessary)Starch and Cellulose : Properties and uses (Elucidation of structure not necessary).	**15**
V	Colloidal state: Types of colloids. Preparation and properties of colloids and applications. Emulsions and gels: Preparation, properties and applications. Catalysis: Characteristics, types, mechanism of catalytic action and Industrial application	**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, 1st Edition	Priya publications, Karur	2005
2	Bahl, B.S. and Arun Bhal	Advanced Organic Chemistry1st 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, 1st Edition	Anmol publications Pvt. Ltd.	2001
2	Soni, P.L.	Text book of Organic Chemistry, 28th Revised Edition	Sultan Chand & Sons	2002
3	Lubs, H.A.	Chemistry of Synthetic Dyes and Pigments, 1st Edition	Robert E. Krieger publishing company	1995

Mapping with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H

Programme code:	B.Sc.	**Programme Title :**		CHEMISTRY	
Course Code:	18UPS 4A5/ 18UBY4A6/ 18UZY4A6	**Title**		**Batch :**	2018-2021
		Ancillary Chemistry Practical		**Semester**	III & IV
Hrs/Week:	2			**Credits:**	2

CO3	M	S	S	S	H
CO4	S	H	H	S	H

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.N.Karpagam Dr.N.Santhi Ms.R.Sudha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran

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 copper using Sodium thiosulphate.(Demonstration only) 7. Estimation of temporary, permanent and total hardness of water 8. Estimation of Zinc using EDTA. 9. Estimation of Mg using EDTA. **Organic analysis:** Detection of elements. Nitrogen, Sulphur and Halogens. **1.** To distinguish between aliphatic and aromatic, saturated and unsaturated compounds. **2.** Functional group tests for : i) Mono and Dicarboxylic acids;	

	ii) Phenols iii) Carbohydrates(Reducing and non reducing) iv) Amines and v) Amides.	
	Total contact Hrs/Semester	**45**

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, 1st 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,. 3rd Edition	Scientific Book Centre	1985

Mapping with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	H	S
CO2	H	S	H	S	H
CO3	S	S	S	H	H

CO4	H	S	H	S	H

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

Compiled by **Name with Signature**	**Verified by** **HOD Name with Signature**	**CDC**	**COE**
Dr.N.Karpagam Dr.N.Santhi Ms.R.Sudha	Dr.A.Ayyasamy	Dr.M.Durairaju	Dr.R.Muthukumaran