FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : CHEMISTRY

NAME OF THE PROGRAMME : B.Sc. CHEMISTRY

PROGRAMME CODE : UACH

ACADEMIC YEAR : 2023-2024

VISION of the department

To transform the students entrusted in our hands intocompetent chemists.

MISSION OF THE DEPARTMENT

To Transfer the knowledge of chemistry with values to createglobally competent chemists.

To Promote scientific enquiry and inculcate research.To inculcate in students the skills of problem solving.

To create in them the awareness about ecological concerns.

To train to adopt cost effective and eco-friendly green chemistrymethodologies.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

A graduate of B.Sc. Chemistry programme after five years will be

PEO 1	Our graduates will be academic, digital and information literates, creative, inquisitive, innovative and desirous for the “more” in all aspects
PEO 2	They will be efficient individual and team performers, exhibiting progress, flexibility, transparency and accountability in their professional work
PEO 3	The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills

PEO 4	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

GRADUATE ATTRIBUTES (GA)

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

I. SOCIAL COMPETENCE	
GA 1	Deep disciplinary expertise with a wide range of academic and digital literacy
GA 2	Hone creativity, passion for innovation and aspireexcellence
GA 3	Enthusiasm towards emancipation and empowermentof humanity
GA 4	Potentials of being independent
GA 5	Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research
GA 6	Effectiveness in different forms of communications tobe employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professionaland cyber dignity and decorum
GA 8	Integrity respecting the diversity and pluralism in societies, cultures and religions

GA 9	All – inclusive skill sets to interpret, analyse and solvesocial and environmental issues in diverse environments
GA 10	Self awareness that would enable them to recognise their uniqueness through continuous self-assessmentin order to face and make changes building on their strengths and improving their weaknesses
GA 11	Finesse to co-operate exhibiting team-spirit whileworking in groups to achieve goals
GA 12	Dexterity in self-management to control their selves in attaining the kind of life that they dream for
GA 13	Resilience to rise up instantly from their intimidating setbacks
GA 14	Virtuosity to use their personal and intellectual autonomy in being life-long learners
GA 15	Digital learning and research attributes
GA 16	Cyber security competence reflecting compassion,care and concern towards the marginalised
GA 17	Rectitude to use digital technology reflecting civic andsocial responsibilities in local, national and global scenario
II. PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would makethem professionally competent
GA 19	Prowess to be successful entrepreuners and become employees of trans-national societies
GA 20	Excellence in Local and Global Job Markets
GA 21	Effectiveness in Time Management
GA 22	Efficiency in taking up Initiatives
GA 23	Eagerness to deliver excellent service

GA 24	Managerial Skills to Identify, Commend and tapPotentials
III. ETHICAL COMPETENCE	
GA 25	Integrity and be disciplined in bringing stability leading a systematic life promoting good human behaviour to build better society
GA 26	Honesty in words and deeds
GA 27	Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life
GA 28	Social and Environmental Stewardship
GA 29	Readiness to make ethical decisions consistently fromthe galore of conflicting choices paying heed to their conscience
GA 30	Right life skills at the right moment

PROGRAMME OUTCOMES (PO)

On completion of B.Sc. Chemistry programme, the learners would beable to

PO 1	Apply acquired scientific knowledge to solve complex issues.
PO 2	Attain Analytical skills to solve complex cultural, societaland environmental issues.
PO 3	Employ latest and updated tools and technologies to analyse complex issues.
PO 4	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion of B.Sc. Chemistry programme, the learners would beable to

PSO 1	Thorough understanding of all basic concepts andtheories pertaining to Chemistry
PSO 2	A comprehensive view of bonding,structure,reactivity and stability of chemical species.
PSO 3	An overall perspective view of physical principles that govern all physical and chemical transformations .
PSO 4	Basic knowledge about instrumentation involving UV,IR,ESR and NMR
PSO 5	Hands on experience of laboratory experiments both qualitative and quantitative
PSO 6	Project undertaking enables presentation of results and strengthens the learners in lab to land procedures that nurture societal need and environmental protection.
PSO 7	Diversified informative sources that equip learners toenter varied fields
PSO 8	Additional in-puts of using appropriate software related to Chemistry and chemical calculations

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

B.Sc Chemistry FRONT PAGE

Programme Code: UACH

SEMESTER	COURSE CODE	COURSE	HOURS	CREDITS	CIA MARKS	END SEM MARKS	TOTAL MARKS
I	23C1CC1	General Chemistry–I	5	6	40	60	100
	23C1CC2	Inorganic estimation and Preparations	5	4	40	60	100
	23C1GEZ1/ 23C1GEN1	Chemistry for Biological Sciences-I (for Zoology and Home Science students)	3	3	40	60	100
	23C1GEZ2 /23C1GEN2	Chemistry Practical's for biological sciences	1	2	40	60	100
	23C1SE1	Food Chemistry (NME)	2	2	40	60	100
	23C1FC	Foundation Course in Chemistry	2	2	40	60	100
II	23C2CC3	General Chemistry–II	5	6	40	60	100
	23C2CC4	Qualitative Organic Analysis and preparation	5	4	40	60	100
	23C2GEZ3/ 23C2GEN3	Chemistry for Biological Sciences-II (for Zoology and Home Science students)	3	3	40	60	100
	23C2GEZ4/ 23C2GEN4	Chemistry Practical for Biological Sciences (for Zoology and Home Science students)	1	2	40	60	100
	23C2SE2	Dairy Chemistry (NME)	2	2	40	60	100
	23C2SE3	Cosmetics and Personal care Products (Discipline Specific)	2	2	40	60	100
III	19C3CC7	Organic &Inorganic Chemistry (Aromatic Hydrocarbons, Aromatic Electrophilic, Nucleophilic Substitution, Chemistry of VII Group, d-Block Elements)	5	4	40	60	100
	19C3CC8	Physical chemistry-I (Gaseous state, Solutions,dilute	4	3	40	60	100

		solutions,radio activity & Nuclear transformations and nuclear chemistry)					
	19C3SB1	Agricultural chemistry	2	2	40	60	100
	19C3SB1(A)	Dairy Chemistry	2	2	40	60	100
	19C3CC9	Inorganic Qualitative Analysis	3	2	40	60	100
	19P3ACC1	Allied Chemistry –I (Theory behind chemical bonding, quantitative and qualitative analysis, kinetics of chemical reactions and thermodynamics)	3	3	40	60	100
	19P3ACC2	Allied Chemistry Practicals-I	2	2	40	60	100
IV	**19C4CC10**	Inorganic Chemistry-III (Coordination chemistry)	5	4	40	60	100
	19C4CC11	Physical chemistry-II (Chemical Kinetics,Solid State And Distribution Law)	4	3	40	60	100
	19C4SB2	Dyes and Pigments	2	2	40	60	100
	19C4SB2 (A)	Health and Chemistry	2	2	40	60	100
	19C4CC12	Organic Qualitative Analysis	3	2	40	60	100
	19P4ACC3	Allied Chemistry –I	3	3	40	60	100
	19P4ACC4	Allied Chemistry practicals-II	3	3	40	60	100
V	**19C5CC13**	Organic chemistry–III (Aldehydes And Ketones, CarboxylicAcids And Their Derivatives, Stereo isomerism, Amines and Diazo Compounds and Carbohydrates)	6	**4**	40	60	100
	19C5CC14	Physical chemistry –III (Thermodynamics, Phase Rule & GroupTheory)	6	4	40	60	100
	19C5ME1	Spectroscopy	5	5	40	60	100
	19C5ME2	Bio-Chemistry	5	5	40	60	100
	19C5SB3	Medicinal chemistry	2	2	40	60	100

	19C5SB4	Nano Science	2	2	40	60	100
	19C5CC15	Inorganic Practicals	4	2	40	60	100
	22C5CC16	Conventional and Green synthesis	4	2	40	60	100
VI	**19C6CC17**	Organic chemistry –IV (Polynuclear Hydrocarbons, Heterocyclic Compounds, Amino Acids And Proteins)	5	4	40	60	100
	19C6CC18	Physical chemistry-IV	5	4	40	60	100
	19C6ME3	Advanced Organic Chemistry	5	5	40	60	100
	19C6ME4	Polymer Chemistry	5	5	40	60	100
	19C6ME5	Advanced physical chemistry	5	5	40	60	100
	19C6ME6	Advanced Inorganic Chemistry	5	5	40	60	100
	19C6SB5	Computers in Chemistry	2	2	40	60	100
	19C6SB6	Green chemistry	2	2	40	60	100
	19C6CC19	Physical Practicals	6	4	40	60	100

CHEMISTRY- SELF LEARNING

COURSE CODE	COURSE TITLE	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
21UG2SLCA	House Hold Products And Marketing	2	II	40	60	100
22UG4SLNC	Textile Coloration	2	IV	40	60	100
23UG6SLZC	Herbal Cosmetics	2	VI	40	60	100

I B.Sc.CHEMISTRY

SEMESTER –I

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	23C1CC1	GENERALCHEMISTRY-I	Lecture + Tutorial	5+1	5

COURSE DESCRIPTION

This course helps the students to acquire a thorough knowledge of the basics of organic and inorganic chemistry.

COURSE OBJECTIVES

The course aims at

- giving an overall view of the various atomic models and atomic structure
- wave particle duality of matter
- periodic table, periodicity in properties and its application in explaining the chemical behaviour
- nature of chemical bonding, and fundamental concepts of organic chemistry

UNITS

UNIT –I Atomic structure and Periodic trends (18 HRS.)

History of atom (J.J.Thomson, Rutherford); Moseley's Experiment and Atomic number, Atomic Spectra; Black-Body Radiation and Planck's quantum theory - Bohr's model of atom; The Franck-Hertz Experiment; Interpretation of H- spectrum; Photoelectric effect, Compton effect; Dual nature of Matter- De- Broglie wavelength- Davisson and Germer experiment Heisenberg's Uncertainty Principle; Electronic Configuration of Atoms and ions- Hund's rule, Pauli' exclusion principle and Aufbau principle; Numerical problems involving the core concepts.

UNIT –II

Introduction to Quantum mechanics **(18 HRS.)**

Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics; probability interpretation of wavefunctions, Formulation of Schrodinger wave equation - Probability and electron density-visualizing the orbitals -Probability density and significance of Ψ and Ψ2.

Modern Periodic Table

Cause of periodicity, Features of the periodic table; classification of elements - Periodic trends for atomic size- Atomic radii, Ionic, crystal and Covalent radii; ionization energy, electron affinity, electronegativity - electronegativity scales, applications of electronegativity. Problems involving the core concepts.

UNIT –III Structureandbonding **(18 HRS.)**

Ionic bond: Lewis dot structure of ionic compounds; properties of ionic compounds; Energy involved in involved in ionic compounds; Born Haber cycle – lattice energies, Madelungconstant; relative effect of lattice energy and solvation energy; Ion polarization – polarising power and polarizability; Fajans' rules - effects of polarisation onproperties of compounds; problems involving the core concepts.

Covalent bond: Shapes of orbitals, overlap of orbitals – σ and Π bonds; directed valency - hybridization; VSEPR theory

VB theory – application to hydrogen molecule; concept of resonance – resonance structures of some inorganic species – CO_2, NO_2 - limitations of VBT; MO theory - bonding, anti bonding and non bonding orbitals, bond order; MO diagrams of H_2, C_2, O_2, magnetic characteristics, comparison of V Band MO theories.

Coordinate bond: Definition, Formation of BF3, NH3, NH4+, H_3O^+properties - Weak Chemical Forces - Vander Waals forces, ion-dipole forces, dipole – dipole interactions, induced dipole interactions, Instantaneous dipole – induced dipole interactions. Repulsive forces; Hydrogen bonding – Types, special properties of water, ice, stability of DNA; Effects of chemical force, melting and boiling points.

UNIT –IV Basic concepts in Organic Chemistry and Electronic effects

(18 HRS.)

Types of bond cleavage – heterolytic and homolytic; arrow pushing in organic reactions; reagents and substrates; types of reagents - electrophiles, nucleophiles, free radicals; reaction intermediates – carbanions, carbocations, carbenes, arynes and nitrynes.

Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects.

Resonance – resonance energy, conditions for resonance - acidity of phenols, basicity of aromatic amines, stability of carbonium ions, carbanions and free radicals, reactivity of vinyl chloride, dipole moment of vinyl chloride and nitrobenzene, bond lengths; steric inhibition to resonance.

Hyperconjugation - stability of alkenes, bond length, orienting effect of methyl group, dipole moment of aldehydes and nitromethane

Types oforganic reactions- addition, substitution, eliminationand rearrangements

UNIT –V ALKANES **(18 HRS.)**

Introduction-IUPAC Nomenclature-Isomerism-Free rotation about carbon – carbon single bond, Conformations – Ethane and n-butane – Definition and distinction between configurational and conformational isomers. Classes of carbon atoms and hydrogen atoms. Industrial source - preparation – Hydrogenation of alkenes, Reduction of RX, coupling of RX with Lithium dialkyl copper (R2CuLi). Reactions – halogenation (mechanism, orientation, relative reactivity of alkanes, reactivity and selectivity), combustion – pyrolysis.

REFERENCES:

1. Jain. M.K., & Sharma. S.C., Modern Organic Chemistry, 1st Edition, Vishal Publishing Co., New Delhi,2017.
2. Bahl. B.S., & Arun Bahl, Organic Chemistry, 22nd Edition, S.Chand & CompanyLtd.,New Delhi, 2017.

3. Finar. I. L, Organic Chemistry,Volume 1, The Fundamental Principles, 6th Edition, ELBS & Longman group Pvt., Ltd.,2005.
4. Morrison. R.T & Boyd, Organic Chemistry, 6th Edition, Prentice-hall of India Pvt, Ltd., New Delhi, 2005.
5. Jerry March, A, Advanced Organic Chemistry, 6th Edition, John Wiley and sons reprint, 2008.
6. Bhupinder Mehta & Manju Mehta, Organic Chemistry, 6th Edition, PHI Learning Pvt Ltd., New Delhi, 2011.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 Atomic structure and Periodic trends				
1.1	History of atom (J.J.Thomson, Rutherford); Moseley's Experiment and Atomic number	2	Lecture	Black Board
1.2	Atomic Spectra; Black-Body Radiation and Planck's quantum theory	2	Lecture	Black Board
1.3	Bohr's model of atom	2	Lecture	Black Board
1.4	The Franck-Hertz Experiment; Interpretation of H- spectrum;	2	Lecture	Black Board
1.5	Photoelectric effect, Compton effect; Dual nature of Matter- De-Broglie wavelength	2	Lecture	Black Board
1.6	Davisson and Germer experiment Heisenberg's Uncertainty Principle	2	Lecture	Black Board
1.7	Electronic Configuration of Atoms and ions- Hund's rule	2	Lecture	PPT & White board
1.8	Pauli'exclusion principle and Aufbau principle	2	Discussion	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.9	Numerical problems involving the core concepts	2	Lecture	Black Board
UNIT -2	**Introduction to Quantum mechanics**			
2.1	Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital;	2	Chalk & Talk	Black Board
2.2	Postulates of quantum mechanics; probability interpretation of wave functions,	1	Chalk & Talk	LCD
2.3	Formulation of Schrodinger wave equation	1	Lecture	Ball & Stick Models
2.4	Probability and electron density-visualizing the orbitals	2	Lecture	Black Board
2.5	Probability density and significance of Ψ and Ψ2.	2	Lecture	Black Board
2.6	Cause of periodicity, Features of the periodic table	2	Lecture	Black Board
2.7	classification of elements - Periodic trends for atomic size	2	Lecture	PPT & White board
2.8	Atomic radii, Ionic, crystal and Covalent radii; ionization energy, electron affinity,	2	Discussion	Black Board
2.9	electronegativity-electronegativity scales, applications of electronegativity.	2	Lecture	Black Board
2.10	Problems involving the core concepts.	2	Lecture	Black Board
UNIT -3	**Structureandbonding**			
3.1	Ionicbond: Lewis dot structure of ionic compounds; properties of ionic compounds; Energy involved in involved in ionic compounds	1	Lecture	Black Board
3.2	Born Haber cycle – lattice energies, Madelung constant;	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	relative effect of lattice energy and solvation energy			
3.3	Ion polarization – polarising power and polarizability; Fajans' rules - effects of polarisation on properties of compounds; problems involving the core concepts.	2	Lecture	Black Board
3.4	Covalent bond: Shapes of orbitals, overlap of orbitals	2	Lecture	Black Board
3.5	σ and Π bonds; directed valency - hybridization; VSEPR theory	2	Lecture	Black Board
3.6	VB theory – application to hydrogen molecule; concept of resonance –resonance structures of some inorganic species– CO_2,NO_2	2	Lecture	Black Board
3.7	MO theory - bonding, anti bonding and non bonding orbitals, bond order; MO diagrams of H_2,C_2,O_2.	2	Lecture	Black Board
3.8	Magnetic characteristics, comparison of VB and MO theories.	2	Lecture	Black Board
3.9	Coordinate bond: Definition, Formation of BF3, NH3, NH4+, $H3O^+$ properties - Weak Chemical Forces - Vander Waals forces	2	Lecture	Black Board
3.10	Ion - dipole forces, dipole – dipole interactions, induced dipole interactions, Instantaneous dipole –induced dipole interactions. Repulsive forces; Hydrogen bonding – Types.	2	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -4 BasicconceptsinOrganicChemistryandElectroniceffects				
4.1	Types of bond cleavage – heterolytic and homolytic; arrow pushing in organic reactions	2	Lecture	Black Board
4.2	Reagents and substrates; types of reagents - electrophiles, nucleophiles, free radicals	2	Lecture	Black Board
4.3	Reaction intermediates – carbanions, carbocations, carbenes, arynes and nitrynes.	2	Lecture	Black Board
4.4	Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects	2	Lecture	Black Board
4.5	Resonance – resonance energy, conditions for resonance - acidity of phenols, basicity of aromatic amines, stability of carbonium ions, carbanions and free radicals,	2	Lecture	Black Board
4.6	Reactivity of vinyl chloride, dipole moment of vinyl chloride and nitrobenzene, bond lengths; steric inhibition to resonance.	2	Lecture	Black Board
4.7	Hyperconjugation - stability of alkenes, bond length, orienting effect of methyl group, dipole moment of aldehydes and nitromethane	2	Lecture	PPT & White board
4.8	Types of organic reactions- addition, substitution, elimination and Rearrangements.	2	Lecture	Black Board
UNIT -5ALKANES				
5.1	Introduction-IUPAC Nomenclature-Isomerism-Free rotation about carbon – carbon single bond	2	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.2	Conformations – Ethane	3	Discussion	LCD
5.3	Conformations – n-Butane	3	Lecture	PPT & White Board
5.4	Definition and distinction between configurational and conformational isomers	2	Lecture	Black Board
5.5	Classes of carbon atoms and hydrogen atoms. Industrial source – preparation	2	Discussion	LCD
5.6	Hydrogenation of alkenes, Reduction of RX	2	Lecture	Black Board
5.7	Coupling of RX with Lithium dialkyl copper (R2CuLi).	2	Lecture	Black Board
5.8	Reactions – halogenation (mechanism, orientation, relative reactivity of alkanes, reactivity and selectivity).	2	Lecture	Black Board

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	**e**xplaintheatomicstructure,waveparticledualityofmatter,periodicpropertiesbonding,andpropertiesofcompounds.	K1,K2,K3 & K4	PSO1& PSO2
CO 2	classifytheelementsintheperiodictable,typesofbonds,reactionintermediateselectroniceffectsinorganiccompounds,typesofreagents	K1,K2,K3 & K4	PSO3

CO 3	applythetheoriesofatomicstructure,bonding,tocalculateenergyofaspectraltransition,Δx,Δpelectronegativity,percentageioniccharacterandbondorder.	K1,K2,K3 & K4	PSO5
CO 4	evaluatetherelationshipexistingbetweenelectronicconfiguration,bonding,geometryofmoleculesandreactions;structurere activity and electroniceffects	K1,K2,K3 & K4	PSO2
CO 5	construct MO diagrams, predict trends in periodic properties, assess the properties ofelements, and explain hybridization in molecules, nature of H – bonding and organic reaction mechanisms.	K1,K2,K3 & K4	PSO3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentageofCourseContributiontoPos	3.0	3.0	3.0	3.0	3.0

LevelofCorrelationbetweenPSO'sandCO'S

COURSE DESIGNER:

1. **Dr.M.Priyadharsani**
2. **Dr.B. Vinosha**

Forwarded By

HOD'S Signature

& Name

I B.Sc. CHEMISTRY

SEMESTER –I

For those who join from 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1CC2	INORGANIC ESTIMATION AND PREPARATION	MAJOR PRACTICAL	4	4

COURSE DESCRIPTION

This paper gives a basic understanding of volumetric analysis & Inorganic complex preparation to major students as Core practical.

COURSE OBJECTIVES

This course aims to provide knowledge on the

- basics of preparation of solutions.
- principles and practical experience of volumetric analysis
- Preparation of Inorganic Complexes

Course Learning Outcomes

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

CO1: explain the basic principles involved in titrimetric analysis and inorganic preparations.

CO2: compare the methodologies of different titrimetric analysis.

CO3: calculate the concentrations of unknown solutions in different ways and

develop the skillto estimate the amount of a substance present in a given solution.

CO4: assess the yield of different inorganic preparations and identify the end point of various titrations.

VOLUMETRIC ANALYSIS – QUANTITATIVE ESTIMATION

1. Estimation of $H_2C_2O_4$ - Permangnometry
2. Estimation of $H_2C_2O_4$ – Acid- base
3. Estimation of $K_2Cr_2O_7$ - Dichrometry
4. Estimation of Na_2CO_3 – Acid – base
5. Estimation of FAS - Permangnometry
6. Estimation of $KMnO_4$ - Iodometry
7. Estimation of Hardness of water - Complexometry
8. Estimation of $FeSO_4$ - External Indicator Method

INORGANIC COMPLEXES - PREPARATION

1. Preparation of FAS
2. Preparation of Potash Alum
3. Preparation of Tetramine copper (II) sulphate tetra hydrate

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explain the basic principles involved in titrimetric analysis and inorganic preparations.	K1,K3 & K4	PSO1& PSO2

CO 2	Compare the methodologies of different titrimetric analysis.	K1 & K2	PSO2 &PSO7
CO 3	Calculate the concentrations of unknown solutions in different ways and develop the skillto estimate the amount of a substance present in a given solution.	K1, K2 , K3& K4	PSO6
CO 4	Assess the yield of different inorganic preparations and identify the end point of various titrations.	K1, K2 & K4	PSO1
CO 5	Analyse various methods to identify an appropriate method for the separation of chemical components.	K1,K2&K3	PSO4 & PSO5

Reference Book

V. Venkateswaran, R. Veerasamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry; Sultan Chand & sons, Second edition, 1997.

	PO1	PO 2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO9	PO1 0
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage ofCourse Contribution to Pos	3.0	3.0	3.0	3.0	3.0

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I B.Sc.

SEMESTER –I

For those who joined from 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1GEZ1	CHEMISTRY FOR BIOLOGICAL SCIENCES I (FOR BOTANY, ZOOLOGY AND HOMESCIENCE STUDENTS)	Generic Elective	3	2

COURSE DESCRIPTION

This paper gives a basic understanding of chemistry to other major students as allied paper.

COURSE OBJECTIVES

This paper deals with the concept of chemical bonding – detailed study of VB Theory & MO Theory, Types of Organic Reactions –Preparation of industrially important chemicals, Drugs, Analytical Techniques involved in separation and Purification of compounds.

UNIT –I Chemical bonding and Co-ordination Chemistry (9 HRS)

Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. M. O diagrams for Hydrogen, Helium, Nitrogen and Oxygen discussion of bond order and magnetic properties.

Co-ordination Chemistry: Definition of terms - IUPAC Nomenclature Werner'stheory - EAN rule - Pauling's theory – Postulates - Applications to $[Ni(CO)4]$, $[Ni(CN)4]^{2-}$,$[Co(CN)6]^{3-}$

Biologically important compounds & chelates

Biological role of Hemoglobin and Chlorophyll (elementary idea) - Chelation - Applications in qualitative and quantitative analysis

Unit II Industrial Chemistry **(9 HRS)**

Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required).

Silicones: Synthesis, properties and uses of silicones.

Fertilizers: Urea, ammonium sulphate, potassium nitrate NPK fertilizer, superphosphate, triple superphosphate.

UNIT III Fundamental Concepts in Organic Chemistry& organic reactions mechanisms **(9 HRS)**

Hybridization: Orbital overlap hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Polar effects: Inductive effect and consequences onK_a and K_b of organic acids and bases, electromeric, mesomeric, hyperconjugation and steric examples and explanation.

Reaction Mechanism:

Electrophilic Substitution: nitration, halogenation, Friedel craft's alkylation and acylation

Heterocyclic Compound: Preparation, Properties of pyrrole

UNIT IV Drugs , Artificial Sweeteners & Organic Halogen Compounds

(9 HRS)

Definition, structure and uses: Antibiotics, Anaesthetics, Antipyretics

Antibiotics viz., Penicillin, Chloramphenicol – **Anaesthetics** viz., Chloroform and ether; **Antipyretics** viz., aspirin, paracetamol;

Artificial Sweeteners viz., saccharin-Preparation, properties and uses - Aspartame and cyclamate – only Procedure involved in the preparation

Organic Halogen compounds -Preparation- properties and uses of Freon, Teflon.

UNIT V:

Analytical Chemistry **(9 HRS)**

Introduction qualitative and quantitative analysis. Principles of volumetric analysis. **Separation techniques**: Extraction of organic compounds – **purification techniques** –Methods for purification of Solids and liquids

Biochemical Techniques-Chromatography: principle – Clasification of Chromatography- column, thin layer chromatography

.**REFERENCES:**

1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009.

2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006.

3. ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012.

4. P.L.Soni, H.M.Chawla, Text Book of Inorganic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007

5. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

6. Jayashree gosh, Fundamental Concepts of Applied Chemistry; Sultan & Chand, Edition 2006.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT IChemical bonding - VB Theory				
1.1	V.B. Theory, Types of overlapping	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.2	Sigma and pi bonds, sp^3, Hybridisation in methane	1	Chalk & Talk	Black Board
1.3	sp^2, and sp Hybridisation in ethylene and acetylene - MO theory .	3	Chalk & Talk	Black Board
1.4	Theories of coordination compound Werner's theory and Sidgwick theor EAN rule	2	Chalk & Talk	Black Board
1.5	Biologically important compound Lingands and their types, chelation.	2	Chalk & Talk	Black Board
UNIT II	**INDUSTRIAL CHEMISTRY**			
2.1	Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas,	1	Chalk & Talk	Black Board
2.2	producer gas, CNG, LPG and oil gas (manufacturing details not required).	1	Chalk & Talk	Black Board
2.3	Synthesis, properties and uses of silicones.	2	Chalk & Talk	Black Board
2.4	Urea, ammonium sulphate, potassium nitrate	2	Chalk & Talk	Black Board
2.5	NPK fertilizer, superphosphate,	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.6	triple superphosphate.- Preparation	1	Chalk & Talk	Black Board
UNIT III - Fundamental concepts in Organic Chemistry, organic reaction reactions & heterocyclic compound				
3.1	Orbital overlap hybridization and geometry of C_6H_6. Polar effects – introduction ..	1	Chalk & Talk	Black Board
3.2	Inductive effect and consequences onK_a and K_b of organic acids and bases, electromeric,.	2	Chalk & Talk	Black Board
3.3	mesomeric, hyperconjugation and steric effects - examples and explanation	3	Chalk & Talk	Black Board
3.4	Electrophilic Substitution: nitration, halogenation, Friedel craft's alkylation and acylation	2		
3.5	Preparation, Properties of pyrrole	1	Chalk & Talk	Black Board
UNIT IV Drugs , Artificial Sweeteners & Organic Halogen Compounds				
4.1	Definition, structure and uses: Antibiotics, Anaesthetics, Antipyretics **Antibiotics** viz., Penicillin,	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Chloramphenicol – **Anaesthetics** viz., Chloroform and ether; **Antipyretics** viz., aspirin, paracetamol;			
4.2	**Artificial Sweeteners** viz., saccharin-Preparation, properties and uses - Aspartame and cyclamate – only Procedure involved in the preparation	3	Chalk & Talk	Black Board
4.3	**Organic Halogen compounds** - Preparation- properties and uses of Freon, Teflon.	3	Chalk & Talk	Black Board
UNIT V	**Analytical Chemistry**			
5.1	Introduction qualitative and quantitative analysis.	1	Chalk & Talk	Black Board
5.2	Principles of volumetric analysis. **Separation techniques**: Extraction of organic compounds –	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.3	**purification techniques –** Methods for purification of Solids and liquids	2	Chalk & Talk	Black Board
5.4	**Biochemical Techniques-** Chromatography: principle – Clasification- of Chromatography-	1	Chalk & Talk	Black Board
5.5	column, thin layer chromatography	3	Chalk & Talk	Black Board

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Construct MO diagrams for homonuclear diatomic molecules	K1,K3 & K4	PSO1& PSO2
CO 2	Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.	K1 & K2	PSO2 &PSO7
CO 3	Evaluate the efficiencies and uses of various fuels and fertilizers.	K1, K2 , K3& K4	PSO6
CO 4	Demonstrate the structure and uses of antibiotics, anaesthetics, antipyretics	K1, K2 & K4	PSO1

	and artificial sugars.		
CO 5	Analyse various methods to identify an appropriate method for the separation of chemical components.	K1,K2&K3	PSO4 & PSO5

Mapping COs Consistency with PSOs
Mapping COs Consistency with PSOs

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO10	PSO11	PSO12
CO 1	3	3	2	2	2	2	2	2				
CO 2	2	3	2	2	2	2	3	2				
CO 3	2	2	2	2	2	3	2	2				
CO 4	3	2	2	2	2	2	2	2				
CO 5	2	2	2	3	3	2	2	2				

Note: ♦ Strongly Correlated – **3** ♦ ModeratelyCorrelated – **2**
♦ WeaklyCorrelated -**1**

CIA COMPONENTS

Components	Marks	Converted Marks
T1	30	15
T2	30	
Assignment & Attendance		5 (3+2)
Quiz / Seminar		5
Total		25 Marks

Course designer
Dr. B.SUGANTHANA

I B.Sc.

SEMESTER –I

For those who joined from 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1GEN1	CHEMISTRY FOR BIOLOGICAL SCIENCES I (FOR BOTANY, ZOOLOGY AND HOMESCIENCE STUDENTS)	Generic Elective	3	2

COURSE DESCRIPTION

This paper gives a basic understanding of chemistry to other major students as allied paper.

COURSE OBJECTIVES

This paper deals with the concept of chemical bonding – detailed study of VB Theory & MO Theory, Types of Organic Reactions –Preparation of industrially important chemicals, Drugs, Analytical Techniques involved in separation and Purification of compounds.

UNIT –I Chemical bonding and Co-ordination Chemistry (9 HRS)

Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. M. O diagrams for Hydrogen, Helium, Nitrogen and Oxygen discussion of bond order and magnetic properties.

Co-ordination Chemistry: Definition of terms - IUPAC Nomenclature Werner'stheory - EAN rule - Pauling's theory – Postulates - Applications to $[Ni(CO)4]$, $[Ni(CN)4]^{2-}$,$[Co(CN)6]^{3-}$

Biologically important compounds & chelates

Biological role of Hemoglobin and Chlorophyll (elementary idea) - Chelation - Applications in qualitative and quantitative analysis

Unit II Industrial Chemistry **(9 HRS)**

Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required).

Silicones: Synthesis, properties and uses of silicones.

Fertilizers: Urea, ammonium sulphate, potassium nitrate NPK fertilizer, superphosphate, triple superphosphate.

UNIT III Fundamental Concepts in Organic Chemistry& organic reactions mechanisms **(9 HRS)**

Hybridization: Orbital overlap hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Polar effects: Inductive effect and consequences on K_a and K_b of organic acids and bases, electromeric, mesomeric, hyperconjugation and steric examples and explanation.

Reaction Mechanism:

Electrophilic Substitution: nitration, halogenation, Friedel craft's alkylation and acylation

Heterocyclic Compound: Preparation, Properties of pyrrole

UNIT IV Drugs , Artificial Sweeteners & Organic Halogen Compounds

(9 HRS)

Definition, structure and uses: Antibiotics, Anaesthetics, Antipyretics

Antibiotics viz., Penicillin, Chloramphenicol – **Anaesthetics** viz., Chloroform and ether; **Antipyretics** viz., aspirin, paracetamol;

Artificial Sweeteners viz., saccharin-Preparation, properties and uses - Aspartame

and cyclamate – only Procedure involved in the preparation

Organic Halogen compounds -Preparation- properties and uses of Freon, Teflon.

UNIT V:

Analytical Chemistry **(9 HRS)**

Introduction qualitative and quantitative analysis. Principles of volumetric analysis. **Separation techniques**: Extraction of organic compounds – **purification techniques** –Methods for purification of Solids and liquids

Biochemical Techniques-Chromatography: principle – Clasification of Chromatography- column, thin layer chromatography

.**REFERENCES:**

1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009.

2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006.

3. ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012.

4. P.L.Soni, H.M.Chawla, Text Book of Inorganic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007

5. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

6. Jayashree gosh, Fundamental Concepts of Applied Chemistry; Sultan & Chand, Edition 2006.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	UNIT IChemical bonding - VB Theory			

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.1	V.B. Theory, Types of overlapping	1	Chalk & Talk	Black Board
1.2	Sigma and pi bonds, sp^3, Hybridisation in methane	1	Chalk & Talk	Black Board
1.3	sp^2, and sp Hybridisation in ethylene and acetylene - MO theory .	3	Chalk & Talk	Black Board
1.4	Theories of coordination compound Werner's theory and Sidgwick theor EAN rule	2	Chalk & Talk	Black Board
1.5	Biologically important compound Lingands and their types, chelation.	2	Chalk & Talk	Black Board
UNIT II	**INDUSTRIAL CHEMISTRY**			
2.1	Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas,	1	Chalk & Talk	Black Board
2.2	producer gas, CNG, LPG and oil gas (manufacturing details not required).	1	Chalk & Talk	Black Board
2.3	Synthesis, properties and uses of silicones.	2	Chalk & Talk	Black Board
2.4	Urea, ammonium sulphate, potassium nitrate	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.5	NPK fertilizer, superphosphate,	2	Chalk & Talk	Black Board
2.6	triple superphosphate.- Preparation	1	Chalk & Talk	Black Board
UNIT III - Fundamental concepts in Organic Chemistry, organic reaction reactions & heterocyclic compound				
3.1	Orbital overlap hybridization and geometry of C_6H_6. Polar effects – introduction ..	1	Chalk & Talk	Black Board
3.2	Inductive effect and consequences onK_a and K_b of organic acids and bases, electromeric,.	2	Chalk & Talk	Black Board
3.3	mesomeric, hyperconjugation and steric effects - examples and explanation	3	Chalk & Talk	Black Board
3.4	Electrophilic Substitution: nitration, halogenation, Friedel craft's alkylation and acylation	2		
3.5	Preparation, Properties of pyrrole	1	Chalk & Talk	Black Board
UNIT IV Drugs , Artificial Sweeteners & Organic Halogen Compounds				
4.1	Definition, structure and uses: Antibiotics, Anaesthetics, Antipyretics	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Antibiotics viz., Penicillin, Chloramphenicol – **Anaesthetics** viz., Chloroform and ether; **Antipyretics** viz., aspirin, paracetamol;			
4.2	**Artificial Sweeteners** viz., saccharin-Preparation, properties and uses - Aspartame and cyclamate – only Procedure involved in the preparation	3	Chalk & Talk	Black Board
4.3	**Organic Halogen compounds** - Preparation- properties and uses of Freon, Teflon.	3	Chalk & Talk	Black Board
UNIT V	**Analytical Chemistry**			
5.1	Introduction qualitative and quantitative analysis.	1	Chalk & Talk	Black Board
5.2	Principles of volumetric analysis. **Separation techniques**: Extraction of organic compounds –	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.3	**purification techniques** – Methods for purification of Solids and liquids	2	Chalk & Talk	Black Board
5.4	**Biochemical Techniques-** Chromatography: principle – Clasification- of Chromatography-	1	Chalk & Talk	Black Board
5.5	column, thin layer chromatography	3	Chalk & Talk	Black Board

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Construct MO diagrams for homonuclear diatomic molecules	K1,K3 & K4	PSO1& PSO2
CO 2	Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.	K1 & K2	PSO2 &PSO7
CO 3	Evaluate the efficiencies and uses of various fuels and fertilizers.	K1, K2 , K3& K4	PSO6
CO 4	Demonstrate the structure and uses of	K1, K2 & K4	PSO1

	antibiotics, anaesthetics, antipyretics and artificial sugars.		
CO 5	Analyse various methods to identify an appropriate method for the separation of chemical components.	K1,K2&K3	PSO4 & PSO5

Mapping COs Consistency with PSOs
Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO10	PSO11	PSO12
CO 1	3	3	2	2	2	2	2	2				
CO 2	2	3	2	2	2	2	3	2				
CO 3	2	2	2	2	2	3	2	2				
CO 4	3	2	2	2	2	2	2	2				
CO 5	2	2	2	3	3	2	2	2				

Note: ♦ Strongly Correlated – **3** ♦ ModeratelyCorrelated – **2**
♦ WeaklyCorrelated -**1**

CIA COMPONENTS

Components	Marks	Converted Marks
T1	30	15
T2	30	
Assignment & Attendance		5 (3+2)
Quiz / Seminar		5
Total		25 Marks

Course designer
Dr. B.SUGANTHANA

I B.Sc Chemistry

SEMESTER-I

(For those who joined in June2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1GEZ2	CHEMISTRY PRACTICALS FOR BIOLOGICAL SCIENCES	Lab	2	3

Objectives of the course

This course aims to provide knowledge on the

- Basics of preparation of solutions.
- Principles and practical experience of volumetric analysis

VOLUMETRIC ANALYSIS

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of Sodium carbonate using standard sodium carbonate.
3. Estimation of ferrous Ammonium sulphate using standard Mohr's salt.
4. Estimation of oxalic acid using standard ferrous Ammonium sulphate.
5. Estimation of potassium permanganate using standard dichromate
6. Estimation of coppersulphate using standard dichromate
7. Estimation of dichromate using standard dichromate

Reference Book

V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles Of Practical Chemistry; Sultan Chand & sons, Second edition, 1997

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette.

CO 2: design, carry out, record and interpret the results of volumetric titration.

CO 3: apply their skill in the analysis of water/hardness.

CO4: analyze the chemical constituents in allied chemical products

CO /PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

S-Tedona.

I B.Sc Chemistry

SEMESTER-I

(For those who joined in June2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1GEN2	CHEMISTRY PRACTICALS FOR BIOLOGICAL SCIENCES	Lab	2	3

Objectives of the course

This course aims to provide knowledge on the

- Basics of preparation of solutions.
- Principles and practical experience of volumetric analysis

VOLUMETRIC ANALYSIS

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of Sodium carbonate using standard sodium carbonate.
3. Estimation of ferrous Ammonium sulphate using standard Mohr's salt.
4. Estimation of oxalic acid using standard ferrous Ammonium sulphate.
5. Estimation of potassium permanganate using standard dichromate
6. Estimation of coppersulphate using standard dichromate
7. Estimation of dichromate using standard dichromate

Reference Book

V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles

Of Practical Chemistry; Sultan Chand & sons, Second edition, 1997

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette.

CO 2: design, carry out, record and interpret the results of volumetric titration.

CO 3: apply their skill in the analysis of water/hardness.

CO4: analyze the chemical constituents in allied chemical products

CO /PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

S-Tedona.

SEMESTER I
For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1SE1	FOOD CHEMISTRY	Skill Enhancement NME	2	2

Course Objectives

This course aims at giving an overall view of the

- Types of food
- Food adulteration and poisons
- Food additives and preservation

UNIT I

Food Adulteration

Sources of food, types, advantages and disadvantages. Food adulteration - contamination of wheat, rice, milk, butter etc. with clay stones, water and toxic chemicals -Common adulterants, Ghee adulterants and their detection. Detection of adulterated foods by simple analytical techniques.

UNIT-II

Food Poison

Food poisons - natural poisons (alkaloids - nephrotoxin) - pesticides, (DDT, BHC, Malathion) -Chemical poisons - First aid for poison consumed victims.

UNIT-III

Food Additives

Food additives -artificial sweeteners – Saccharin - Cyclomate and Aspartate Food flavours -esters, aldehydes and heterocyclic compounds – Food colours-Emulsifying agents – preservatives -leavening agents. Baking powder –yeast – tastemakers – MSG - vinegar.

UNIT-IV

Beverages

Beverages-softdrinks-soda-fruitjuices-alcoholicbeverages-examples. Carbonation-addiction to alcohol– diseases of liver and social problems.

UNIT-V

Edible Oils

Fats and oils - Sources of oils - production of refined vegetable oils - preservation.Saturated and unsaturated fats - iodine value - role of MUFA and PUFA in preventing heart diseases-determination of iodine value,RM Value saponification values and their significance.

REFERENCES

1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.
2. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand &Co.Publishers, second edition, 2006.
3. Food chemistry, H. K. Chopra, P. S. Panesar, Narosapublishning house, 2010.
4. Food Chemistry, Dr. L. Rakesh Sharma, Evincepub publishing, 2022.
5. Food processing and preservation, G. Subbulakshmi, Shobha A Udipi, Pdmini S Ghugre, New age international publishers, second edition, 2021
6. H.-D. Belitz, Werner Grosch, Food Chemistry Springer Science & Business Media, 4th Edition, 2009.
7. M.Swaminathan, Food Science and Experimental Foods, Ganesh and Company,1979.
8. Hasenhuettl, Gerard. L.; Hartel, Richard. W. Food Emulsifiers and their applications Springer New York 2nd ed. 2008.
9. Food Chemistry, H.-D. Belitz, W. Grosch, P. Schieberle, Springer, fourth revised and extended edition, 2009.
10. Principles of food chemistry, John M. deMan, John W. Finley, W. Jefferey

Hurst, Chang Yong Lee, Springer, Fourth edition, 2018.

ModuleNo.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-1 FOOD ADULTERATION				
1.1	Sources of food	1	Chalk &Talk	Black Board
1.2	Types , advantages and disadvantages	1	Chalk &Talk	Black Board
1.3	Food adulteration	1	Chalk &Talk	PPT& Whitebo ard
1.4	Contamination of wheat , rice, milk , and butter with clay stones ,water and toxic chemicals .	1	Chalk &Talk	Black Board

1.5	Common adulterants , Ghee adulterants and their detection	1	Chalk &Talk	Black Board
1.6	Detection of adulterated foods by simple analytical technique	1	Chalk &Talk	Black Board
Unit-2	**FOOD POISON**			
2.1	Food poisons	1	Chalk &Talk	Black Board
2.2	Natural poisons (alkaloids – nephrotoxin)	1	Chalk &Talk	Black Board
2.3	Pesticides (DDT ,BHC ,Malathion)	2	Chalk & Talk	Black Board
2.4	Chemical Poisons	1	Chalk & Talk	PPT & White board
2.5	First aid for poison consumed victims	1	Chalk & Talk	Black Board
UNIT-3 THEORY OF DILUTE SOLUTIONS				
3.1	Food additives	1	Chalk &Talk	Black Board
3.2	Cyclomate and Aspartate	1	Chalk &Talk	PPT& White board
3.3	Food Flavours	1	Chalk &Talk	Black Board
3.4	Food Colours	1	Chalk &Talk	PPT& White board
3.5	Emulsifying agent	1	Chalk &Talk	BlackBoar

				d
3.6	Baking Powder	1	Chalk &Talk	BlackBoard
UNIT-4 BEVERAGES				
4.1	Beverages	2	Chalk &Talk	PPT& White board
4.2	Alcoholic beverages	1	Chalk &Talk	Black Board
4.3	Carbocation	1	Chalk &Talk	Black Board
4.4	Addiction to alcohol	1	Chalk &Talk	Black Board
4.5	Diseases of liver and social problems	1	Chalk &Talk	Black Board
UNIT-V EDIBLE OILS				
5.1	Fats and oils	1	Chalk &Talk	PPT
5.2	Production of refined vegetable oil	1	Chalk &Talk	BlackBoard
5.3	Preservation of saturated and unsaturated fats	1	Chalk &Talk	BlackBoard
5.4	Role of MUFA and PUFA in preventing heart disease	1	Chalk &Talk	BlackBoard

5.5	Determination of iodine value ,RM value, saponification values and their significance	2	Chalk &Talk	PPT

CIA COMPONENTS

Components	Marks	Converted Marks
T1	**30**	**20**
T2	**30**	
Assignment		**5**
Quiz / Seminar		**5**
Non-scholastic		**5**
Open book Test		**5**
Total		**40 Marks**

S.NO.	COURSE OUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOs ADDRESSED
CO1	learn about Food adulteration - contamination of Wheat, Rice, Milk, Butter	K1,K2,K3&K4	PSO1&PSO2
CO2	get an awareness about food poisons like natural poisons (alkaloids - nephrotoxin) pesticides, DDT, BHC, Malathion	K1,K2,K3&K4	PSO3
CO3	get an exposure on food additives, artificial sweeteners, Saccharin, Cyclomate and Aspartate in the food industries.	K1,K2,K3&K4	PSO5

CO4	acquire knowledge on beverages, soft drinks, soda, fruit juices and alcoholic beverages examples.	K1,K2,K3&K4	PSO7
CO5	study about fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats –MUFA and PUFA	K1,K2,K3&K4	PSO7

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-POMapping(CourseArticulationMatrix)

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage ofCourse Contribution toPos	3.0	3.0	3.0	3.0	3.0

LevelofCorrelationbetweenPSO'sandCO's

Course Designer
1.Dr.J.Jone Celestina

HOD's Signature

IB.Sc.CHEMISTRY

SEMESTER–

I

Forthosewhojoinedin2023onwards

PROGRAMMECODE	COURSECODE	COURSETITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	**23C1FC**	**FOUNDATION COURSE-I**N CHEMISTRY	**MAJORCORE**	**2**	**2**

COURSEDESCRIPTION

This course providesa detailed description of the basics of chemistry, especially atom, determination of molecular weight and role of organic chemistry and the gravimetric analysis

COURSEOBJECTIVES

Thecourseaimsatgivinganoverallviewofthe

- variousatomicmodelsandatomicstructure
- waveparticledualityofmatter
- periodictable,periodicityinpropertiesanditsapplicationinexplainingthechemical behaviornatureofchemicalbonding,and fundamentalconceptsoforganicchemistry

Unit I: Structure atom: Classical method (4 hours)

History of atom-detection of electron- discharge tube experiments-electron are the essential constituent of atoms- determination of charge and mass of electron-millikan;s oil drop experiment- positive rays and the proton- discovery of neutron

Unit II: Properties of compounds (4 hours)

Definition of melting and boiling points- Determination of meltig point and boiling points- calculation of empirical formula of compounds- calculation of molecular formula of compounds- physical methods of determination of molecular weight- Victor mayer method-cryoscopic methods.

Unit III: Fundamentals of Chemistry (4 hours)

Definition of Organic Chemistry-Comparison of Organic and Inorganic Compounds-Importance of organic Chemistry- source of organic compounds-Detection of elements carbon & nitrogen- estimation of elements carbon &nitrogen.

Unit IV: Analytical Chemistry (4 hours)

Role and importance of analytical chemistry-types of analytical methods-Principle of gravimetric analysis- condition for precipitation- specific and selective precipitant,use of sequestering agents.

Unit V: Fundamentals of Biochemistry (4 hours)

Definition- branch of biochemistry-historical resume-biochemistry living organisms- characteristics of the living matter-axioms of living matter-major compounds of living beings-biochemical techniques-observations on tissues-perfusion-tissue slices-Homogenization

References:

1. P.l.Soni, Text book of Inorganic Chemistry 20th revised edition
2. B.S.Bhal, Arun Bhal,Textbook of organic chemistry
3. J.J. Jain, S.J.Jain, Fundamentals of Biochemistry

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
Unit-1 Structure atom: Classical method (4 hours)				
1.1	History of atom-detection of electron	1	Chalk &Talk	BlackBoard
1.2	Discharge tube experiments-electron are the essential constituent of atoms-	1	Chalk &Talk	BlackBoard
1.3	Millikan's oil drop experiment	1	Chalk &Talk	PPT& White board
1.4	Oil drop experiment- Positive rays and the proton- discovery of neutron	1	Chalk &Talk	BlackBoard
Unit-2 Properties of Compounds (4 hours)				
2.1	Definition of melting and boiling points	1	Chalk &Talk	BlackBoard
2.2	Determination of meltig point and boiling points- Victor mayer method-cryoscopic methods.	1	Chalk &Talk	BlackBoard
2.3	calculation of empirical formula of compounds	1	Chalk &Talk	BlackBoard
2.4	calculation of molecular formula of compounds, physical methods of determination of molecular weight	1	Chalk &Talk	PPT& White board
UNIT-3 Fundamentals of Chemistry (4 hours)				

3.1	Definition of Organic Chemistry-Comparison of Organic and Inorganic Compounds-	1	Chalk &Talk	BlackBoard
3.2	Importance of organic Chemistry	1	Chalk &Talk	PPT& White board
3.3	source of organic compounds, Estimation of elements carbon &nitrogen	1	Chalk &Talk	BlackBoard
3.4	Detection of elements carbon Detection of nitrogen	1	Chalk &Talk	PPT& White board

Module No.	Topic	No.ofLectures	Teaching Pedagogy	Teaching Aids
UNIT-4 Analytical Chemistry(4 hours)				
4.1	Role and importance of Analytical Chemistry	1	Chalk &Talk	Black board
4.2	Types of analytical methods	1	Chalk &Talk	Black Board
4.3	Principle of gravimetric analysis, use of sequestering agents	1	Chalk &Talk	Black Board
4.4	Condition for precipitation, specific and selective precipitant	1	Chalk &Talk	Black Board

Module No.	Topic	No.ofLectures	Teaching Pedagogy	Teaching Aids
UNIT-VFundamentals of Biochemistry(4 hours)				

5.1	Definition, branch of biochemistry	1	Chalk &Talk	PPT
5.2	historical resume, biochemistry living organisms	1	Chalk &Talk	BlackBoard
5.3	Characteristics of the living matter	1	Chalk &Talk	BlackBoard
5.4	Axioms of living matter	1	Chalk &Talk	BlackBoard

CIA COMPONENTS

Components	Marks	Converted Marks
T1	**30**	**20**
T2	**30**	
Assignment		**5**
Quiz / Seminar		**5**
OBT		**5**
NonScholastic		**5**
Total		**40 Marks**

COURSE OUTCOMES

Onthesuccessfulcompletionofthecourse,studentswillbeableto:

NO.	COURSEOUTCOMES	KNOWLEDGE LEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Gainabasicknowledgeaboutthe basic concepts of chemistry	K1,K2,K3&K4	PSO1&PSO2
CO2	Knowledge about the determination of boiling point and molecular weight determination	K1,K2,K3&K4	PSO3
CO3	Understanding the concept of detection of elements carbon & nitrogen- estimation of elements carbon &nitrogen.	K1,K2,K3&K4	PSO5
CO4	Know about the Gravimetric analysis and selective precipitant, use of sequestering agents	K1,K2,K3&K4	PSO7
CO5	Gain a knowledge in major compounds of living beings-biochemical techniques	K1,K2,K3&K4	PSO7

MappingofCOswithPSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	1	1	1	1	1
CO2	2	1	3	1	1	1	1	1
CO3	2	1	1	1	3	1	1	1
CO4	2	1	1	1	1	1	3	1
CO5	2	1	1	1	1	1	3	1

MappingofCOswithPOs

CO/PSO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	2	3	2	2
CO3	2	2	3	2
CO4	3	2	2	2
CO5	3	2	2	2

Note: StronglyCorrelated–**3** ModeratelyCorrelated–**2**

♦ WeaklyCorrelated-**1**

HOD'SSignature

I B.Sc., Chemistry SEMESTER –II

For those who joined from 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDIT
UGACH	23C2CC3	General Chemistry II	Lecture	6	4

COURSE DESCRIPTION : This paper deals with the theories of acids and bases, chemistry of III, IV, V & VI group elements and hydrocarbons

COURSE OBJECTIVES :

This course aims at providing an overall view of the

- chemistry of acids, bases and ionic equilibrium
- properties of s and p-block elements
- chemistry of hydrocarbons
- applications of acids and bases
- compounds of main block elements and hydrocarbons

COURSE OUT COMES : After the successful completion of course, students will be able to

- **CO1:** explain the concept of acids, bases and ionic equilibria; periodic properties of s and p block elements, preparation and properties of aliphatic and aromatic hydrocarbons
- **CO2:** discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids
- **CO3:** classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons
- **CO4:** explain theories of acids, bases and indicators, buffer action and important compoundsof s-block elements
- **CO5:** assess the application of hard and soft acids indicators, buffers, compounds of s and p-block elements and hydrocarbons

UNIT –I Acids, bases and Ionic equilibria

Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept, Lewis concept; Relative strengths of acids, bases and dissociation constant; dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions; Degree of dissociation, common ion effect, factors affecting degree of dissociation; acid base indicators, theory of acid base indicators – action of phenolphthalein and

methyl orange, titration curves - use of acid base indicators;

Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson-Hasselbalch equation - Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis; Solubility product - determination and applications; numerical problems - involving the core concepts.

UNIT –II Chemistry of s- block elements

Hydrogen: Position of hydrogen in the periodic table. Alkali metals: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates.
Diagonal relationship of Li with Mg. Preparation, properties and uses of NaOH, Na_2CO_3, KBr, $KClO_3$ alkaline earth metals. Anomalous behaviour of Be.

Chemistry of p - Block Elements (Group 13 & 14) & Organo metallic compounds

Preparation and structure of diborane and borazine. Chemistry of borax. Extraction of Al and its uses. Alloys of Al. comparison of carbon with silicon. Carbon-di-sulphide – Preparation, properties, structure and uses. Percarbonates, per monocarbonates and per dicarbonates

Preparation ,properties , structure and uses of organo metallic compounds (B & Al)

UNIT- III Chemistry of p- Block Elements (15-18)

General characteristics of elementsof Group 15; chemistry of $H_2N\text{-}NH_2$,NH_2OH, HN_3 and HNO_3. Chemistry of PH_3, PCl_3, PCl_5, $POCl_3$, and oxy acids of phosphorous (H_3PO_3 and H_3PO_4)

General properties of elements of group 16 - Structure and allotropy of elements - chemistry of ozone - Classification and properties of oxides - oxides of sulphur and selenium – Oxy acids of sulphur (Caro's and Marshall's acids).

Chemistry of Halogens:

General characteristics of halogen with reference to electro-negativity, electron affinity, oxidation states and oxidizing power.

a) Peculiarities of fluorine. Halogen acids (HF, HCl, HBr and HI), oxides and oxy acids (HClO4).

Inter-halogen compounds (ICl, ClF_3, BrF_5 and IF_7), pseudo halogens [$(CN)_2$ and $(SCN)_2$] and basic nature of Iodine,.

(b) Noble gases: Position in the periodic table. Preparation, properties and structure of XeF_2, XeF_4, XeF_6 and $XeOF_4$; uses of noble gases. clathrate compounds

UNIT IV : Hydrocarbon Chemistry-I

Petroproducts: Fractional distillation of petroleum; cracking, isomerisation, alkylation, reforming and uses

Alkenes-Nomenclature, general methods of preparation – Mechanism of -□ elimination reactions – E1 and E2 mechanism - factors influencing – stereochemistry – orientation – Hofmann and Saytzeff rules. Reactions of alkenes – addition reactions – mechanisms – Markownikoff's rule, Kharasch effect, oxidation reactions – hydroxylation, oxidative degradation, epoxidation, ozonolysis; polymerization

Alkadienes-Nomenclature - classification – isolated, conjugated and cumulated dienes; stability of conjugated dienes; mechanism of electrophilic addition to conjugated dienes - 1, 2 and 1, 4 additions; free radical addition to conjugated dienes– Diels–Alder reactions – polymerisation – polybutadiene, polyisoprene (natural rubber), vulcanisation, polychloroprene

Alkynes- Nomenclature; **Hybridization** general methods of preparation, properties and reactions; acidicnature of terminal alkynes and acetylene, polymerisation and isomerisation.

Cycloalkanes: Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations. Conformational analysis of cyclohexane, mono and di substituted cyclohexanes in **(1,2) (1,3) and (1,4). Geometrical isomerism in cyclohexanes (1,2) (1,3) and (1,4) position, Energy profile for different chair confirmations.**

UNIT V : Hydrocarbon Chemistry – II

Benzene: Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, anti aromatic and non-aromatic and homo aromatic compounds Huckel's (4n+2) rule and its applications, **Cyclobutadiene, Tropylium Ion, Naphthalene, Furan, Indole, Pyridine, Cyclooctatetraene, Pyrene, Phenanthrene, [8] Annulene, [10]Annulene.** Electrophilic substitution reactions - General mechanism of aromatic electrophilic substitution - nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and disubstituted benzene - Effect of substituent – orientation and reactivity.

Polynuclear Aromatic hydrocarbons: Naphthalene – nomenclature, Haworth synthesis; physical properties, reactions – electrophilic substitution reaction, **Diazotization (aliphatic),** nitration, sulphonation, halogenation, Friedel – Crafts acylation & alkylation, preferential substitution at - position – reduction, oxidation – uses. **Nucleophilic substitution S_N1, S_N2**

Anthracene – synthesis by Elbs reaction, Diels – Alder reaction and Haworth synthesis; physical properties; reactions - Diels-Alder reaction, preferential substitution at C-9 and C-10; uses.

REFERENCES:

TEXT BOOK

Puri, B.R., Sharma, L.R., & Kalia., Principles Of Inorganic Chemistry., 13th Edition., Vishal Publishing House., New Delhi., 2009.

REFERENCE BOOKS

1. Huheey, J.E., Ellen. A., Keiter., Richard. I., Keiter., Inorganic Chemistry, 4th Edition, Pearson Education(Singapore) Pvt. Ltd., New Delhi, 2004.

2. Wahid, U. Malik, G.D. Tuli Madan, R.D., Selected Topics in Inorganic Chemistry,4th

3. Lee, J. D., Concise Inorganic Chemistry, 5th Edition, Black Well Science Ltd., Noida, 1996.

4. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nded, S.Chand and Company, New Delhi.

5. Sathya Prakash, Tuli G D,Basu S K and Madan R D, (2003), Advanced Inorganic Chemistry, 17th ed., S.Chand and Company, New Delhi.

6. Bahl B S, Arul Bhal, (2003), Advanced Organic Chemistry, 3rd ed., S.Chand and Company, New Delhi.

7. Tewari K S, Mehrothra S N and Vishnoi N K, (1998), Text book of Organic Chemistry, 2nd ed., Vikas Publishing House, New Delhi.

8. Puri B R, Sharma L R, (2002), Principles of Physical Chemistry, 38th ed., Vishal Publishing Company, Jalandhar.

COURSECONTENTS&LECTURESCHEDULE:

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
	I Acids, bases and Ionic Equilibria (15 Hrs.)			**(4 hours)**
1.1	Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept, Lewis concept, Relative	2	Chalk &Talk	Black Board

	strengths of acids, bases and dissociation constant.			
1.2	Dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions, Degree of dissociation, common ion effect, factors affecting degreeof dissociation.	2	Chalk &Talk	Black Board
1.3	Acid-base indicators, theory of acid base indicators-action of phenolphthalein and methyl orange, titration curves - use of acid base indicators;	2	Chalk &Talk	Black Board
1.4	Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson-Hasselbalch equation - Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids.	2	Chalk &Talk	Black Board
1.5	Weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant	**2**	Chalk &Talk	Black Board
1.6	Degree of hydrolysis; Solubility product determination and applications	**2**	Chalk &Talk	Black Board
1.7	Numerical problems - involving the core concepts**.**	**3**	Chalk &Talk	Black Board
	UNIT –II Chemistry s-block elements		**(15 Hrs)**	
2.1	Hydrogen: Position of hydrogen in the periodic table. Alkali metals:	2	Chalk &Talk	BlackBoard

	Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates.			
2.2	Diagonal relationship of Li with Mg. Preparation, properties and uses of NaOH, Na_2CO_3,	2	Chalk &Talk	BlackBoard
2.3	KBr, $KClO_3$ alkaline earth metals. Anomalous behaviour of Be. **Chemistry of p - Block Elements (Group 13 & 14) & Organo metallic compounds** Preparation and structure of diborane	2	Chalk &Talk	BlackBoard
2.4	Structure of borazine. Chemistry of borax Extraction of Al and its uses. Alloys of Al comparison of carbon with silicon.	2	Chalk &Talk	Black Board
2.5	Carbon-di-sulphide – Preparation, properties, structure and uses Percarbonates, per monocarbonates	**2**	Chalk &Talk	Black Board
2.6	Per dicarbonates. Preparation , properties , structure	**2**	Chalk &Talk	Black Board
2.7	Uses of organo metallic compounds (B & Al)	**3**	Chalk &Talk	Black Board
UNIT- III	**Chemistry of p- Block Elements (15-18)**		**(15 Hrs.)**	

3.1	General characteristics of elementsof Group 15; chemistry of H_2N-NH_2,NH_2OH, HN_3 and HNO_3.	2	Chalk &Talk	Black Board
3.2	Chemistry of PH_3, PCl_3, PCl_5, $POCl_3$, and oxy acids of phosphorous (H_3PO_3 and H_3PO_4) General properties of elements of group 16 - Structure	2	Chalk &Talk	Black Board
3.3	Allotropy of elements - chemistry of ozone - Classification and properties of oxides - oxides of sulphur and selenium – Oxy acids of sulphur (Caro's and Marshall's acids).	2	Chalk &Talk	Black Board
3.4	**Chemistry of Halogens:** General characteristics of halogen with reference to electro-negativity, electron affinity, oxidation states and oxidizing power.	2	Chalk &Talk	Black Board
3.5	Peculiarities of fluorine. Halogen acids (HF, HCl, HBr and HI), oxides and oxy acids (HClO4).	**2**	Chalk &Talk	Black Board
3.6	Inter-halogen compounds (ICl, ClF_3, BrF_5 and IF_7), pseudo halogens [$(CN)_2$ and $(SCN)_2$] and basic nature of Iodine,. **(b) Noble gases:** Position in the	**2**	Chalk &Talk	Black Board

	periodic table.			

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
UNIT IV : Hydrocarbon Chemistry-I		**(15 Hrs.)**		
4.1	**Petroproducts:** Fractional distillation of petroleum; cracking, isomerisation, alkylation, reforming and uses **Alkenes**-Nomenclature, general methods of preparation, Mechanism of elimination reactions, E1 and E2 mechanism	2	Chalk &Talk	Black board
4.2	Factors influencing, stereochemistry, orientation, Hofmann and Saytzeff rules. Reactions of alkenes, addition reactions ,mechanisms, Markownikoff's rule, Kharasch effect,	3	Chalk &Talk	Black Board
4.3	Oxidation reactions, hydroxylation, oxidative degradation, epoxidation, ozonolysis; polymerization. **Alkadienes,** Nomenclature, classification, isolated, conjugated and cumulated dienes. stability of conjugated dienes; mechanism of electrophilic addition	2	Chalk &Talk	Black Board
4.4	Mechanism of addition to conjugated dienes, 1, 2 and 1, 4 additions; free radical addition to	2	Chalk &Talk	Black Board

	conjugated dienes, Diels–Alder reactions, polymerisation, polybutadiene, polyisoprene (natural rubber), vulcanisation, polychloroprene			
4.5	**Alkynes-** Nomenclature; **Hybridization** general methods of preparation, properties and reactions; acidic nature of terminal alkynes and acetylene, polymerisation and isomerisation.	**2**	Chalk &Talk	Black Board
4.6	**Cycloalkanes:** Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations. Conformational analysis of cyclohexane, mono and di substituted cyclohexanes in (1,2) (1,3) and (1,4). Geometrical isomerism in cyclohexanes (1,2) (1,3) and (1,4) position, Energy profile for different chair confirmations.	**3**	Chalk &Talk	Black Board
Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
UNIT V : Hydrocarbon Chemistry – II				**(15 Hrs.)**

5.1	**Benzene:** Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, anti aromatic and non-aromatic and homo aromatic compounds Huckel's (4n+2) rule and its applications.	2	Chalk &Talk	BlackBoard
5.2	Cyclobutadiene, Tropylium Ion, Naphthalene, Furan, Indole, Pyridine, Cyclooctatetraene, Pyrene, Phenanthrene, [18] Annulene, [10] Annulene.	2	Chalk &Talk	BlackBoard
5.3	Electrophilic substitution reactions, General mechanism of aromatic electrophilic substitution, nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation.	2	Chalk &Talk	BlackBoard
5.4	**Polynuclear Aromatic hydrocarbons**: Naphthalene nomenclature, Haworth synthesis, physical properties, reactions electrophilic substitution reaction, Diazotization (aliphatic), nitration, sulphonation, halogenation, Nucleophilic substitution S_N1, S_N2 Anthracene, synthesis by Elbs reaction	2	Chalk &Talk	BlackBoard
	Diels – Alder reaction and Haworth synthesis; physical properties, reactions - Diels-Alder reaction, preferential substitution at C-9 and	**3**	Chalk &Talk	BlackBoard

	C-10; uses.			
	Friedel – Crafts acylation & alkylation, preferential substitution at different positions reduction, oxidation and its uses.	**2**	Chalk &Talk	BlackBoard
	Mono substituted and disubstituted benzene, Effect of substituent orientation and reactivity.	**2**	Chalk &Talk	BlackBoard

COURSE OUTCOMES

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

NO.	COURSEOUTCOMES	KNOWLEDGE LEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	Explain the concept of acids, bases and ionic equilibria; periodic properties of s and p block elements, preparation and properties of aliphatic and aromatic hydrocarbons	K1,K2,K3&K4	PSO1&PSO2
CO2	Discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids	K1,K2,K3&K4	PSO3
CO3	Classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and	K1,K2,K3&K4	PSO5

	aromatic hydrocarbons		
CO4	Explain theories of acids, bases and indicators, buffer action and important compoundsof s-block elements	K1,K2,K3&K4	PSO7
CO5	Assess the application of hard and soft acids indicators, buffers, compounds of s and p- block elements and hydrocarbons	K1,K2,K3&K4	PSO7

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

HOD'S Signature

S-Tedona.

II B.Sc. CHEMISTRY

SEMESTER –II

For those who join from 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C2CC4	QUALITATIVE ORGANIC ANALYSIS AND PREPARATION	MAJOR PRACTICAL	4	4

COURSE DESCRIPTION

This paper gives a basic understanding of organic qualitative Analysis and Preparation of organic compounds to major students as Core practical.

COURSE OBJECTIVES

This course aims to provide knowledge on the

- preparation of Organic compounds
- principles and practical experience of Organic Qualitative Analysis

Course Learning Outcomes
On completion of the course the students should be able to

CO1: identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.

CO2: compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non- reducing sugars and explain the reactions behind it.

CO3: exhibit a solid derivative with respect to the identified functional group.

CO4 :: Prepare an Organic Compoiund with Practical Experience

Qualitative Organic Analysis

Preliminary examination, detection of special elements - nitrogen, sulphur andhalogens

Aromatic and aliphatic nature, Test for saturation and unsaturation,identification of functional groups using solubility tests

Confirmation of functional groups

- monocarboxylic acid, dicarboxylic acid
- monohydric phenol, polyhydric phenol
- aldehyde, ketone, ester
- carbohydrate (reducing and non-reducing sugars)
- primary, secondary, tertiary amine
- monoamide, diamide, thioamide
- anilide, nitro compound
- Preparation of Derivatives

Preparation of Organic Compounds

i. Salicylic acid from Methyl Salicylate
ii. Osazone from Glucose
iii. 2,4,6- tri bromo phenol from Phenol

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explain the basic principles involved in organic qualitative analysis and preparations Understand the theory behind practicals – organic qualitative analysis.	K1,K3 & K4	PSO1& PSO2
CO 2	Identify the presence of special elements and functional group in	K1 & K2	PSO2 &PSO7

	an unknown organic compound performing a systematic analysis.		
CO 3	Compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non- reducing sugars and explain the reactions behind it.	K1, K2 , K3& K4	PSO6
CO 4	Exhibit a solid derivative with respect to the identified functional group.	K1, K2 & K4	PSO1
CO 5	Prepare an Organic Compoiund with Practical Experience	K1,K2&K3	PSO4 & PSO5

Reference Books

1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. *Basic Principlesof Practical Chemistry*, 2nd ed.; Sultan Chand: New Delhi, 2012.
2. Manna, A.K. *Practical Organic Chemistry*, Books and Allied: India,2018.
3. Gurtu, J. N; Kapoor, R. *Advanced Experimental Chemistry (Organic)*,Sultan Chand: New Delhi, 1987.
4. Furniss,B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. *Vogel'sTextbook of Practical Organic Chemistry*, 5th ed.; Pearson: India,1989.

	PO1	PO 2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO9	PO1 0
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12

Weighted percentage ofCourse Contribution to Pos	3.0	3.0	3.0	3.0	3.0

I B.Sc.

SEMESTER –II

For those who joined from 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	23C2GEZ3/23C2GEN3	CHEMISTRY FOR BIOLOGICAL SCIENCES II (FOR BOTANY, ZOOLOGY AND HOMESCIENCE STUDENTS)	Generic elective-II	2	2

COURSE OBJECTIVES

This course aims to provide knowledge on

- Water Purification techniques
- Carbohydrate Chemistry
- Amino acids in Bio systems
- provide fundamentals of electrochemistry and photochemistry

UNIT I: Water Technology

Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques –BOD and COD- Reverse Osmosis –Desalination – Water softening techniques - Demineralisation

Unit II Carbohydrates

Classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose. Glucose-fructose interconversion. Preparation and properties of sucrose, starch and cellulose.

UNIT III

Amino Acids and Essential elements of biosystem

Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method - Proteins- classification – structure - Colour reactions. Essentials of trace metals in biological system-Na, Cu, K, Zn, Fe, Mg.

UNIT IV Electrochemistry

Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials - electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination - colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.

UNIT V Photochemistry

Grothus - Drapper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples).

REFERENCES:

1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009.

2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006.

3. ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012.

4. P.L.Soni, H.M.Chawla, Text Book of Inorganic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007

5. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

6. Jayashree gosh, Fundamental Concepts of Applied Chemistry;
Sultan & Chand, Edition 2006.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	UNIT –I water technology			
1.1	Basic introduction on water treatment	1	Chalk & Talk	Black Board
1.2	Water Technology: Hardness of water, determination of hardness of water using	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	EDTA method			
1.3	Purification techniques –BOD and COD-	2	Chalk & Talk	Black Board
1.4	Water softening techniques - Demineralisation.	2	Chalk & Talk	Black Board
1.5	zeolite method- Reverse Osmosis Desalination –	2	Chalk & Talk	Black Board
UNIT II	**Carbohydrates**			
2.1	Classification, preparation and properties of glucose and fructose..	3	Chalk & Talk	Black Board
2.2	Discussion of open chain ring structures glucose and fructose. Glucose-fructo interconversion.,	3	Chalk & Talk	Black Board
UNIT III	**Amino Acids and Essential elements of biosystem**			
3.1	Classification - preparation and properties of alanine,	2	Chalk & Talk	Black Board
3.2	preparation of dipeptides using Bergmann method -	2	Chalk & Talk	Black Board
3.3	Proteins- classification – structure - Colour reactions.	3	Chalk & Talk	Black Board
3.4	Essentials of trace metals in biological system-Na, Cu, K, Zn, Fe, Mg. .	2	Chalk & Talk	Black Board
UNIT IV	**Electrochemistry**			

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.1	Galvanic cells - Standard hydrogen electrode	1	Chalk & Talk	Black Board
4.2	calomel electrode - standard electrode potentials -electrochemical series. Strong and weak ionic product of water -pH, pKa, pKb.	2	Chalk & Talk	Black Board
4.3	Conductometric titrations - pH determination	2	Chalk & Talk	Black Board
4.4	colorimetric method – buffer solutions and biological applications	2	Chalk & Talk	Black Board
4.5	Nickel and chrome plating – Types of cells - fuel cells-corrosion and its prevention.	2	Chalk & Talk	Black Board
UNIT V	**Photochemistry**			
5.1	Grothus - Drapper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield	3	Chalk & Talk	Black Board
5.2	Phosphorescence, fluorescence, chemiluminescence	3	Chalk & Talk	Black Board
5.3	photosensitization and photosynthesis (definition with examples). .	3	Chalk & Talk	Black Board

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Estimate the hardness of water samples	K1,K3 & K4	PSO1& PSO2
CO 2	Distinguish the monosaccharides and disaccharides	K1 & K2	PSO2 &PSO7
CO 3	Explain the role of amino acids in biological systems	K1, K2 , K3& K4	PSO6
CO 4	Gain knowledge in electrochemical reactions and corrossion	K1, K2 & K4	PSO1
CO 5	Differentiate thermal and photochemical reactions	K1,K2&K3	PSO4 & PSO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
CO1	3	3	2	2	2	2	2	2				
CO2	2	3	2	2	2	2	3	2				
CO3	2					2	2	2	2	3	2	2
CO4	3	2	2	2	2	2	2	2				
CO5	2	2	2	3	3	2	2	2				

Note: ♦ Strongly Correlated – **3** ♦ ModeratelyCorrelated – **2** ♦ WeaklyCorrelated -**1**

CIA COMPONENTS

Components	Marks	Converted Marks
T1	30	15
T2	30	
Assignment & Attendance		5 (3+2)
Quiz / Seminar		5
Total		25 Marks

COURSE DESIGNER:

Staff Name

1.Dr. B.SUGANTHANA

B-Tedona.

FATIMA COLLEGE (AUTONOMOUS) ,MADURAI- 18

SEMESTER-II

(According to TANSCHE Regulations, For those who joined in June2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C2GEZ4	CHEMISTRY PRACTICALS FOR BIOLOGICAL SCIENCES - II (FOR ZOOLOGY AND HOMESCIENCE STUDENTS)	Generic Elective	2	1

This course aims to provide knowledge on:

- Identification of organic functional groups
- Different types of organic compounds with respect to theirproperties.
- Determination of elements in organic compounds..

SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS

The analysis must be carried out as follows:

(a) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehydeand glucose].

(b) Detection of elements (N, S, Halogens).

(c) To distinguish between aliphatic and aromaticcompounds.

To distinguish – Saturated and unsaturated compounds.

Reference Books

1. V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic PrinciplesofPractical Chemistry; Sultan Chand & sons, Second edition, 1997.

Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to

CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette.

CO 2: design, carry out, record and interpret the results of volumetric titration.

CO 3: apply their skill in the analysis of water/hardness.

CO4: analyze the chemical constituents in allied chemical products

CO /PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution toPSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

FATIMA COLLEGE (AUTONOMOUS) MADURAI- 18

SEMESTER-II

(According to TANSCHE Regulations, For those who joined in June2023 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C2GEN4	CHEMISTRY PRACTICALS FOR BIOLOGICAL SCIENCES - II (FOR ZOOLOGY AND HOMESCIENCE STUDENTS)	Generic Elective	2	1

This course aims to provide knowledge on:

- Identification of organic functional groups
- Different types of organic compounds with respect to theirproperties.
- Determination of elements in organic compounds..

SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS

The analysis must be carried out as follows:

(d) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehydeand glucose].

(e) Detection of elements (N, S, Halogens).

(f) To distinguish between aliphatic and aromaticcompounds.

To distinguish – Saturated and unsaturated compounds.

Reference Books

2. V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic PrinciplesofPractical Chemistry; Sultan Chand & sons, Second edition, 1997.

Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to

CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette.

CO 2: design, carry out, record and interpret the results of volumetric titration.

CO 3: apply their skill in the analysis of water/hardness.

CO4: analyze the chemical constituents in allied chemical products

CO /PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution toPSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

I B.Sc.CHEMISTRY

SEMESTER

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C2SE2	DAIRY CHEMISTRY	Skill Enhancement (NME)	2	2

COURSE DESCRIPTION

This course provides a detailed study of Composition of Milk, Processing of Milk, Major Milk Products, Special Milk, Fermented and other Milk Products.

COURSE OBJECTIVE

This Course aims at Providing an overall view of the

- Chemistry of milk and milk products
- Processing of milk
- Preservation and formation of milk products

UNIT I

Composition of Milk

Milk-definition-general composition of milk- constituents of milk - lipids, proteins, carbohydrates,

vitamins and minerals - physical properties of milk - colour, odour, acidity, specific gravity, viscosity and conductivity -Factors affecting the composition of milk - adulterants, preservatives with neutralizer- examples and their detection- estimation of fat, acidity and total solids in milk.

Unit II

Processing of Milk

Microbiology of milk - destruction of micro - organisms in milk, physico – chemical changes taking place in milk due to processing - boiling, pasteurization – types of pasteurization -Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization.

UNIT III

Major Milk Products

Cream - definition - composition - chemistry of creaming process - gravitational and centrifugal methods of separation of cream - estimation of fat in cream. Butter - definition -composition - theory of churning – desi butter - salted butter, estimation of acidity and moisture content in butter. Ghee - major constituents - common adulterants added to ghee and their detection – rancidity definition - prevention - antioxidants and synergists - natural and synthetic.

UNIT IV:

Special Milk

Standardised milk - definition - merits - reconstituted milk - definition - flow diagram of manufacture - Homogenised milk - flavoured milk - vitaminised

milk - toned milk -Incitation milk - Vegetable toned milk - humanized milk -condensed milk - definition, composition and nutritive value.

UNIT V

Fermented and other Milk Products

Fermented milk products – fermentation of milk - definition, conditions, cultured milk - definition of culture - example, conditions - cultured cream, butter milk - Bulgarious milk -acidophilous milk – Yoheer Indigeneous products- khoa and chhena definition - Ice cream -definition-percentage composition-types-ingredients-manufacture of ice–cream,

stabilizers - emulsifiers and their role-milk powder-definition-need form a king milk powder- drying process-types of drying.

Text Books:

1. K.BagavathiSundari,AppliedChemistry,MJPPublishers,firstedition,2006.

2. K.S.RangappaandK.T.Acharya,IndianDairyProducts,AsiaPublishingHouseNew Delhi,1974.

3.

Textbookofdairychemistry,M.P.Mathur,D.DattaRoy,P.Dinakar,IndianCouncilofAgricultural Research,1stedition,2008.
4. ATextbookofdairychemistry,SauravSingh,DayaPublishinghouse,1stedition,2013.
Textbookofdairychemistry,P.L.Choudhary,Bio-Greenbookpublishers,2021.

Reference Books:

1. RobertJennessandS.Patom,PrinciplesofDairyChemistry,S.Wiley,NewYork,200
2. F.P.Wond,FundamentalsofDairyChemistry,Springer,Singapore,2006.
3. Sukumar De,OutlinesofDairyTechnology,OxfordUniversityPress,NewDelhi,198
4.P.F.FoxandP.L.H.Mcsweeney,DairyChemistryandBiochemistry,Springer,Second edition,2016.
5.Dairy chemistry and biochemistry,P.F.Fox,T.Uniacke-Lowe,P.L.H. McSweeney,J.A.OMahony,Springer,Secondedition,2015.

COURSE CONTENTS &LECTURE SCHEDULE:

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-1 COMPOSITION OF MILK				
1.1	Milk - definition - general composition of milk - constituents of milk.	1	Chalk &Talk	Black Board
1.2	Lipids - proteins - carbohydrates, vitamins, and minerals	1	Chalk &Talk	Black Board
1.3	Physical properties of milk - colour, odour, acidity, specific gravity , viscosity and conductivity.	1	Chalk &Talk	PPT& White board
1.4	Factors affecting the composition of milk	1	Chalk &Talk	Black Board
1.5	Adulterants , preservatives with neutralizer - examples and their detections	1	Chalk &Talk	Black Board
1.6	Estimation of fat, acidity, and total solids in milk.	1	Chalk &Talk	Black Board
Unit-2 PROCESSING OF MILK				
2.1	Microbiology of milk - destruction of micro-organism in milk	1	Chalk &Talk	Black Board
2.2	Physico-chemical changes taking place in milk due to processing	1	Chalk &Talk	Black Board

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
2.3	Boiling , pasteurization - types of pasteurization	1	Chalk &Talk	Black Board
2.4	Bottle - Batch and HTST (High Temperature Short Time)	1	Chalk &Talk	PPT& White board
2.5	Vaccum pasteurization	1	Chalk &Talk	Black Board
2.6	Ultra High Temperature Pasteurization.	1	Chalk &Talk	Black Board
UNIT-3 MAJOR MILK PRODUCTS				
3.1	Cream	1	Chalk &Talk	Black Board
3.2	Gravitational and centrifugal methods of separation of cream	1	Chalk &Talk	PPT& White board
3.3	Estimation of cream	1	Chalk &Talk	Black Board
3.4	Butter	1	Chalk &Talk	PPT& White board
3.5	Ghee	1	Chalk &Talk	Black Board
3.6	Rancidity	1	Chalk &Talk	Black Board

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-4 SPECIAL MILK				
4.1	Standardised milk	1	Chalk &Talk	PPT& White board
4.2	Reconstituted milk	1	Chalk &Talk	Black Board
4.3	Flow diagram of manufacture	1	Chalk &Talk	Black Board
4.4	Homogenised milk , Flavoured milk	1	Chalk &Talk	Black Board
4.5	Vitaminised milk , Toned milk	1	Chalk &Talk	Black Board
4.6	Incitation milk , Vegetable toned milk , Humanized milk	1	Chalk &Talk	Black Board

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-VNUCLEARCHEMISTRY				
5.1	Fermented milk products	1	Chalk &Talk	PPT
5.2	Cultured milk	1	Chalk &Talk	Black Board
5.3	Butter milk	1	Chalk &Talk	Black Board
5.4	Ice cream	1	Chalk &Talk	Black Board
5.5	Milk powder	1	Chalk &Talk	PPT
5.6	Drying process	1	Chalk &Talk	Black Board

CIA COMPONENTS

Components	Marks	Converted Marks
T1	30	20
T2	30	
Assignment		5
Quiz / Seminar		5
Non-scholastic		5
Open book Test		5
Total		40 Marks

COURSE OUTCOMES

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

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRSSED
CO1	understandaboutgeneralcompositionofmilk–constituentsanditsphysicalproperties	K1,K2,K3&K4	PSO1&PSO
CO2	acquire knowledge about pasteurization of Milk and various types of pasteurization – Bottle, Batch and HTST Ultra High Temperature Pasteurization.	K1,K2,K3&K4	PSO3
CO3	learn about Cream and Butter their composition and how to estimate fat in cream and Ghee	K1,K2,K3&K4	PSO5
CO4	explainaboutHomogenizedmilk,flavouredmilk,vitaminisedmilkandtonedmilk.	K1,K2,K3&K4	PSO7

CO5	haveanideaabouthowtomakemilkpowderanditsdryingprocess-typesofdryingprocess	K1,K2,K3&K4	PSO7

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-POMapping(CourseArticulationMatrix)

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage ofCourse Contribution toPos	3.0	3.0	3.0	3.0	3.0

LevelofCorrelationbetweenPSO'sandCO's

HOD'S Signature

I B.Sc.CHEMISTRY

SEMESTER–II

For those who joined in 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C2SE3	COSMETICS AND PERSONAL CARE PRODUCTS (GROOMING)	Skill Enhancement (Disclipine Specific)	2	2

This course aims at familiarizing the students with

- formulations of various types of cosmetics and their significance
- hair, skin and dental care
- makeup preparations and personal grooming

Unit I

Skin care

Nutrition of the skin, skin care and cleansing of the skin; face powder – ingredients; creams and lotions – cleansing, moisturizing all purpose, shaving and sunscreen (formulation only); Gels – formulation and advantages; astringent and skin tonics – key ingredients, skin lightness, depilatories.

Unit II Hair care

Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner – types – ingredients

Dental care

Tooth pastes – ingredients – mouth wash

Unit III Make up

Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eye shadow, concealers, rouge

Unit IV Perfumes

Classification - Natural – plant origin – parts of the plant used, chief constituents; animal origin – amber gries from whale, civetone from civet cat, musk from musk deer; synthetic – classification emphasizing characteristics –esters – alcohols – aldehydes – ketones

Unit V Beauty treatments

Facials - types – advantages – disadvantages; face masks – types; bleach - types – advantages– disadvantages; shaping the brows; eyelash tinting; perming types; hair colouring and dyeing ; permanent waving – hair straightening; wax types – waxing; pedicure, manicure - advantages – disadvantages

REFERENCE

1.Thankamma Jacob, (1997) Foods, drugs and cometics – A consumer guide, Macmillan publication, London.
2. Wilkinson J B E and Moore R J, (1997) Harry's cosmeticology, 7th ed., Chemical Publishers, London.
3. George Howard, (1987) Principles and practiceof perfumes and cosmetics,

NO.	COURSEOUTCOMES	KNOWLEDGELEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED
CO1	know about the composition of various cosmetic products	K1,K2,K3&K4	PSO1&PSO2
CO2	understand chemical aspects and applications of hair care and dental care and skin care products.	K1,K2,K3&K4	PSO3
CO3	understandchemicalaspectsandapplicationsofperfumesandskincareproducts.	K1,K2,K3&K4	PSO5
CO4	tounderstandthemethodsofbeautytreatmentstheiradvantagesanddisadvantage	K1,K2,K3&K4	PSO7

CO5	understand the hazards of cosmetic products.	K1,K2,K3&K4	PSO7

COURSECONTENTS&LECTURESCHEDULE

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teachin Aids
UNIT-1 Skin Care				
1.1	Nutrition of the skin, skin care and cleansing of the skin; moisturizing all purpose, –	2	Chalk &Talk	PPT,LC
1.2	face powder – ingredients; creams and lotions – cleansing,	2	Chalk &Talk	Black ard
1.3	shaving and sunscreen (formulation only); Gels	2	Chalk &Talk	Black ard
1.4	formulation and advantages; astringent and skin tonics	2	Lecture	Black ard
1.5	key ingredients, skin lightness, depilatories.	2	Lecture	Black ard

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-2 Hair Care				
2.1	Shampoos – types –	2	Lecture	BlackBoard
2.2	powder, cream, liquid, gel – ingredients;	2	Chalk &Talk	GreenBoard
2.3	conditioner – types – ingredients	2	Chalk &Talk	BlackBoard
2.4	Dental care Tooth pastes –	2	Lecture	PPT& White board
2.5	Tooth paste ingredients – mouth wash	2	Chalk &Talk	LCD

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-3 Make up				
3.1	Base – foundation –	2	Lecture	BlackBoard
3.2	Foundation types – ingredients;	2	Discussion	LCD
3.3	lipstick, eyeliner,	2	Lecture	PPT& White Board
3.4	mascara, eye shadow, c	2	Lecture	BlackBoard
3.5	Concealers, rouge	2	Discussion	LCD
UNIT-4 Perfumes				
4.1	Classification - Natural – plant origin	1	Lecture	BlackBoard
4.2	– parts of the plant used, chief constituents;	2	Chalk &Talk	GreenBoard

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
4.3	animal origin – amber gries from whale, civetone from civet cat, musk from musk deer; s	2	Chalk &Talk	BlackBoard
4.4	Synthetic – classification emphasizing characteristics –	2	Lecture	PPT& White board
UNIT-5 Beauty Treatments				
5.1	Facials - types – advantages – disadvantages;	2	Lecture	BlackBoard
5.2	face masks – types; bleach - types – advantages– disadvantages;	2	Chalk &Talk	GreenBoard
5.3	shaping the brows; eyelash tinting; perming types;	2	Chalk &Talk	BlackBoard

Module No.	Topic	No.of Lectures	Teaching Pedagogy	Teaching Aids
5.4	hair colouring and dyeing ; permanent waving –	2	Lecture	PPT& White board
5.5	hair straightening; wax types – waxing;	2	Discussion	LCD
5.6	pedicure, manicure - advantages – disadvantages	2	Lecture	BlackBoard
5.7	Digestionoftheprecipitate,Washingand Filtration, DryingorIgnition	2	Lecture	PPT& White board
5.8	ErrorsinGravimetryandscopeofthetechnique,Inorganicand Organicprecipitatingagents.	2	Lecture	BlackBoard

Levels	C1	C2	C3	C4	TotalScholasticMarks	NonScholasticMarksC5	CIA Total	%ofAssessment
	Session-wiseAverage 5Mks.	BetterofW1,W2 5 Mks	M1+M2 5+5=10Mks.	MID-SEMTEST 15Mks	35Mks.	5Mks.	40Mks.	
K1	5	-	-	2½	7.5	-	7.5	18.75%
K2	-	5	4	2½	11.5	-	11.5	28.75%
K3	-	-	3	5	8	-	8	20%
K4	-	-	3	5	8	-	8	20%
NonScholastic	-	-	-	-		5	5	12.5%
Total	5	5	10	15	35	5	40	100%

CIA	
Scholastic	35
NonScholastic	5
	40

- ✓ **All the course outcomesare to beassessed in thevarious CIAcomponents.**

- ✓ ThelevelsofCIAAssessmentbasedonRevisedBloom'sTaxonomy **for:**

K1-Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATIONPATTERN

SCHOLASTIC				NON-SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1–AverageofTwoSessionWiseTests

C2–AverageofTwoMonthlyTests

C3-MidSemTest

C4–BestofTwoWeeklyTests

C5–Non-Scholastic

CIA COMPONENTS

Components	Marks	Converted Marks
T1	30	20
T2	30	
Assignment		5
Quiz / Seminar		5
Non- scholastic		5
Open book Test		5
Total		40 Marks

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-POMapping(CourseArticulationMatrix)

LevelofCorrelationbetweenPSO′sandCO′s

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
WeightedpercentageofCourseContributiontoPos	3.0	3.0	3.0	3.0	3.0

HOD′S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. CHEMISTRYSEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C3CC7	ORGANIC & INORGANIC CHEMISTRY	UG-Core	5	4

COURSE DESCRIPTION

This paper deals with the concept of aromaticity and detailed study of electrophilic and nucleophilic substitutions in aromatic compounds. The inorganic chemistry part of the paper deals with the general characteristics of, VII group elements,d- block elementsandPrinciples of InorganicQualitative andQuantitative Analysis.

COURSE OBJECTIVES

In this course the students are able to gain knowledge about aromaticity and able to apply the concept to other organic compounds, and they are exposed to electrophilic and nucleophilicmechanisms. Students are able to appreciatechemistry behind practicals of qualitative and quantitative analysis.

COURSE OUTCOME:

After completion of the course the students should be able to:

CO 1 To interpret the concept of aromaticity and the main properties of aromatic compounds.

CO 2 To explore reactivity patterns of conjugated, aromatic molecules andto evaluate the kinetics and thermodynamics controlled reactions.

CO 3 Explain types of oxides and oxyacids, their structure and

reactivity inhalogens

CO 4 Discuss the properties d block elements & triads of transition elements.

CO 5 Recognize the role of oxidizing agents, reducing agents, groupreagents andcomplexing agents, and inferences with theory behind practicals.

I. (a) Aromatic hydrocarbon (6Hrs)

The Concept of Aromaticity, Aromatic, Antiaromatic and non-aromatic compounds- Huckel's rule and applications of Huckel's rule,Structure of Benzene, Stability of Benzene ring - Heats of Hydrogenation and combustion, C-C Bond lengths, resonance structure of Benzene,Molecular orbital picture of benzene andNomenclature of Benzene derivatives.

(b). Electrophilic Aromatic Substitution (9Hrs)

Introduction, General mechanism of Nitration, SulphonationandDesulphonation, Halogenation, Friedal crafts alkylation and acylation.Limitations of Friedel-Crafts alkylation, Orientation effect of substituent groups on further electrophilic aromatic substitution, Classification of substituent groups, Effect of Activating groups, Effect of deactivating groups, Steric factors in Electrophilic Aromatic Substitution, Introduction of a third substituent into the benzene ring.

II.(a) Nucleophilic Aromatic Substitution (3Hrs)

Activated Nucleophilic substitution, Benzyne mechanism and evidences in favour of benzyne mechanism

(b) Phenols (12Hrs)

Classification and Nomenclature, Preparation –General Physical properties,.Chemical properties– Acidic character of phenols, Electrophilic aromatic substitution reactions of phenol- Reaction with dilute nitric

acid and con. Nitric acid, Sulphuric acid, Bromine, Nitrous acid, Alkyl halides and formaldehyde(LedererManasse Reaction), Coupling reaction, Kolbe reaction, Reimer Tiemann reaction, Reactins of OH group similar to alcohols-reaction with sodium, Esterification-Fries rearrangement, Etherification- Claisenrearrangementand Tests for phenol.

III. Chemistry of VII Group elements (15Hrs)

Group discussion, anomalous behavior of F, ionic-, covalent-,bridging halides, reactivity of halogens - reduction of halogens by thiosulfate and application to iodo/iodimetry, Comparison of Acid strength of HX.

Halogen oxides: oxygen difluoride, dioxygendifluoride, dichlorine monoxide, chlorinedioxide, dichlorinehexoxide, dichlorineheptoxide; bromine dioxide, iodine pentoxide.Oxoacids of halogens: hypohalous acid HOX, halous acid

HXO_2, halic oxide HXO_3,perhalic acid HXO_4, strength of oxoacids.Interhalogen compounds: ClF, ICl;, IF_3, , BrF_5, - structure-VSEPR Model.

IV Chemistry of d-block elements (15Hrs)

First, second and third transition series - General characteristics – Metalliccharacter, atomic and ionic radii – oxidation states, colour, complex formation, catalytic and magnetic properties-Non-stoichiometric compounds- Preparation, properties and uses of Importantcompounds of transitionmetals:Chromous Acetate, Potassium Ferocyanide, Potassium Ferricyanide, Prussian blue,Sodium nitro prusside, Nickel DMG complex, Wilkinson'sCatalyst, Hg_2Cl_2,$HgCl_2$,Hgl_2,$K_2Cr_2O_7$ and$KMnO_4$.

(V) Principles of Inorganic Qualitative and Quantitative Analysis (15 Hrs)

Qualitative analysis: Basic principles of chemical analysis-solubility product-definition-application of solubility product, Reactions of dilute and concentrated acids-preparation of Na_2CO_3 extract- Tests for interfering and non-interfering acid radicals.

Quantitative Analysis: Introductionto Gravimetric analysis, Precipitation

methods of Gravimetric analysis, Mechanism of precipitation-Desirable properties of Gravimetric precipitates, Factors affecting the solubilities of precipitates, common ion effect, adverse ion effect-coprecipitation, post precipitation, Digestion of the precipitate, Washing and Filtration, Drying or Ignition, Errors in Gravimetry and scope of the technique,Inorganic and Organic precipitating agents.

Text Books

1. For Units I and II - M. K. Jain and S.C. Sharma- Modern Organic Chemistry, 4th(Reprint) Edn, Vishal Publishing Co., 2013.
2. For unit III, IV and V -B.R.Puri, L.R.Sharma&Kalia.- Principles ofInorganic chemistry –32ndEdn, Milestone publishers, 2018.

Reference Books

1. R.T.Morrison&R.N.Boyd, Organic chemistry 6thEdn, Prentice-hall ofIndia private Ltd, 2005.
2. ArunBahl& B. S. Bahl, Advanced Organic chemistry, First Edition,Reprint, S.Chand& Co. 2005.
3. Jerry March, Advanced Organic Chemistry, 4th Edition, John Wiley, NewYork, 2005.
4. SatyaPrakash, G.D.Tuli, S.K.Basu, R.D. Madan, Advanced InorganicChemistry,Vol-I, Reprint, S.Chand& Co., 2016.
5. James E.Huheey, Inorganic Chemistry, Pearson publications, 4th edition,2008.
6. F. A. Cotton, G. Wilkinson, C. Murillo & M. Bochman, AdvancedInorganic Chemistry, 6thed., John Wiley, New York, 1991

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 (a) Aromatic hydrocarbon (b) Electrophilic aromatic substitution				
1.1	The Concept of Aromaticity Aromatic, Antiaromatic and non- aromatic compounds	2	Chalk & Talk	PPT,LCD
1.2	Huckel's rule	1	Chalk & Talk	Black Board
1.3	applications of Huckel's rule	1	Chalk & Talk	Black Board
1.4	Structure of Benzene, Stability of Benzene ring - Heats of Hydrogenation and combustion, C-C Bond lengths, resonance structureof Benzene,Molecular orbital picture of benzene andNomenclature of Benzene derivatives.	3	Lecture	Black Board
1.5	Introduction, General mechanism of Nitration, sulphonationandDesulphonation, Halogenation, Friedal crafts alkylation and acylation.	3	Lecture	Black Board

1.6	Limitations of Friedel-Crafts alkylation, Orientation effect of substituent groups on further electrophilic aromatic substitution, Classification of substituent groups,	2	Lecture	Chalk and Talk
1.7	Effect of Activating groups, Effectof deactivating groups	1	Lecture	White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.8	Steric factors in Electrophilic Aromatic Substitution, Introduction of a third substituent into the benzene ring.	2	Lecture	Black Board
UNIT -2 (a) Nucleophilic Aromatic Substitution (b) Phenols				
2.1	Activated Nucleophilicsubstitution	1	Lecture	Black Board
2.2	Benzyne mechanism and evidences in favour of benzyne mechanism	2	Chalk & Talk	Green Board
2.3	ClassificationandNomenclature, Preparation General Physical properties	2	Chalk & Talk	Black Board
2.4	Chemical properties– Acidiccharacter of phenols, Electrophilic aromatic substitution reactions of phenol	3	Lecture	PPT & White board
2.5	Reaction with dilute nitric acid and con. Nitric acid, Sulphuric acid, Bromine, Nitrous acid, Alkyl halides and formaldehyde	2	Chalk & Talk	LCD

2.6	Coupling reaction, Kolbe reaction, Reimer Tiemannreaction	1	Lecture	Black Board
2.7	Reactins of OH group similar toalcohols-reaction with sodium, Esterification-Fries rearrangement, Etherification-Claisenrearrangementand Tests for phenol.	4	Lecture	PPT & White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -3 Chemistry of VII Group elements				
3.1	Group discussion, anomalousbehavior of Flourine.	2	Lecture	Black Board
3.2	Ionic-covalent-,bridging halides, reactivity of halogens - reduction of halogens by thiosulfate	3	Discussion	LC D
3.3	application to iodo/iodimetry, Comparison of Acid strength of HX.	3	Lecture	PPT & White Board
3.4	Halogen oxides oxygen difluoride, dioxygendifluoride, dichlorine monoxide	2	Lecture	Black Board
3.5	chlorinedioxide, dichlorinehexoxide, dichlorineheptoxide	1	Discussion	LC D
3.6	bromine dioxide, iodine pentoxide. Oxoacids of halogens: hypohalous acid HOX	2	Lecture	Black Board

3.7	halous acid HXO_2, halic oxide HXO_3, perhalic acid HXO_4, strength of oxoacids.	1	Lecture	Black Board
3.8	Interhalogen compounds: ClF,ICl; ClF_3, BrF_3, IF_3, ClF_5, BrF_5, IF_5 - structure-VSEPR Model.	1	Lecture	Black Board
UNIT -4 Chemistry of d-block elements				
4.1	First, second and third transitionseries	1	Lecture	Black Board
4.2	General characteristics – Metallic	3	Chalk & Talk	Green Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	character, atomic and ionic radii			
4.3	oxidation states, colour, complexformation	2	Chalk & Talk	Black Board
4.4	catalytic and magnetic properties-Non-stoichiometric compounds	3	Lecture	PPT & White board
4.5	Preparation, properties and usesof Importantcompounds of transitionmetals:Chromous Acetate	1	Discussion	LCD
4.6	Potassium Ferocyanide,	1	Lecture	Black Board
4.7	Potassium Ferricyanide, Prussian blue,Sodium nitro prusside, Nickel DMG complex, Wilkinson'sCatalyst,	2	Lecture	PPT & White board

4.8	Hg_2Cl_2,$HgCl_2$,Hgl_2,$K_2Cr_2O_7$ and$KMnO_4$.	2	Lecture	Black Board
UNIT -5 Principles of Inorganic Qualitative and Quantitative Analysis				
5.1	Qualitative analysis: Basic principles of chemical analysis	2	Lecture	Black Board
5.2	solubility product-definition-application of solubility product	2	Chalk & Talk	Green Board
5.3	Reactions of dilute and concentrated acids-preparation of Na_2CO_3 extract- Tests for interfering and non-interfering acid radicals	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.4	Quantitative Analysis: Introductionto Gravimetri canalysis,	1	Lecture	PPT & White board
5.5	Precipitation methods of Gravimetric analysis, Mechanism of precipitation-Desirable properties of Gravimetric precipitates,	2	Discussion	LCD
5.6	Factors affecting the solubilities of precipitates, common ion effect, adverse ion effect-coprecipitation, post precipitation,	1	Lecture	Black Board
5.7	Digestion of the precipitate, Washing and Filtration, Drying or Ignition	2	Lecture	PPT & White board

5.8	Errors in Gravimetry and scopeof the technique,Inorganic and Organic precipitating agents.	2	Lecture	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session -wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non Scholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

- ✓ **All the course outcomes are to be assessed in the various CIA components.**

- ✓ The levels of CIA Assessment based on Revised Bloom's Taxonomy **for :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To interpret the concept of aromaticity and to understand the mechanism and main properties of aromatic compounds.	K1	PSO1& PSO2
CO 2	To explore reactivity patterns of aromatic molecules and to evaluate the reaction pattern.	K1, K2	PSO3
CO 3	To explain types of compound formed by halogens, their structure and reactivity .	K1 & K3	PSO5
CO 4	To discuss the properties of d block elements & triads of transition elements.	K1, K2 & K3	PSO1& PSO2
CO 5	To recognize the role of oxidizing agents, reducing agents, group reagents and complexing agents, and inferences with theory behind practicals.	K2 & K4	PSO1& PSO2

MappingCOs withPSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	2	1	1	1	1	2	1
CO2	3	3	2	1	1	1	1	1
CO3	3	3	2	1	1	1	1	1
CO4	3	3	2	1	1	1	1	1
CO5	3	3	3	1	3	1	1	1

Mapping of COs with POs

CO / PSO	PO1	PO2	PO3	PO4
CO 1	3	3	2	1
CO 2	3	3	1	1
CO 3	3	3	1	1
CO 4	3	3	1	1
CO 5	3	3	2	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER

Dr.Sr.ArulMary.J

Forwarded By

S-Tedona.

FATIMA COLLEGE (AUTONOMOUS),

MADURAI -18II B.Sc. CHEMISTRY

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	**19C3CC8**	**PHYSICAL CHEMISTRY - I (Gaseous state, Solutions,dilute solutions,radio activity & Nuclear transformations and nuclear chemistry)**	**Lecture**	**4**	**3**

COURSE DESCRIPTION

This course provides a detailed study of Gaseous state, Solutions, Theory ofdilute solutions ,Radio activity and nuclear chemistry.

COURSE OBJECTIVES

- To focus on the basic concepts and laws of gases state, characteristicsof various types of solutions, and colligative properties
- TO study the properties of radioactive rays and the importance of nuclear chemistry

COURSE OUTCOME:

After completion of the course the students should be able to:

CO 1 Gain a basic knowledge about the kinetic theory of gases, gaseouslaws,types of velocities and properties of gases

CO 2 Distinguish between ideal and non-ideal solutions

CO 3 Derive the relationship between molar mass of a non-volatile solute andcolligative properties

CO 4 calculate the mass defect,packing fraction and binding energy for anynuclei

CO 5 Predict the growing rate,mechanism and age of plants using radioactiveelements

UNIT-I GASEOUS STATE (12 HRS.)

Kinetic theory of gases-gaseous laws-derivation of kinetic gas equation-Type of molecular velocities-average velocity-most probable velocity-RMS Velocity- Maxwell's distribution of molecular velocities-Effect of temperature on distribution of molecular velocities.Maxwells distribution of molecular energies – collision diameter-collision number-mean free path-viscosity of gases--viscosity in terms of momentum transfer-calculation of collision diameter and mean free path from viscosity measurement.

Real gases: Effect of temperature on deviation from ideal behaviour-Boyle temperature-Limitations of vanderwaals equation-Dieterici equation-Berthelot's equation-clausius equation

Self study : Derivation of Boyle temperature from vanderwaals equation.

UNIT-II SOLUTIONS: (12 HRS.)

Solution of liquids in liquids-Ideal and non-ideal solutions-Raoult's law-Vapour pressure-composition curve of ideal solutions-Vapour pressure-composition curve of non-ideal solutions- Type I, Type II and type III solutions. Vapour pressure-composition and boiling point-composition curves of completelymiscible binary solutions –fractional distillation-Azeotropic

distillation-Distillation of immiscible liquids-steam distillation. Solubility of partially miscible liquid pairs-Phenol-water system,Triethylamine-water system,Nicotine-water system.Effect of impurities on Critical solution temperature. Solution of gases in liquids - Absorption co-efficient of gases--Factors affecting the solubility of a gas in liquids-Nature of gas and solvent, andpressure -Henry's law

Self study : Relationship between Henry's law and Raoults law.

UNIT-III THEORY OF DILUTE SOLUTIONS (12 HRS.)

Relative lowering of vapour pressure-Derivation of molecular weight of a non-volatile solute from relative lowering of vapour pressure- Determination of relativelowering of vapour pressure by Ostwald walker's method

Osmotic pressure- -Laws of Osmotic pressure-derivation of molecular weight of a non-volatile solute from osmotic pressure- - Determination of osmotic pressureby Berkley and Hartley's method-Isotonic solutions-

Ebullioscopy:-Derivation of molecular weight of a non-volatile solute using vapour pressure-boiling point curve-Determination of boiling point elevation byLandsberg's method

Cryoscopy: Derivation of molecular weight of a non-volatile solute using vapour pressure-freezing point curve- Determination of freezing point depression byBeckmann method and Rast method

Self study -Vant't-Hoff factor-degree of dissociation and degree of association

UNIT-IV RADIOACTIVITY AND NUCLEAR TRANSFORMATIONS

(12 HRS.)

Natural Radioactivity:-Properties of alpha,Beta and gamma rays-Detection and masurement ofradioactivity. G.M counter & Wilson cloud chamber-Derivation of decay constant and half life period –Radioactive equilibrium-Soddy-Fajan's group displacement law.

Theory of radioactivity: n/p ratio for stable and meta stable nuclei-radioactiveseries-orbital electron capture-Internal Conversion-nuclear isomerism.

Artificial Radioactivity: Definition-different types of nuclear reactions withexample-induced radioactivity.

Application of radioactivity-Medicine,agriculture and industry, as tracerelements in the elucidation of structure and investigation of reaction mechanism,.

Self study - Carbon dating

UNIT-V NUCLEAR CHEMISTRY (12 HRS.)

Nuclear Structure: Size of the nucleus- Nuclear forces-packing fraction-Massdefect-binding energy of the nucleus-Binding energy and stability

of nuclei.

Nuclear models: Nuclear shell model-The liquid drop model

Nuclear fission: Calculation of energy released in nuclear fission, the fissionchain reaction,atom bomb

Nuclear fusion: Stellar energy-Hydrogen bomb.

Self study -Nuclear reactors.

Text Books:

1.B.R.Puri, L.R. Sharma & M.S. Pathania, Principles of Physical Chemistry,"3rdEdn,Vishal Publishing House, 2010.

2.H.J. Arnicker, Essentials of Nuclear Chemistry, New Age International Pvt. Ltd.2005.

Reference Books:

1.P.L.Soni, H.C. Sharma, Principles of Physical Chemistry, S.Chand &Sons, NewDelhi, 1980

2.A.Singh & R. Singh, Text Book of Nuclear Chemistry, New Delhi, Campus BooksInternational, 2006

3. Mahaling Ram Naresh, Basics of Nuclear Chemistry, New Delhi, Anmo PublicationsPvt Ltd

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 GASEOUS STATE				
1.1	Kinetic theory of gases-gaseouslaws-derivation of kinetic gas equation	2	Chalk & Talk	Black Board
1.2	Type of molecular velocities	2	Chalk & Talk	Black Board
1.3	Maxwell's distribution of molecular velocities	2	Chalk & Talk	PPT & White board
1.4	Mean free path-viscosity of gases	2	Chalk &	Black Board

			Talk	
1.5	Effect of temperature on deviation from ideal behaviour -	2	Chalk & Talk	Black Board
1.6	Boyle temperature	1	Chalk & Talk	Black Board
1.7	Dieterici equation-Berthelo equation-clausius equation	1	Chalk & Talk	Black Board
Unit -2 SOLUTIONS				
2.1	Ideal and Non-ideal solutions-Raoult's law	2	Chalk & Talk	Black Board
2.2	Vapour pressure-composition curve of ideal solutions and non-	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	ideal solutions			
2.3	Vapour pressure-composition and boiling point-composition curves of completely miscible binary solutions	2	Chalk & Talk	Black Board
2.4	Distillation of immiscible liquids-steam distillation	2	Chalk & Talk	PPT & White board
2.5	Solubility of partially miscibleliquid pairs	2	Chalk & Talk	Black Board
2.6	.Solution of gases in liquids	2	Chalk & Talk	Black Board
2.7	Henry's law	1	Chalk &	Black Board

			Talk	
UNIT -3 THEORY OF DILUTE SOLUTIONS				
3.1	Derivation of molecular weight from relative lowering of vapourpressure	2	Chalk & Talk	Black Board
3.2	Ostwald walker's method	1	Chalk & Talk	PPT & White board
3.3	Laws of Osmotic pressure-derivation of molecular weightfrom osmotic pressure	2	Chalk & Talk	Black Board
3.4	Berkley and Hartley's method	2	Chalk & Talk	PPT & White board
3.5	Derivation of molecular weight using vapour pressure-boiling point curve	1	Chalk & Talk	Black Board
3.6	Landsberg's method	2	Chalk & Talk	Black Board

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
3.7	Derivation of molecular weight using vapour pressure-freezing point curve.	2	Chalk & Talk	Black Board
UNIT -4 RADIOACTIVITY& NUCLEAR TRANSFORMATIONS				
4.1	Properties of □ ,□ and □ — rays- Detection and measurement ofradioactivity. G.M counter & Wilson cloud chamber-	2	Chalk & Talk	PPT & White board

4.2	Derivation of decay constant andhalf life period – Radioactive equilibrium-Soddy-Fajan's groupdisplacement law.	2	Chalk & Talk	Black Board
4.3	n/p ratio for stable and meta stable nuclei-radioactive series-orbital electron capture-InternalConversion-nuclear isomerism.	2	Chalk & Talk	Black Board
4.4	Different types of nuclear reactiowith example-induced radioactivity.	2	Chalk & Talk	Black Board
4.5	Application of radioactivity-Medicine,agriculture and industry	2	Chalk & Talk	Black Board
4.6	As tracer elements in the elucidation of structure and investigation of reaction mechanism,.	2	Chalk & Talk	Black Board

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
UNIT-V NUCLEAR CHEMISTRY				
5.1	**Nuclear Structure:** Size of the nucleus-Nuclear forces-packingfraction	2	Chalk & Talk	PPT

5.2	Mass defect-binding energy of t nucleus-Binding energy a stability of nuclei.	2	Chalk & Talk	Black Board
5.3	Nuclear models- Nuclear shellmodel-The liquid drop model	3	Chalk & Talk	Black Board
5.4	Nuclear fission- Calculation of energy released	2	Chalk & Talk	Black Board
5.5	The fission chain reaction,atombomb	1	Chalk & Talk	PPT
5.6	Nuclear fusion-Stellar energy-Hydrogen bomb	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ The levels of CIA Assessment based on Revised Bloom's Taxonomy **are :**

  K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Gain a basic knowledge about the kinetic theory of gases, gaseous laws,types of velocitiesand properties of gases	K1, K2, K3 & K4	PSO1& PSO2

CO 2	Distinguish between ideal and non-ideal solutions	K1, K2, K3 & K4	PSO3
CO 3	Derive the relation between molar mass of a non-volatile solute and colligative properties	K1, K2, K3 & K4	PSO5
CO 4	calculate mass defect,packing fraction and binding energy for any nuclei	K1, K2, K3 & K4	PSO7
CO 5	Predict the growing rate,mechanism and age of plants using radioactive elements	K1, K2, K3 & K4	PSO7

Mapping of COs with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	**3**	**3**	**2**	**1**	**1**	**1**	**1**	**1**
CO2	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**
CO3	**2**	**1**	**1**	**1**	**3**	**1**	**1**	**1**
CO4	**2**	**1**	**1**	**1**	**1**	**1**	**3**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**1**	**3**	**1**

Mapping of COs with POs

CO / PSO	PO1	PO2	PO3	PO4
CO 1	**3**	**2**	**2**	**2**
CO 2	**2**	**3**	**2**	**2**
CO 3	**2**	**2**	**3**	**2**

CO 4	**3**	**2**	**2**	**2**
CO 5	**3**	**2**	**2**	**2**

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated **-1**

COURSE DESIGNER:

Mrs.RM.Nagalakshmi

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc CHMISTRY

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	**19C3SB1**	**Agricultural chemistry**	**Skill based**	**2**	**2**

COURSE DESCRIPTION

This course deals with the basic knowledge about the role of soils in the environment,their types and properties.This paper also provides a focus withspecial emphasis on importance of pesticides, organic manures,compost andfertilizers for better production of crops and also their impact

COURSE OBJECTIVES

- To focus on the basic knowledge about soils,the various types,offertilizers and manures
- TO study the methods of controlling pests

COURSE OUTCOME:

After completion of the course the students should be able

to:CO 1 Define the term soil

CO 2 describe the various types of fertilizers and their uses

CO 3 realise the requirements of manures and fertilizers for better productionof various types of crops

CO 4 Examine the adverse effect of pesticides

CO 5 Calculate the amount of calcium and magnesium present in varioustypes of soils

UNIT I SOILS (6 HRS.)

Soils- Introduction, Composition of soil-Organic and inorganicconstitutents,soil acidity, Alkalinity, buffering of soils, Soil fertility.

UNIT –II FERTILIZERS (6 HRS.)

Introduction,Use of fertilizers : urea, DAP, Super phosphate, Gypsum, NPK-mixed fertiizers, Optimal addition of Fertilizers to obtain estimated yields , Adverse effects of fertilizers

UNIT –III **MANURES AND COMPOST**

Farmyard manure, Compost, Reinforcing manure, green manurecrops,Organic farming,Biogas production from biogas plant

UNIT –IV PESTICIDES (6 HRS.)

Pesticides –Introduction, classes of pesticides; Benefits and Adverse effects ofpesticides, methods of pest control, methods of using pest control chemicals natural pesticides

UNIT –V PRACTICALS (6 HRS.)

Soil analysis – Determination of pH and estimation of Ca and Mg by complexometric titration,and water analysis

References

1.Jeyashree Ghosh, Fundamental concepts of Applied Chemistry, S.Chand,2006

2. B.A. Yagodin ,Agricultural Chemistry, Mir Publishers (Moscow), 1976.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 SOILS				
1.1	Soils- Introduction,Composition of soil	1	Chalk & Talk	Black Board
1.2	Organic and inorganic constitutents	1	Chalk & Talk	Black Board
1.3	soil acidity, Alkalinity,	2	Chalk & Talk	PPT & White board
1.4	buffering of soils, Soil fertility	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-2 FERTILIZERS				
2.1	Introduction, Use of fertilizers : urea, DAP, ,	2	Chalk & Talk	Black Board
2.2	Super phosphate, Gypsum, NPK-mixed fertiizers	1	Chalk & Talk	Black Board
2.3	Optimal addition of Fertilizers to obtain estimated yields	2	Chalk & Talk	Black Board
2.4	Adverse effects of fertilizers	1	Chalk & Talk	PPT & White board
UNIT -3 ORGANIC MANURE AND COMPOST				
3.1	Farmyard manure, Compost,	2	Chalk & Talk	Black Board

3.2	Reinforcing manure, greenmanure crops,	2	Chalk & Talk	PPT & White board
3.3	Biogas production from biogasplant	2	Chalk & Talk	Black Board
UNIT -4PESTICIDES				
4.1	Pesticides –Introduction, classes of pesticides -	2	Chalk & Talk	PPT & White board
4.2	Benefits and Adverse effects of pesticides,.	2	Chalk & Talk	Black Board
4.3	methods of pest control, method of using pest control chemicals.	2	Chalk & Talk	Black Board
UNIT-V PRACTICALS				
5.1	Soil analysis	2	Chalk & Talk	lab

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.2	Determination of pH.	2	Chalk & Talk	lab
5.3	estimation of Ca and Mg bycomplexometric titration	2	Chalk & Talk	lab

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session-wise Average	Better of W1, W2	M1+M2	MID - SEM TEST				

	5 Mks.	5 Mks	5+5=10 Mks.	15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✓ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Learn the charecteristics of soil	K1& K2	PSO7
CO 2	describe the various types of fertilizers and their uses	K1 & K2	PSO6
CO 3	discuss the requirements of manuresand fertilizers for better production of various types of crops	K1, K2&K3	PSO6
CO 4	Examine the adverse effect of pesticides	K1 & K3	PSO6 & PSO7
CO 5	Calculate the amount of calcium andmagnesium present in various types of soils	K1 & K3	PSO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	2	2	2	2	2	2	3	2
CO2	2	2	2	2	2	3	2	2
CO3	2	2	2	2	2	3	2	2
CO4	2	2	2	2	2	3	3	2
CO5	2	2	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	3
CO2	2	2	3	3
CO3	2	1	1	3
CO4	3	1	2	3
CO5	2	2	1	3

Note: Strongly Correlated – **3** Moderately Correlated – **2**
♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr.**

K.R.SUBIMOL

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18
SEMESTER-III
(For those who joined in June- 2021 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WEEK	CREDITS
UACH	19C3SB1(A)	Dairy Chemistry	SKILL BASED	2	2

Course Objective:

- To provide an understanding of the bioactive role, chemical interactions of milk constituents their components
- Their effects of nutritional quality, functional properties important to health.

Course Outcomes

After successful completion of the course, the students should be able to

- The Composition, physical and chemical properties of milk. ·
- Know the minerals and vitamins present in the milk. ·
- Gain the skills to develop milk powder processing
- Gain knowledge about the chemistry of milk and milk products

UNIT-I: Introduction (6 hrs)

UNIT-II : Chemistry of carbohydrates (6 hrs)

UNIT-III: Milk Fat (6hrs)

UNIT-IV: Milk and milk powder processing (6 hrs)

UNIT-V : Minerals and vitamins of milk (6hrs)

Unit-I. Introduction

Milk - definition – composition of milk – physical and chemical properties of milk -factors affecting yield and composition of milk – inter relationship between the milk constituents- effect of heat, acid and enzymes on milk- nutritive value of milk.

Unit -II. Chemistry of carbohydrates

Chemistry of carbohydrates – lactose structure – physical forms – action of bacteria on lactose –browning reaction - physiological properties of lactose - uses of lactose.

III. Milk fat

Milk fat - structure and chemical nature of milk fat –size of fat globules – fat constants - oxidation and its control – auto oxidation

IV. Milk and milk powder processing

Introduction – different methods of processing of milk- pasteurization – VHT milk- HTST milk – homogenized milk - skimmed milk powder – whole dry milk powder – butter milk powder.

V. Minerals and vitamins of milk:

Distribution of major minerals in milk- trace elements in milk- salt composition on milk – significance and factors affecting salt balance - protein and mineral interaction. Vitamins in milk: nutrional importance and structure.

References:

1.Jayashree Ghosh, Fundemental concepts of Applied chemistry, S.Chand& company LTD. First edition-2006.

2. K.Bagavathi Sundari, " Applied Chemistry" MJP Publishers, Chennai-2006.

3.Mathur MP, Roy DD and Dinakar P.1999. Textbook of Dairy Chemistry. ICAR.

4. Anantha Krishnan, C.P., (1991), Technology of milk processing, Sri Lakshmi Publications, Chennai -10.

5. Eeckles.CH.Combs, W.B and Macy.H (1955), Milk and Milk Products, Tata Mc Graw Hill Publishing Co.Pvt.Ltd., New Delhi.

6. Sukumar De (1980), Outlines of Dairy Technology, Oxford University Press, New Delhi.

7. Wong N.P, Jenness.R. Keeney.M. Marth E.H (1998); Fundamentals of Dairy Chemistry, CBB Publishers and Distributors, New Delhi.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
Unit-I. Introduction				
1.1	Milk - definition – composition of milk	1	Chalk & Talk	Black Board
1.2	physical and chemical properties of milk	1	Chalk & Talk	Black Board
1.3	factors affecting yield and composition of	2	Chalk & Talk	PPT & White

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	milk inter relationship between the milk constituents			board
1.4	effect of heat, acid and enzymes on milk-nutritive value of milk.	2	Chalk & Talk	Black Board
Unit -II. Chemistry of carbohydrates				
2.1	, Chemistry of carbohydrates – lactose structure	2	Chalk & Talk	Black Board
2.2	physical forms	1	Chalk & Talk	Black Board
2.3	action of bacteria on lactose –browning reaction	2	Chalk & Talk	Black Board
2.4	physiological properties of lactose - uses of lactose.	1	Chalk & Talk	PPT & White board
III. Milk fat				
3.1	Milk fat – structure, chemical nature of milk fat	2	Chalk & Talk	Black Board
3.2	size of fat globules	2	Chalk & Talk	PPT & White board
3.3	fat constants - oxidation and its control – auto oxidation	2	Chalk & Talk	Black Board
IV. Milk and milk powder processing:				
4.1	Introduction – different methods of processing of milk -	2	Chalk & Talk	PPT & White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.2	pasteurization – VHT milk- HTST milk – homogenized milk	2	Chalk & Talk	Black Board
4.3	skimmed milk powder – whole dry milk powder – butter milk powder.	2	Chalk & Talk	Black Board
V. Minerals and vitamins of milk:				
5.1	Distribution of major minerals in milk trace elements in milk- salt composition on milk	2	Chalk & Talk	lab
5.2	significance and factors affecting s balance - protein and mineral interaction	2	Chalk & Talk	lab
5.3	Vitamins in milk: nutrional importance and structure.	2	Chalk & Talk	lab

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average	Better of W1, W2	M1+M2	MID-SEM TEST				

	5 Mks.	5 Mks	5+5=10 Mks.	15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non cholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ **All the course outcomes are to be assessed in the various CIA components.**
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✓ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Knowledge about milk and milk products	K1& K2	PSO7
CO 2	describe the various types of factors affecting milk and its products	K1 & K2	PSO6
CO 3	Chemistry involved in the processing of milk	K1, K2&K3	PSO6
CO 4	Examine the major minerals present in the milk	K1 & K3	PSO6 & PSO7
CO 5	Calculate nutrional importance of milk	K1 & K3	PSO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	2	2	2	2	2	2	3	2
CO2	2	2	2	2	2	3	2	2
CO3	2	2	2	2	2	3	2	2
CO4	2	2	2	2	2	3	3	2
CO5	2	2	2	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	3
CO2	2	2	3	3
CO3	2	1	1	3
CO4	3	1	2	3
CO5	2	2	1	3

Note: Strongly Correlated – **3** Moderately Correlated – **2**
♦ Weakly Correlated **-1**

COURSE DESIGNER:

1. **Dr. A.RAJESWARIForwarded By**

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS),

MADURAI -18II B.Sc. PHYSICS

SEMESTER –II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WEEK	CREDITS
UACH	19P3ACC1	ALLIED CHEMISTRY - I (THEORY BEHIND CHEMICAL BONDING, QUANTITATIVE AND QUALITATIVE ANALYSIS,KINETICS OF CHEMICAL REACTIONS AND THERMODYNAMICS)	allied	3	3

COURSE DESCRIPTION : This paper deals with theories of bonding, chemical kinetics, thermodynamics and theory behind the volumetricanalysis.

COURSE OBJECTIVES :

- To learn the theories of bonding in coordination chemistry and basic concepts in organic analysis.
- To focus on kinetic studies, first law of thermodynamics and basic principles involved in potentiometric, acid base and complxometric titrations.

COURSE OUTCOME:

After completion of the course the students should be able to:

CO 1 To comprehend the fundamental theories of Valence Bond, types ofoverlapping and VSEPR.

CO 2 To categorize the reactions involved in volumetric

analysisCO 3 To analyze the various organic compounds

qualitatively CO 4 To recognize the theories of chemical

kinetics.

CO 5 To highlight the importance of thermodynamics and its relatedfunctions.

UNITS

UNIT –I INTRODUCTION TO BONDING AND SHAPES OF MOLECULES

(9Hrs)

The V.B. Theory – Types of overlapping – s-s, s-p & p-p overlap, Sigma & pi bonds – Hybridization in Ethane, Ethylene & Acetylene respectively. Shapes of covalent molecules using VSEPR Theory [$BeC1_2$, $SnC1_2$, BF_3, NH_3, & H_2O Only].

UNIT –II PRINCIPLES OF VOLUMETRIC ANALYSIS (9Hrs)

Normality, Molarity, Molality, Volumetric principles, Acid base titrations permanganometric titration, iodo and iodimetric titration, Dichrometry, Argentimetry and EDTA titrations.

UNIT III : PRINCIPLES OF ORGANIC ANALYSIS (9Hrs)

Detection of elements – N.S. and Halogens – preparation of Lassaaigne's extract and the reactions involving the extract. Distinction between aliphatic and aromatic- saturated and unsaturated compounds. Reactions of mono and dicarboxylic acids – Solubility, Reaction with $NaHCO_3$ and soda lime, Formation of phenolphthalein and Resorcinol. Reactions of Carbony1Compounds– Solubility, Tollen's Reagent test, Borsche's test, Formation of hydrazones and Oxime. Reactions of mono and Disaccharides, Solubility, Reaction with conc. H_2SO_4,Molisch'stest, Fehlings solution test, Barfoed's test and Benedict's test. Reactions of primary, secondary and tertiary amines Solubility, Reaction with HNO_2, Diazotisation and coupling reaction, Formation of p-Nitroso tertiary amine. Reactions of monoamide and Diamide – Solubility, action of heat, reaction with NaOH and Biuret test.

Reactions of alcohols and phenols – Solubility, Reaction with NaOH and neutral $FeC1_3$

UNIT IV : . CHEMICAL KINETICS (9Hrs)

Introduction, Rate equation. Order and molecularity of the reaction, pseudo unimolecular reaction, factors influencing the rate of the reaction, Derivation of rate constant for zero, first and second order reactions, Methods of determination of the order of the reaction – Arrhenius equation – Theories of reaction rates – collision theory and ARRT.

UNIT V : THERMODYNAMICS- I (9Hrs)

Thermodynamics- Importance, Limitations, terminology ofthermodynamic – systems, macroscopic properties, state variables, statefunctions, path functions, thermodynamic equilibrium, isothermal, adiabatic, isochoric, reversible and irreversible process- nature of work and heat, law of conservation of energy, first law of thermodynamics- internal energy- enthalpyof a system, heat capacity, correlation between Cp and Cv.

REFERENCES:

TEXT BOOK

Puri, B.R., Sharma, L.R., & Kalia., Principles Of Inorganic Chemistry., 13th Edition., Vishal Publishing House., New Delhi., 2009.

REFERENCE BOOKS

1. For unit I –Puri,B. R, Sharma, L.R and Kalia, K.C. Principles of Inorganic Chemistry, 31stEdition' 2013.
2. For Unit III, & IV – Principles of physical chemistry - by B.R.Puri, L.R.Sharma&S.Pathania. 33rdEdition' 1992.
3. For Unit II "Basic Principles of practical chemistry" byV.Venkateswaran, R.veeraswamy& A.R.Kulandaivelu,3rdEdition' 1992.

FATIMA COLLEGE (AUTONOMOUS),

MADURAI -18

II B.Sc. CHEMISTRY

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WEEK	CREDITS
UACH	19C3CC9	INORGANIC QUALITATIVE ANALYSIS	LAB IN	3	2

COURSE OBJECTIVE: This paper Involves the analysis of inorganic mixturesan acid and basic radicals qualitatively.

Interfering Acid radicals

- Phosphate
- Borate
- Oxalate

Non interfering acid radicals

- Chloride
- Bromide
- Iodide
- Carbonate
- Sulphate
- Nitr

ateBasic

radicals

Group I : Lead

Group II :Bismuth , copper, cadmium,
GroupIII : Manganese, Iron and
chromium.
Group IV : Manganese, Cobalt, Nickel
and ZincGroup V : Calcium, Strontium
and Barium Group VI : Ammonium and
Magnesium

Reference Book

V.Venkateswaran, R.veeraswamy&A.R.Kulandaivelu,Basic Principles ofpractical chemistry, 3rd Edn, 1992.

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	Get the knowledge of procedure for group separation and group analysis	PSO1& PSO2
CO 2	Identify various ions present inmixture of salt	PSO3
CO 3	Recognize the role of oxidizing agents, reducing agents, group reagents andcomplexing agents.	PSO3
CO 4	Analyse the experimental observations and inferences with theory behind practicals.	PSO1& PSO2

CO 5	Identification of two acid radicals and two basic radicals	PSO3

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	3	2	1	1	2	3	2	1
CO5	1	2	1	2	2	2	3	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated **-1**

COURSE DESIGNER:

1.M.Priyadharsani

2.B.Vinosha

Forwarded By

S-Tedona.

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS),

MADURAI -18II B.Sc. PHYSICS

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WEEK	CREDITS
UACH	19P3ACC2	Allied chemistry practicals-I	LAB IN	2	2

Course Description

This course trains the students to estimate the solutions quantitativelyby different techniques.

Course Objective: This paper deals with volumetric law, volumetricprinciple and procedure for various titrimetric methods such as permanganometry, acidimetry and iodometry.

Course outcomes

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

- describe the principles and procedures of various titrimetricmethods
- identify suitable indicators for a particularreaction
- know the various terms such as standard solution, normality,molality, molarity, equivalent weight and molecularweight.
- select the specific titric method to estimate the amount of analytepresent in the given solution.
- Apply the expressions and equations to calculate the strengthofsolutions

Permanganonometry

1.Estimation of Potassium Permanganate 2.Estimation of Ferrous Ammonium Sulphate
3.Estimation of FerrousSulphate

4.Estimation of Oxalic Acid

Acidimetry-Alkalimetry

5.Estimation of Sodium Hydroxide6.Estimation of SodiumCarbonate

Iodometry

6.Estimation of Potassium

Dichromate 7.Estimation of Copper

sulphate 8.Estimation of

Potassiumpermanganate

ReferenceBook

Venkateswaran, R.veeraswamy&A.R.Kulandaivelu,Basic Principles of practicalchemistry, 3rdEdn,1992.

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Describe the principles and procedures of various titrimetricmethods	K1	PSO1& PSO5
CO 2	Identify suitable indicators for aparticular reaction	K1, K3	PSO5
CO 3	Know the various terms such as standard solution, normality andmolality.	K2 & K4	PS05, PSO7

CO 4	Select the specific titric method toestimate the amount of analyte present in the given solution.	K1, K3 & K4	PSO1,PSO 5& PSO7
CO 5	Apply the expressions and equationsto calculate the strength of solutions	K1 & K4	PSO1,PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	2	2	2	3	2	1	1
CO2	2	1	2	2	3	1	2	1
CO3	2	1	2	2	3	2	3	2
CO4	3	2	1	1	3	2	3	1
CO5	3	2	1	2	2	2	3	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	1	1
CO2	2	3	2	1
CO3	3	2	3	1
CO4	3	2	2	3
CO5	3	2	2	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Mrs. R.M. Nagalakshmi

2. Dr. P. Silviya

ReetaForwarded By

HOD'S Signature&
Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18 II

B.Sc. Chemistry

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C4CC10	Inorganic Chemistry-III (Coordination Chemistry)	UG core	5	4

COURSE DESCRIPTION: The Course enables the students to gain knowledge on the chemistry of coordination compounds, carbonyl compounds and "F' block elements.

COURSE OBJECTIVES: This course provides an extensive study of coordination complexes, including their spectral and magnetic properties and 'F' block elements

COURSE OUTCOMES

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

CO 1 Know the structure and bonding of important coordination compounds

CO 2 Apply the rules to calculate the magnetic properties of complexes and how magnetic moments can be employed for the interpretation of their structure

CO 3 Get an overview about the reaction mechanism of metal complexes

CO 4 Import the skills to elucidate the structure and mode of bonding in organometallic compounds

CO 5 Gain knowledge about the chemistry of Lanthanides and Actinides

UNITS

UNIT –I Theories of Coordination Compounds – I (15HRS.)

a). Introduction – classification of ligands, nomenclature, preparation methods of complexes and

detection of complexes using solubility, colour change, conductance measurements and visible absorption studies. Basis for isomerism in complexes, stereo isomerism (Geometrical and optical isomerism) and Structural isomerism (Ionisation isomerism, linkage isomerism, ligand isomerism, hydrate isomerism and co-ordination position isomerism).

b). Werner's theory –merits & demerits. Sidgwick's electronic concept of effective atomic number and EAN rule as applied to carbonyls

Self Study: Chemical test for distinguishing *cis-trans* isomers.

UNIT –II Theories of Coordination Compounds – II (15HRS.)

a).Valence bond theory – Introduction, Hybridisation, sp^3 in $NiCl_4$, dsp^2 in $NiCN_4$,dsp^3 in $FeCl_5$, d^2sp^3 in $Fe(CN)_6$, & sp^3d^2 in CrF_6, merits & demerits.

b).Crystal Field theory – Introduction, crystal field splitting in octahedral, tetrahedral & square planar arrangement of ligands. Spectro chemical series, ligand field effect and colour, crystal field stabilization energy , factors affecting the magnitude of Δ_0 and its application.Distortion of octahedral complexes and John-Teller theorem. Limitations of CFT.

c).M.O.Theory – M.O. Theory as applied to octahedral complexes $[Co(NH3)6]^{2+}$ and $[CoF_6]^{4+}$, Pi-bonding and M.O. theory, Merits.

Self Study: Structure of Spinels

UNIT –III Reaction Mechanism in coordination complexes (15 HRS.)

a).Kinetics of complexes – stability – Kinetic and thermodynamic stability –Factors affecting stability and lability Stepwise and over all stability constants (determination not required)

b)Reaction mechanism in 6 co-ordinate complexes S_N1 and S_N2 Hydrolysis reaction-Acid hydrolysis – Base hydrolysis S_N1_{CB}

c) Mechanism of ligand substitution reaction in square planar complexes, Trans effect, trans effect in synthesis, Mechanism of trans effect.

d)Spectroscopic states: L-S coupling & J-J coupling schemes, derivation of spectroscopic states for free C-atom.

Self Study: Mechanism of trans effect.

UNIT –IV Organometallic Chemistry and Microstates (15HRS.)

Preparation and structure of metal carbonyls – $Ni(CO)_4$, $Fe(CO)_5$, $[V(CO)_6]$ & $Mn_2(CO)_{10}$. Metal nitrosyls – sodium nitroprusside and nitoso ferrous sulphate. Ferrocene (structure based

on VBT).

Self Study: $Co_2(CO)_8$and $Fe_2(CO)_9$

UNIT –V :'**F' Block Elements** **(15 HRS.)**

a). The lanthanide series electronic configuration, Oxidation states, spectral and magnetic properties of ce^{3+} and yb^{3+} , causes and consequences of lanthanide contraction - separation of lanthanides by fractional crystallization, solvent extraction, precipitation, change in oxidation state and Ion exchange chromatography.

b). Actinides The actinide series and electronic configuration. Extraction of Uranium from pitchblende.

Self Study: Extraction of thorium from monazite

REFERENCES:

1. R.D.Madan, Wahid U.Malik&G.D.Tuli, -*Selected topics in Inorganic Chemistry* - S.Chand& Company LTD. 2010 - For Units I, II and III
2. B.R.Puri, L.R.Sharma& K.C. Kalia. "*Principles of Inorganic Chemistry"*Milestone Publishers, 2014, For Unit IV.
3. James E HuheeyInorganic Chemistry, II Edn.,.Published by Dorling Kindersley (India) Pvt.Ltd. 2009 - For Unit III - (d)

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT - 1	Theories of Coordination – I **(15HRS)**			
1.1	Introduction	1	Chalk & Talk	Black Board
1.2	Classification of ligands	2	Chalk & Talk	Black Board

1.3	Nomenclature	3	Lecture	Black Board
1.4	Preparation of complexes	1	Lecture	Black Board
1.5	Detection of complexes usingsolubility,colour change,conductance measurements and visible absorption studies	2	Lecture	Black Board
1.6	Basis for isomerism in complexes	1	Discussion	Black Board
1.7	Different types of isomerism.	2	Lecture	Black Board
1.8	Werner's theory –merits &demerits	1	Discussion	Black Board
1.9	EAN rule as applied to carbonyls	2	Problem solving	Black Board
UNIT - 2	Theories of Coordination – II	**(15HRS**		
2.1	Valence bond theory –	3	Lecture	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Introduction, Hybridisation,sp^3, dsp^2, dsp^3, d^2sp^3, & sp^3d^2, merits& demerits.			Board & Models
2.2	Crystal Field theory – Introduction, crystal field splitting in octahedral, tetrahedral & square planararrangement of ligands.	2	Chalk & Talk	Black Board
2.3	Spectro chemical series, ligand field effect and colour &crystal field stabilization energy .	3	Problem solving	Black Board
2.4	Factors affecting the magnitude of Δ_0 and its application	2	Chalk & Talk	Black Board
2.4	Tetrahedral Vs Octahed Complexes.Distortion of octahed complexes and John-Tell theorem.Limitations of CFT	2	Chalk & Talk	Black Board
2.5	M.O.Theory – M.O. Theory as applied to octahedral complexes,	2	Chalk & Talk	Black Board
2.6	Pi- bonding and M.O. theo Merits.	1	Discussion	Black Board
UNIT -3 MECHANISM IN COORDINATION COMPLEXES (15Hours)				
3.1	Kinetics of complexes – stability – Kinetic and thermodynamicstability	2	Chalk & Talk	Black Board
3.2	Factors affecting stability andlability	2	Chalk & Talk	Black Board

3.3	Stepwise and over all stability constants (determination not required)	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.4	Mechanism of hydrolysis reactio in octahedral complexes.	2	Chalk & Talk	Black Board
3.5	Mechanism of ligand substitut reaction in square plan complexes, Trans effect, trans effe in synthesis, Mechanism o tra effect.	3	Chalk & Talk	Power point
3.6	Spectroscopic states: L-S coupling & J-J coupling schemes.	2	Chalk & Talk	Black Board
3.7	Derivation of spectroscopic states for free C-atom	2	Derivation	Black Board
UNIT -4 ORGANOMETALLIC CHEMISTRY (15Hours)				
4.1	Preparation of metal carbonyls	2	Chalk & Talk	Black Board
4.2	$Ni(CO)_4$, $Fe(CO)_5$, $[V(CO)_6]$,	3	Seminar	Black Board
4.3	$Mn_2(CO)_{10}$, $Co_2(CO)_8$ and $Fe_2(CO)_9$.	1	Chalk & Talk	Black Board
4.4	EAN calculation	2	Chalk & Talk	Black Board

4.5	Metal nitrosyls – sodium nitroprusside and nitoso ferroussulphate.	3	Chalk & Talk	Black Board
4.6	Ferrocene (structure based on VBT)	4	Chalk & Talk	Black Board
UNIT-5 'F' BLOCK ELEMENTS (15Hours)				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.1	The lanthanide series electronic configuration, Oxidation states, spectral and magnetic propertiesof ce^{3+} and yb^{3+}	4	Chalk & Talk	Black Board
5.2	Causes and consequences of lanthanide contraction	1	Chalk & Talk	Black Board
5.3	Separation of lanthanides by fractional crystallization, solvent extraction, precipitation, changein oxidation state and Ion exchange chromatography	3	Chalk & Talk	Black Board & Models
5.4	The actinide series and electronicconfiguration	3	Chalk & Talk	Black Board
5.5	Extraction of Uranium from pitchblende and thorium frommonazite.	5	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✓ The I UG course teachers are requested to start conducting S1,W1, M1,in due intervals of time.

□

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - ScholasticCOURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Know the structure and bondingof important coordination compounds	K1, K2, K3 & K4	PSO1& PSO2
CO 2	Apply the rules to calculate the magnetic properties of complexesand how magnetic moments canbe employed for the interpretation of their structure	K1, K2, K3 & K4	PSO3
CO 3	Get an overview about the reaction mechanism of metalcomplexes	K1, K2, K3 & K4	PSO5
CO 4	Import the skills to elucidate the	K1, K2, K3 &	PSO7

	structure and mode of bonding in organometallic compounds	K4	
CO 5	Gain knowledge about the chemistry of Lanthanides and Actinides	K1, K2, K3 & K4	PSO7

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9
CO1	3	3	2	1	1	1	1	1	1
CO2	2	1	3	1	1	1	1	1	1
CO3	2	1	1	1	3	1	1	1	1
CO4	2	1	1	1	1	1	3	1	1
CO5	2	1	1	1	1	1	3	1	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	1	2
CO2	3	3	2	2
CO3	3	2	2	2
CO4	3	2	2	2
CO5	3	2	2	2

Note: Strongly Correlated – **3** Moderately Correlated – **2**
♦ Wakly Correlated -**1**

COURSE DESIGNER:

1. **Dr.A. Rajeswari**
2. Ms. RM Nagalakshm

Forwarded By

S-Tedona.

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc.

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	**19C4CC11**	**PHYSICAL CHEMISTRY -II (Chemical Kinetics, Solid State and distribution Law)**	**UG Core**	**4**	**3**

COURSE DESCRIPTION

This paper focuses on all the important aspects of Physical concepts of chemical kinetics, solid state and distribution law.

COURSE OBJECTIVES

This course provides an elaborate study of chemical kinetics, solid state and distribution law.

COURSE OUTCOMES

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

CO 1 To determine integrated rate expression for zero order, first order, second order reactions and their respective half-life period expressions with examples

CO 2 To study the various factors which affect the rate of a chemical reaction such as concentration, temperature, and solvent

CO 3 To learn the crystal diffraction and experimental techniques used to characterize the solid crystals

CO 4 To recognize and give the lattice parameter relationships for the seven crystal systems

CO 5 To value the Nernst distribution law - its thermodynamic derivation, modification of law when solute undergoes association, dissociation and chemical combination with one of the solvents

UNITS

UNIT –I CHEMICAL KINETICS - I (12 HRS.)

a) Introduction, Rate of the reaction, the rate equation, Rate constant, order and molecularityof the reaction, methods of determining the rate of the reaction, factors that affect the rate of the reaction. Reactions of I order and pseudo first order reactions-Derivation of rate constant and Half life period

– Decomposition of (1) Nitrous Oxide, (2) Hydrogen peroxide, (3) Ammonium nitrite and (4) Dinitrogen, pentoxide, Acid catalysed hydrolysis of ester, Inversion of sucrose and Hydrolysis of benzene diazonium chloride.

b) Reaction of second order – Derivation of rate expression and Half-life period – Reaction between Triethylamine and methyl iodide and saponificationof ester.

c) Zero order-Examples-Derivation of rate constant and Half life period.

d) Methods of determining the order of the reaction, Effect of temperature on reaction rates – Concept of activation energy. Calculation of energy of activation – the Arrhenius equation, measurement of Arrhenius parameter.

e) Mechanism of enzyme reaction, determination of Michaelis constant, Effectof enzyme and substrate concentration, pH and temperature on the rate. **Self study–**Effect of pH and temperature on the rate of the reaction.

UNIT –II CHEMICAL KINETICS-II (12 HRS.)

a) The theories of reaction rates – collision theory of bimolecular gaseous reactions, Activated complex theory. The Lindemann'stheory of unimolecular reactions.

b) Characteristics of complex Reactions – opposing or Reversible reactions, consecutive reaction, competing or parallel reactions and chain reactions (Derivations not required).

c) Diffusion controlled reactions in solution, the influence of ionic strength

on the rate of the reactions, influence of solvent on reaction rates. (Derivationsnot required).

Self study–Influence of ionic strength and solvent on rate reaction.

UNIT –III SOLID STATE - I (12 HRS.)

a) Introduction, crystalline and amorphous solids-difference, size and shape of crystals, symmetry in crystal systems, space lattice and unit cell, Bravais Lattices, law of Rational indices, Miller indices, X-ray diffraction – Bragg's equation and experimental Techniques – X-ray diffraction on crystals and powder method.

b) Lattice energy – Born-Lande' equation,Cohesive energy and Fermi energy.

c) Close packing in solids-hexagonal close packing, cubic close packing and interstitial sites in Close packed lattices, Ionic radius, Radius ratio and shape of crystals.

Self study– Fermi energy.

UNIT –IV SOLID STATE - II (12 HRS.)

a) Types of crystals – Molecular, covalent, metallic and ionic crystals – structure of water and ammonia (molecular crystals), diamond and Graphite (covalent crystals), metallic bonds in metals (metallic crystals) Sodium Chloride, Potassium Chloride and Cesium Chloride (Ionic Crystals).

b) Conductors, Insulators and Semi-conductors, crystal defects.

c) Liquid Crystals – Classification, Smectic, Nematic and Cholesteric liquid crystals – Theories of liquid Crystals – The swarm Theory – Application of liquid Crystals.

Self study–crystal defects.

UNIT –V DISTRIBUTION LAW (12 HRS.)

The Distribution law, conditions for the validity of the distribution law, Thermodynamic derivation. Association, Dissociation of the solute in one of the solvents and solute enters into chemical combination with one of the solvents, Applications of distribution law.

Self study– Application of distribution law.

REFERENCES:

Text Book:

Puri, B.R, Sharma, L.R. and Pathania, M.S. Principles of Physical Chemistry,Vishal Publishing House, 47thEdn.,2016.

Reference Books:

1. Laildler, K. J, Chemical Kinetics, Pearson, 3rdEdn.,2012 or 2003.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT IChemical Kinetics – I				
1.1	Introduction, Rate of the reaction, the rate equation, Rateconstant, order and molecularityof the reaction	1	Chalk & Talk	Black Board
1.2	Methods of determining the rate of the reaction, factors that affect the rate of the reaction. Reactions of I order and pseudo first order reactions-Derivation of rate constant and Half life period	2	Chalk & Talk	Black Board
1.3	Decomposition of (1) Nitrous Oxide, (2) Hydrogen peroxide, (3) Ammonium nitrite and (4) Dinitrogen, pentoxide, Acid catalysed hydrolysis of ester, Inversion of sucrose and Hydrolysis of benzene diazonium chloride.	1	Chalk & Talk	Black Board
1.4	Reaction of second order Derivation of rate expression a Half-life period – Reacti between Triethylamine and meth iodide and saponification of ester	2	Chalk & Talk	Black Board

1.5	Zero order-Examples-Derivation rate constant and Half life period Methods of determining the ord of the reaction, Effect temperature on reaction rates	2	Chalk &Talk	Black Board
1.6	Concept of activation energ Calculation of energy of activati	2	Chalk &Talk	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	– the Arrhenius equatio measurement of Arrheni parameter.			Board
1.7	Mechanism of enzyme reaction, determination of Michaelis constant,	1	Chalk &Talk	Black Board
1.8	Effect of enzyme and substrateconcentration	1	Chalk &Talk	Black Board
UNIT II Chemical Kinetics – II				
2.1	The theories of reaction rates	1	Chalk & Talk	Black Board
2.2	collision theory of bimolecul gaseous reactions	2	Chalk & Talk	Black Board
2.3	Activated complex theory.	2	Chalk & Talk	Black Board
2.4	Lindemann'stheory of unimolecular reactions.	2	Chalk & Talk	Black Board
2.5	Characteristics of complex Reactions – opposing or Reversible reactions, consecutive reaction, competing or parallel reactions and chain reactions	2	Chalk & Talk	Black Board
2.6	Diffusion controlled reactions insolution	2	Chalk & Talk	Black Board

2.7	The influence of ionic strength on the rate of the reactions	1	Chalk & Talk	Black Board
UNIT III Solid State – I				
3.1	Introduction, crystalline and amorphous solids- difference, size and shape of crystals	1	Chalk & Talk	Using models
3.2	symmetry in crystal systems, space lattice and unit cell,	1	Chalk &	LCD

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
			Talk	
3.3	Bravais Lattices, law of Rationalindices, Miller indices	2	Chal k &Talk	Black Board
3.4	X-ray diffraction – Bragg's equatiand experimental Techniques – ray diffraction on crystals a powder method	2	Chalk & Talk	Black Board
3.5	Lattice energy – Born-Lande' equation, Cohesive energy	2	Chalk & Talk	Black Board
3.6	Close packing in solids- hexagonal close packing, cubic close packing	1	Chalk & Talk	Black Board
3.7	interstitial sites in Close packedlattices, Ionic radius	1	Chalk & Talk	Black Board
3.8	Radius ratio and shape of crystal	2	Chalk & Talk	Black Board
UNIT IV Solid State – II				
4.1	Types of crystals – Molecular, covalent, metallic and ionic crystals	1	Chalk & Talk	Black Board
4.2	structure of water and ammonia (molecular crystals), diamond	1	Chalk & Talk	Black Board

4.3	Graphite (covalent crystals), metallic bonds in metals (metallic crystals) Sodium Chloride	1	Chalk & Talk	Black Board
4.4	Potassium Chloride andCesiuChloride (Ionic Crystals).	1	Chalk & Talk	Black Board
4.5	Conductors, Insulators and Semi-conductors	3	Chalk & Talk	Black Board
4.6	Liquid Crystals – Classification, Smectic, Nematic and Cholesteric liquid crystals	2	Chalk & Talk	Black Board
4.7	Theories of liquid Crystals – The swarm Theory	2	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
			Talk	Board
4.8	Application of liquid Crystals.	1	Chal k &Talk	BlackBoard
UNIT V Distribution Law				
5.1	The Distribution law	2	Chalk & Talk	Black Board
5.2	conditions for the validity of thedistribution law	2	Chalk & Talk	Black Board
5.3	Thermodynamic derivation	2	Chalk & Talk	Black Board
5.4	Association of the solute in one of the solvents	2	Chalk & Talk	Black Board
5.5	Dissociation of the solute in oneof the solvents	2	Chalk & Talk	Black Board

5.6	solute enters into chemical combination with one of the solvents	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75
								%
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy**

for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✓ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To determine integrated rate expression for zero order, first order, second order reactions and their respective half-life period expressions with examples	K1, K2, K3 &K4	PSO1& PSO2

CO 2	To study the various factors which affect the rate of a chemical reaction such as concentration, temperature, and solvent	K1, K2, K3 &K4	PSO3& PSO7
CO 3	To learn the crystal diffraction and experimental techniques used to characterize the solid crystals	K1, K2, K3 &K4	PSO5&PSO6
CO 4	To recognize and give the lattice parameter relationships for the seven crystal systems	K1, K2, K3 &K4	PSO1&PSO2
CO 5	To value the Nernst distribution law - its thermodynamic derivation, modification of law when solute undergoes association, dissociation and chemical combination with one of the solvents	K1, K2, K3 &K4	PSO3&PSO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	2	2	2	2	2
CO2	2	2	3	2	2	2	3	2
CO3	2	2	2	2	3	3	2	2
CO4	3	3	2	2	2	2	2	2
CO5	2	2	3	2	3	2	2	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	2
CO2	2	3	2	3
CO3	2	2	3	1
CO4	3	1	2	2
CO5	3	2	1	2

COURSE DESIGNER:

Dr.K R SUBIMOL

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS),

MADURAI -18II B.Sc CHEMISTRY

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	**19C4SB2**	**DYES AND PIGMENTS**	**Skill based**	**2**	**2**

COURSE DESCRIPTION

This course gives an introduction to Natural and Synthetic Dyes and alsohighlights the uses of dyes in our day today life.

COURSE OBJECTIVES

- To focus on basic concept of theory of dyes
- To study the chemistry of natural and synthetic dyes

COURSE OUTCOMES

After successful completion of the course, the students will be able toCO 1 know and comprehend the principle and theories of dyes

CO 2 identify the chromophoric groups and auxochromespresent in the dyesCO 3 classify the of dyes whether natural or synthetic

CO 4 Predict the structure of dyes

CO 5 recognise the applications of dyes in various industries

UNIT I THEORY OF DYES (6 HRS.

Color and dyes: Color sensation, Dyes and dying color and chemical

constitution- Witt theory and Modern theory of dyes. Nomenclature of dyes:Valance bond theory of color.

Classification according to application - direct or substantive dyes, mordentdyes, vat dyes, Ingrain or developed dyes, Disperse dyes, sulphur dyes,

reactive dyes, oil and spirit soluble dye

UNIT –III CLASSIFICATION OF DYES-II HRS.)

Classification according to chemical structure: a) Nitro and Nitroso dyes. b) Tripheyl methane dye malachite green, pararosaniline, crystal violet and its applications. c) Azo dyes – aniline yellow, butter yellow, methyl orange, methyl red, resorcin yellow and congo red. d) Phthalein and Xanthen – phenophthalein, fluorescein, eosin and rhodamine B.

UNIT –IV PIGMENTS (6 HRS.)

Introduction- chemical composition,structure and applications of

Anthocyanins,Flavones,Phthalocyanins,Carotenoids

and Chlorophyll.

UNIT –V APPLICATIONS OF DYES (6 HRS.)

Applictions of dyes- in food industry, cosmetics, textiles and non textile industries

References

1.JeyashreeGhosh, Fundamental concepts of Applied Chemistry, S.Chand,2006

2. B.A. Yagodin ,Agricultural Chemistry, Mir Publishers (Moscow), 1976.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 THEORY OF DYES				
1.1	Soils- Introduction,Composition of soil Color and dyes: Color sensation	1	Chalk & Talk	Black Board
1.2	Dyes and dying color and chemical constitution	1	Chalk & Talk	Black Board
1.3	Witt theory and Modern theory ofdyes,	2	Chalk & Talk	PPT & White board
1.4	Nomenclature of dyes: Valancebond theory of color.	2	Chalk & Talk	Black Board
UNIT-2 CLASSIFICATION OF DYES-I				
2.1	direct or substantive dyes,mordent dyes, ,	2	Chalk & Talk	Black Board
2.2	mordent dyes, vat dyes, Ingrainor developed dyes	2	Chalk & Talk	PPT & White board
2.3	sulphur dyes, reactive dyes,	1	Chalk & Talk	Black Board
2.4	oil and spirit soluble dye ,	1	Chalk & Talk	Black Board
UNIT -3CLASSIFICATION OF DYES-II				

3.1	Nitro and Nitroso dyesand Tripheyl methane dye-malachitegreen, pararosaniline, crystal violet	2	Chalk & Talk	Black Board
3.2	Azo dyes – aniline yellow, butteryellow, methyl orange, methyl red, resorcin yellow and congo red	2	Chalk & Talk	PPT & White board
3.3	Phthalein and Xanthen – phenophthalein, fluorescein,eosin and rhodamine-B	2	Chalk & Talk	Black Board
UNIT -4STRUCTURE OF DYES				
4.1	Indigo	2	Chalk &	PPT & White

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
			Talk	board
4.2	Alizarin	2	Chalk &Talk	Black Board
4.3	Raw material for the manufactur of dyes	2	Chalk & Talk	Black Board
UNIT-V APPLICATIONS OF DYES				
5.1	Dyesin food industry	2	Chalk & Talk	PPT
5.2	Dyes in cosmetics, textiles	2	Chalk & Talk	PPT
5.3	Dyes in non textile industries	2	Chalk & Talk	PPT

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100

									%

CIA	
Scholastic	35
Non Scholastic	5
	40

- ✓ The levels of CIA Assessment based on Revised Bloom's Taxonomy **are :**

  K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

	SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED

CO 1	know and comprehend the principle and theories of dyes	K1, K2, K3 &K4	PSO1& PSO2
CO 2	identify the chromophoric groups and auxochromes in dyes	K1, K2, K3 &K4	PSO3
CO 3	classify the of dyes whether naturalor synthetic	K1, K2, K3 &K4	PSO5
CO 4	Predict the structure of dyes	K1, K2, K3 &K4	PSO7
CO 5	recognise the applications of dyes invarious industries	K1, K2, K3 &K4	PSO7

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9
CO1	**3**	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**1**
CO2	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**
CO3	**2**	**1**	**1**	**1**	**3**	**1**	**1**	**1**	**1**
CO4	**2**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**1**

Mapping of C0s with Pos

CO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	2	2	2	2	3	3
CO 2	2	3	2	2	2	3	3
CO 3	2	2	3	2	2	3	3
CO 4	3	2	2	2	2	3	3
CO 5	3	2	2	2	2	3	3

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Mrs.RM.Nagalakshmi

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS),

MADURAI -18II B.Sc CHEMISTRY

SEMESTER –IV

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C4SB2(A)	HEALTH and CHEMISTRY	Skill Based	2	2

COURSE DESCRIPTION

This course deals with the basic knowledge about the significances of health and hygiene in every day human life.This paper also provides a focus with special emphasis on importance of common drugs, enzymes,harmones and also deals with the causes for common diseases

COURSE OBJECTIVES

After completion of the course the students should be able to :

- Acquire the basic knowledge about the significances of food and hygiene
- Classify the given drugs whether they belong to antipyretics,analgesics, depressants etc
- Interpret the structure and mechanism of enzyme action
- Catagorize and identify the function of the different types of harmones
- Analyse the reason for common diseases affecting the human body

UNIT I -HEALTH AND HYGIENE (6 HRS)

Definition: Food, Food Pyramid - Health-Hygiene- mal, under and over nutrition, theircauses and remedies.sanitation.

Self study:

Disinfectants and antiseptics,

UNIT- II COMMON DRUGS (6 HRS)

Narcotic analgesics (only morphine compds). Antipyretic analgesics (acetyl salicyclic acid, p – amino – phenol derivatives). Anticonvulsant drugs (sodium valproate, hydantoins). Muscle relaxants.(,glycerylguaiacolate, diazepam) Antibiotics (pencillin, streptomycin, tetracyclin,) Cardiovascular drugs-nitrates, beta blockers(propranalol and atinelol) and calcium channel blockers.

Self study:

Depressants-Sedatives and hypnotics

UNIT- III - BODY FLUIDS (6 HRS)

Blood volume, blood groups, coagulation of blood , Plasma lipoprotiens ,blood pressure, Hyperchromic and hypochromic anaemia, ,haemoglobin. Arteriosclerosis, Blood tranfusion.

Self study :

Blood sugar and diabetes.

UNIT- IV ENZYMES AND HARMONES (6 HRS)

Classification of enzymes, specificity, and Mechanism of enzyme action

Classsification of harmones,functions of thyroxine ,insulin and progesterone

Self study:

Sex harmones-eastrogen and testosterone

UNIT- V COMMON DISEASES (6 HRS)

Causes for common diseases - fever,cold,head ache ,stomach ache, night blindness, ulcer, diarrhea, Jaundice, vomiting and allergies

Self study:

Medicines used for the above diseases

TEXT BOOKS

1.JayashreeGhosh, A text book of Pharmaceutical Chemistry, S.Chand and Co. Ltd, 1999.

2.S.C. Rastogi, Biochemistry, Tata McGraw Hill Publishing Co., 1993

3.AshutoshKar, Medicinal Chemistry, Wiley Eastern Limited, New Delhi, 1993.

REFERENCES

1. Alex V Ramani, Food Chemistry, MJP Publishers, Chennai, 2009

2. Deb A C, Fundamentals of Biochemistry, New Central Book Agency, Calcutta, 1994.

3. Satake M and Mido Y, Chemistry for Health Science, Discovery Publishing House, New Delhi, 2003.

4.Le Roy, Natural and synthetic organic medicinal compounds, Ealemi., 1976.

5.B.L. Oser, Hawk's physiological chemistry, 14th edition, Tata-McGraw - Hill Publishing Co.Ltd, 1965

6.O. Kleiner and J. Martin, Bio-Chemistry, Prentice-Hall of India(P) Ltd, New Delhi

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -IHEALTH AND HYGIENE				
1.1	Food and Food Pyramid	1	Chalk & Talk	PPT & White board
1.2	Health-Hygiene	2	Chalk &Talk	Black Board
1.3	mal, under and over nutrition, theircauses and remedies	2	Chalk & Talk	PPT & White board
1.4	sanitation	1	Chalk & Talk	Black Board
UNIT-IICOMMON DRUGS				
2.1	Narcotic analgesics (only morphine).	1	Chalk & Talk	Black Board
2.2	Anticonvulsant drugs (sodium valproate, hydantoins)	1	Chalk & Talk	PPT & White board
2.3	Antipyretic analgesics (acetyl salicyclic acid, p – amino – phenol derivatives).	1	Chalk & Talk	Black Board
2.4	Muscle relaxants.(,glycerylguaiacolate,	1	Chalk & Talk	PPT & White

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	diazepam)			board
2.5	Antibiotics (pencillin, streptomycin, tetracyclin)	2	Chalk & Talk	PPT & White board
UNIT -IIIBODY FLUIDS				
3.1	Blood volume, blood groups, coagulation of blo,	1	Chalk & Talk	Black Board
3.2	Plasma lipoprotiens,blood pressure	1	Chalk & Talk	PPT & White board
3.3	Hyperchromic and hypochromic anaemia, ,haemoglobin	2	Chalk & Talk	Black Board
3.4	Arteriosclerosis, Blood tranfusion	2	Black Board	Black Board
UNIT -IVENZYMES AND HARMONES				
4.1	Classification of enzymes, specificity -	1	Chalk & Talk	PPT & White board
4.2	Mechanism of enzyme action	1	Chalk & Talk	Black Board
4.3	Classsification of harmones, .	2	Chalk & Talk	Black Board
4.4	functions of thyroxine ,insulin and progesterone	2	Chalk & Talk	PPT & White board
UNIT-V COMMON DISEASES				
5.1	Causes for common diseases - fever,cold	2	Chalk & Talk	labPPT & White board
5.2	head ache ,stomach ache, night blindnessulcer,	2	Chalk & Talk	PPT & White board
5.3	diarrhea, Jaundice, vomiting and allergies	2	Chalk & Talk	PPT & White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID-SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non cholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

- ✓ **All the course outcomes are to be assessed in the various CIA components.**

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✓ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Define the term health and hygiene	K1	PS04
CO 2	Describe the various types of druds and their uses	K2	PSO1

CO 3	Realise theimportance of maintenance of blood pressure	K3	PS03
CO 4	Analyse the adverse effect of hormonal imbalance	K4	PS02
CO 5	Recognise the reason for disease formation	K3	PS03

COURSE DESIGNER:
Mrs.RM.Nagalakshmi

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. CHEMISTRYSEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C4CC12	ORGANIC QUALITATIVE ANALYSIS	LAB IN	3	2

COURSE DESCRIPTION

This course gives lab experience on organic qualitative analysis.

COURSE OBJECTIVES

This course gives lab experience on organic qualitative analysis by simple chemical reactions.

COURSE OUTCOMES

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

CO 1 Gain the knowledge of appearance, colour, physical state, and odour oforganic substances

CO 2 Distinguish whether the given compound is Aliphatic or Aromatic,andSaturated or Unsaturated.

CO 3 Perform the confirmatory test for various functional groups present inthe given organic compound.

CO 4 Recognize the usage of apparatus and laboratory reagents.

CO 5 Avoiding hazardous experiments by doing microlevel eco friendly experiments.

The analysis involving the detection of following characteristics of thegiven organic compound

1. Whether given organic compound is aliphatic or aromatic

2. Whether given organic compound is saturated or unsaturated

3. Detection of Elements: Nitrogen, Sulphur and halogens

4. Any one of the following functional

groups Carbohydrate

AldehHDE

Ketone

Phenol

Amides

Carboxylic

Acids Amines

Nitro compounds

5. Preparation of derivatives for the above functional groups.

REFERENCES:

1. V.Venkateswaran, R. veeraswamy & A.R.Kulandaivelu, Basic Principles of practical chemistry, 3rd Edn, 1992.

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	Gain the knowledge of appearance, colour, physical state,and odour of organic substances	PSO1& PSO2
CO 2	Distinguish whether the given compound is Aliphatic or Aromatic,and Saturated or Unsaturated.	PSO3
CO 3	Perform the confirmatory test for various functional groups present in the given organic compound.	PSO5

CO 4	Recognize the usage of apparatusand laboratoryreagents.	PSO1
CO 5	Avoiding hazardous experiments by doing microlevel eco friendly experiments.	PSO2

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	3	2	1	1	2	3	2	1
CO5	1	2	1	2	2	2	3	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.M.Priyadharsani

2.B.Suganthana

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. Physics

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19P4ACC3	Allied chemistry-II (Periodic table and atomic properties, electro chemistry–I, II, Catalysis and photochemistry)	Allied	3	3

COURSE DESCRIPTION

This course enables the students to get a thorough knowledge of periodic table and atomic properties, electro chemistry, catalysis, andphotochemistry .

COURSE OBJECTIVES

This course deals with periodic table and its properties, Electro chemistry, catalysis, and photo chemistry.

COURSE OUTCOMES

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

toCO 1 Understand the periodicity in periodic table

CO 2 Understand the different types of condutances and their relations andthe effect of dilution.

CO 3 Use Nernst equation to calculate the electrode potential and emf of electrochemical cells.Study the applications of electrochemical measurements

CO 4 Understand the basics of photochemistry using laws of photochemistryand Jablonsky diagram

CO 5 Derive the rate constants o certain photochemical reactions.

UNITS

UNIT –I PERIODIC TABLE AND ATOMIC PROPERTIES (9HRS.)

Long from periodic table – Cause of periodicity – Division of Elements into s,p,d,&blocks – Atomic Properties – Size of atoms and ions – Covalent radius – Ionic radius – Ionization energy – Electro negativity (Scales and applications exclude).

Self-Study: Atomic PropertiesElectron affinity

UNIT –II ELECTRO CHEMISTRY – I (9HRS.)

Electrical conductance specific conductance molar conductance &Equivalent conductance, determination of conductance conductivity cells, cell constant variation of molar conductance and equivalent conductance with dilution, Kohlrausch's law and its applications, Applications of conductivity measurement – Conductometric titrations – Acid & Bases – Lowry – Brosted concept, Lewis concept, pH – buffer solutions.

Self-Study: Henderson equation

UNIT –III ELECTRO CHEMISTRY – II (9HRS.)

Electochemical cells Galvanic cells, Representation of an electrochemical cell, Elecrode potential, EMF of cell and its Measurment standard cell, Reversible and irreversible cell, Reversible electodes and their types – Metal - metal ion electrode, Gas electrode, Metal – Insoluble metal salt electrodes Oxidation – Reduction Electrodes. Relationship between free energy and electrical energy, Single electode potential – Hydroganelectode, refrence electrode – Hydrogen and calomel electrode, Electro chemical series. pH determination using EMF measurement – Hydrogen electode – Quinehydrone electrode.

Self-Study: Glass electrode

UNIT –IV CATALYSIS (9HRS.)

Catalysis types of catalysts – Promoters, Negative catalysts – Auto Catalysts – General Characteristics of catalytic reactions – Intermediate compound formation Theory Adsorption theory Acid – base catalysts.

Self-Study: Enzyme catalysts

UNIT –V PHOTOCHEMISTRY (9HRS.)

Photo chemistry Introduction, Laws of photochemistry – Lambert's Law, Beer's Law & Stark Einstein's Law of Photo Chemical Equivalence, Quantum yield, Photosenzation, Photo inhibitors, Chemiluminescence's – Fluorescence.

Self-Study: Phosphorescence.

REFERENCES:

TEXT BOOK

1. B.R.Puri, L.R.Sharma&S.Pathania Principles of physicalchemistry,.33rdEdn' 1992.

REFERENCE BOOK

2. R.D.Madan, Modern Inorganic Chemistry, S.Chand andcompany,Reprint' 1994.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 PERIODIC TABLE AND ATOMIC PROPERTIES				
1.1	Long from periodic table	1	Chalk & Talk	Black Board
1.2	Cause of periodicity	1	Chalk & Talk	LCD

1.3	Division of Elements into s,p,d,&blocks – Atomic Properties – Size of atoms andions	2	Lecture	PPT & White board
1.4	Covalent radius	1	Lecture	Smart Board
1.5	Ionic radius	1	Lecture	Black Board
1.6	Ionization energy	1	Discussion	
1.7	Electron affinity	1	Lecture	Smart Board
1.8	Electro negativity	1	Discussion	Black Board
UNIT -2 ELECTRO CHEMISTRY – I				

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
2.1	Electrical conductance, specificconductance	1	Chalk & Talk	Black Board
2.2	molar conductance ,Equivalent conductance, determination of conductance conductivity cells	2	Chal k &Talk	LCD
2.3	cell constant variation of molar conductance and equivalent conductance with dilution	1	Lecture	PPT & White board
2.4	Kohlrausch's law and its applications	1	Lecture	Smart Board
2.5	Applications of conductivitymeasurement	1	Lecture	Black Board
2.6	Conductometric titrations	1	Discussion	
2.7	Acid & Bases – Lowry – Brostedconcept, Lewis concept	1	Lecture	Smart Board
2.8	pH – buffer solutions – Henderson equation	1	Discussion	Black Board
UNIT -3ELECTRO CHEMISTRY – II				

3.1	Electochemical cells Galvaniccells	1	Chalk & Talk	Black Board
3.2	Representation of an electrochemical cell, Elecrode potential, EMF of cell and its Measurment standard cell, Reversible and irreversible cell	2	Chalk & Talk	LCD
3.3	Reversible electodes and theirtypes – Metal - metal ion electrode	1	Lecture	PPT & White board
3.4	Gas electrode, Metal – Insoluble metal salt electrodes Oxidation –Reduction Electrodes	1	Lecture	Smart Board
3.5	Relationship between free energy	1	Lecture	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	and electrical energy			Board
3.6	Single electode potential – Hydroganelectode, refrence electrode – Hydrogen and calomel electrode	1	Discussion	
3.7	Electro chemical series. pHdetermination using EMF measurement	1	Lecture	Smart Board
3.8	Hydrogen electode – Quinehydrone electrode – Glasselectrode	1	Discussion	Black Board
UNIT -4CATALYSIS				
4.1	Catalysis types of catalysts	1	Chalk & Talk	Black Board
4.2	Promoters, Negative catalysts	2	Chalk & Talk	LCD

4.3	Auto Catalysts	1	Lecture	PPT & White board
4.4	General Characteristics ofcatalytic reactions	1	Lecture	Smart Board
4.5	Intermediate compound formation	1	Lecture	Black Board
4.6	Adsorption theory	1	Discussion	
4.7	base catalysts	1	Lecture	Smart Board
4.8	Enzyme catalysts	1	Discussion	Black Board
UNIT -5PHOTOCHEMISTRY				
5.1	Photo chemistry Introduction	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.2	Laws of photochemistry – Lambert's Law	2	Chalk & Talk	LCD
5.3	Beer's Law	1	Lecture	PPT &Whit eboard
5.4	Stark Einstein's Law of Photo Chemical Equivalence	1	Lecture	Smart Board
5.5	Quantum yield,	1	Lecture	Black Board
5.6	Photosenzation, Photo inhibitors	1	Discussion	
5.7	Chemiluminescence's	1	Lecture	Smart Board
5.8	Fluorescence	1	Discussion	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✓ The I UG course teachers are requested to start conducting S1, W1, M1,

in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the periodicity in periodic table	K1	PSO1,PSO2,PSO 3
CO 2	Understand the different types ofcondutances and their relations and the effect of dilution.	K2	PSO1,PSO2,PSO 3

CO 3	Use Nernst equation to calculate the electrode potential and emf ofelectrochemical cells.Study the applications of electrochemical measurements	K3& K4	PSO1,PSO2,PSO 3
CO 4	Understand the basics of photochemistry using laws of photochemistry and Jablonsky diagram	K2, K3	PSO1,PSO2,PSO 3
CO 5	Derive the rate constants o certain photochemical reactions.	K2 & K4	PSO1,PSO2,PSO 3

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	3	1	1	1	1	1
CO2	3	3	3	1	1	1	1	1
CO3	3	3	3	1	1	1	2	1
CO4	3	3	3	1	1	1	1	1
CO5	3	3	3	1	1	1	1	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	2	1
CO2	3	1	2	1
CO3	3	1	2	1
CO4	3	1	2	1
CO5	3	1	2	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE
DESIGNER: Dr.
B.SUGANTHANA

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS),MADURAI -18

II B.Sc.PHYSICS

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WEEK	CREDITS
UACH	**19P4ACC4**	**Allied chemistry practicals-II**	**LAB IN**	**2**	**2**

Course Description:

This course gives lab experience on organic qualitative analysis.

Course Objective:

This course gives lab experience on organic qualitative analysis by simple chemical reactions.

Course outcome:

After completion of the course the students should be able to:

- Gain the knowledge of appearance, colour, physical state,andodourof organic substances.
- Distinguish whether the given compound is Aliphatic orAromatic,and Saturated or Unsaturated.
- Perform the confirmatory test for various functionalgroups present inthe given organic compound.
- Recognize the usage of apparatus and laboratoryreagents.
- Relate the experimental observations with theory behindpracticals.

Organic qualitative analysis

The anaysis involving the detection of following characteristics of thegiven organiccompound

1.Whether given organic compound is aliphatic or aromatic

2. Whether given organic compound is saturated or unsaturated

3. Any one of the following functional groups 1. Carbohydrate
2. Aldehyde
3. Ketone
4. Phenol
5. Amide
6. Carboxylic Acid 7. Amine

Reference Book

Venkateswaran, R. veeraswamy & A.R. Kulandaivelu, Basic Principles of practical chemistry, 3rd Edn, 1992.

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To gain the knowledge of appearance, colour, physical state, and odour of organic substances.	K1	PSO1& PSO5
CO 2	To distinguish whether the given compound is Aliphatic or Aromatic, and Saturated or Unsaturated.	K1, K3	PSO5
CO 3	To perform the confirmatory test for various functional groups present in the given organic compound	K2 & K4	PS05, PSO7

CO 4	To recognize the usage of apparatus and laboratory reagents.	K1, K3 & K4	PSO1,PSO 5& PSO7

CO 5	To relate the experimental observations with theory behind practicals.	K1 & K4	PSO1,PSO5

Mapping of C0s with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	2	2	2	3	2	1	1
CO2	2	1	2	2	3	1	2	1
CO3	2	1	2	2	3	2	3	2
CO4	3	2	1	1	3	2	3	1
CO5	3	2	1	2	2	2	3	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	1	1
CO2	2	3	2	1
CO3	3	2	3	1
CO4	3	2	2	3
CO5	3	2	2	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated **-1**

COURSE DESIGNER:

1.Dr. Sr. ARULMARY

2.Dr. K.R.SUBIMOL

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRY

SEMESTER –V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5CC13	ORGANIC CHEMISTRY – III(ALDEHYDES ANDKETONES, CARBOXYLIC ACIDS AND THEIR DERIVATIVES, STEROISOMERISM, AMINES AND DIAZO COMPOUNDS &CARBOHYDRATES)	UG core	6	4

COURSE DESCRIPTION : This paper deals with comprehensive introduction about Carbonyl compounds, Carboxylic acids and their derivatives, Stereoisomerism, Amines and Diazo compounds & Carbohydrates

COURSE OBJECTIVES :

- To learn the synthesis of aldehydes, ketones, carboxylic acids, Aminesand diazonium salts
- To focus on optical, geometrical and atropisomerism of compounds containing carbon
- To distinguish between Aldehydes and Ketones, Primary, secondary andtertiary amines & Monosaccharides and disaccharides.
- To understand and to elucidate the structure of glucose, fructose,sucrose and maltose.

Unit I – ALDEHYDES AND KETONES (18hrs)

Structure – nomenclature, physical properties, preparation of aldehydes – oxidation of primary alcohols, oxidation of methylbenzenes, reduction of acid chlorides and from Grignard reagent. Preparation of ketones – oxidation ofsecondary alcohols, reaction of acid chlorides with organo copper and Cadmium compounds and Friedel Crafts acylation.

Chemical properties of carbonyl compounds- Reactivity of carbonyl group, Reactions –nucleophilic addition – addition of HCN, addition of derivatives of ammonia, addition of alcohol, Cannizzaro reaction, addition ofGrignard reagent, iodoform reaction, oxidation and reduction reactions,

Reaction involving carbanions – Aldol condensation, dehydration of aldolproducts, crossed aldol condensation, Wittig reaction, Mannich reaction, Benzoin condensation, Perkin & Knovenagel reaction.

Unit II – CARBOXYLIC ACIDS AND THEIR DERIVATIES (18hrs)

(a) Aliphatic Acids

Structure – nomenclature, industrial source, preparation of mono & di - carboxylic acid – oxidation of primary alcohols, oxidation of alkyl benzenes,carbonation of Grignard reagents, hydrolysis of nitriles.

Reactions of mono & di carboxylic acids, Halogen substituted acids andHydroxy acids – salts formation, acidity of carboxylic acids, effect of substituents on acidity, HVZ – reaction, Ascending and descending in carboxylic acid series.

(b) Substituted Aromatic Acids

Preparation and properties of Salicylic acid, Phthalic acid, Sulphanilic acid, Saccharin, choramine - T and dichloramine – T.

(c) Functional Derivatives of Carboxylic Acids

Nomenclature – nucleophilic acyl substitution – role of carbonyl group –nucleophilic substitution alkyl Vs acyl. Preparation and reactions

of acid anhydrides, amides and acid chlorides. Reaction of esters – alkaline hydrolysisand acid hydrolysis, ammonolysis of esters, trans esterification, reduction of esters, Claisen condensation and crossed Claisen condensation, Dieckmann condensation.

(d) Reactive methylene compounds –

Preparation and synthetic applications of ethyl acetoacetate and diethylmalonate.

Unit III – STEROISOMERISM (18 Hrs)

Introduction, Configurational isomerism, concept of chirality, enantiomerism and diasteroisomerism, Fischer projection, Optical isomerism –optical activity, symmetry elements and optical isomerism in lactic acid, malicacid and tartaric acid, Relative (D- and L – configuration) and absolute configuration (R and S configuration), Specification of configuration, Resolution, Racemisation, Walden inversion and Asymmetric synthesis.

Optical isomerism in allenes, spiranes and biphenyls. Optical activity of compounds other than Carbon Nitrogen and Sulphur compounds.(Basic concepts
, not in a detailed manner)

Geometrical isomerism -Distinction between Cis-Trans isomers-maleic andfumaric acid, aldoxime and ketoxime, Beckmann rearrangement, E, Z – Nomenclature.

Unit IV - AMINES AND DIAZO COMPOUNDS (18 Hrs)

(a). Amines

Aliphatic Amines: Classification, Basic nature, preparation of Primary,secondary and tertiary aliphatic amines, Separation of amine mixture –
Hofmann's method and Hinsberg method, Physical properties, Chemical properties of amines – Basicity, Reaction with alkyl halides,

acid chlorides,nitrous acid,carbon disulphide (Hofmann's mustard oil test), Carbylamine reaction, Quaternary ammonium compounds, Mechanism andstereochemistry of Hofmann elimination, Phase transfer catalyst, Distinctionbetween Primary, secondary and tertiary amines.

Aromatic amine: Preparation, properties and uses of aniline

(b) Diazo Compounds

Preparation and Chemical properties of Diazomethane and Benzene diazonium salts.

Unit V – CARBOHYDRATES (18 Hrs)

Introduction and classification, Reducing and non-reducing sugars, Monosaccharides - Structural elucidation of Glucose and Fructose, Mutarotation, Epimerization, Osazone formation. Interconversion of glucoseand fructose, Ascending the series of aldoses- Killiani-Fischer synthesis and descending the series of aldoses- Ruff degradation and Wohl's degradation. Disaccharides – Structural elucidation of Sucrose and Maltose.

Polysaccharides – Introduction to Starch and Cellulose (Structural elucidationnot required), Preparation and uses of Cellulose nitrate, cellulose acetate and rayons.

Text Book:

Bhupinder Mehta and Manju Mehta, Organic Chemistry , PHI Learning PrivateLimited, 2010.

Reference:

1. For units I and II : R.T.Morrison & R.N.Boyd, Organic chemistry, PHILearning Private Limited,6th Edition' 2005.
2. For unit III : i) P. S. Kalsi, Stereochemistry of carbon compounds,New Age International Publishers, 3rd Edition'1995.

ii) P.Ramesh, Basic principles of Organic Stereochemistry, Meenu Publications. First Edition' 2010,

3. For units IV &V : I.L. Finar, Organic chemistry, Volume – I, ELBS &Longmann group Ltd, 60th Edition'1973

CIA Evalatation Pattern

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %

Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non – Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISEDBLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the basic concepts used in the preparation, properties of carbonyl compounds and write the reactions of carbonyl compounds with mechanism	K1, K3	PSO1 PSO2 ,PSO3,
CO 2	Name mono & di - carboxylic acids, Explain the synthetic importance of compounds having reactive methylene groups and compare the Reactions of carboxylic acids and hydroxy acids	K1, K2, K4	PSO1, PSO2,PSO3,
CO 3	Define stereo isomers, diasteromers, enantiomers, optical activity, Resolution and Racemisation, Differentiate optical isomers from geometrical isomers	K1 & K4	PSO1, PSO2, PSO3,PSO7
CO 4	Classify primary, secondary and tertiary amines, Distinguish between primary, secondary and tertiary amines and make use of Diazonium salts in the synthesis of various organic compounds	K2, K3 &K4	PSO1, PSO2,PSO3
CO 5	Describe reducing and non-reducing sugars, Discuss the classification of carbohydrates and analyze the structure of glucose, fructose, sucrose , Maltose, Starch and Cellulose.	K1, K2 & K4	PSO1, PSO2,PSO3

Mapping of C0s with PSOs

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	1	1	1	1	1
CO2	3	3	3	1	1	1	1	1
CO3	3	3	3	1	1	1	2	1
CO4	3	3	3	1	1	1	1	1
CO5	3	3	3	1	1	1	1	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	2	1
CO2	3	1	2	1
CO3	3	1	2	1
CO4	3	1	2	1
CO5	3	1	2	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER: 1.Dr. S.SUKUMARI

2. **Dr. B.SUGANTHANA**

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III

B.Sc.chemistry

SEMESTER –

V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5CC14	PHYSICAL CHEMISTRY – III (THERMODYNAMICS, PHASE RULE & GROUP THEORY)	UG Core	6	4

COURSE DESCRIPTION

Objective: This course provides an elaborate study of the thermodynamics,Phase Rule and Group theory.

COURSE OBJECTIVES

- To understand the chemical and physical systems in thermodynamicsense
- To predict the feasibility of chemical reactions applying II law of thermodynamics
- To explain the absolute entropy of substances and to calculate it
- To interpret the phase diagrams of one and two component systems.
- To classify the molecules into different point groups
- To construct the character table for simple molecules like water andammonia

- To study the applications of group theory in deducing the selection rulesfor IR and Raman spectroscopy
-

UNITS

UNIT – I – THERMODYNAMICS – I law (18 Hrs)

Definition and importance, energy and its units. Mechanical work and heat and its relation, Thermodynamic systems and their characteristics, state of a system, state function and its characteristics-thermodynamic function, thermodynamic processes, thermodynamic equilibrium, first law – statement,

different forms, mathematical formulation – work of expansion at constantpressure.

Heat of reaction at constant volume E and constant pressure. H – Relation between H and E and their inter conversion. Heat capacities at constant volume, Cv.and at constant pressure, Cp. Relation between Cp and Cv - Application of first law to ideal gas and real gas obeying van-der waals equation of state - work done, heat absorbed and change in E during adiabatic and isothermal changes. Joule Thomson expansion coefficient, inversion temperature and its significance, Equipartition energy.Thermodynamic equilibrium of state.

Thermo chemistry – Definitions and enthalpies of reaction, their determination and application, variation of enthalpies with temperature - Kirchoff equation.

Laws of thermo chemistry – (i) Lavoisier and Laplaces law (ii) Hess's law of constant heat summation – statement- thermodynamic derivation and application (iii) Law of Thermo – neutrality of solutions.

Bond Energies – definitions, calculation from thermo chemistry andapplications

.

UNIT –II II law of THERMODYNAMICS (18 Hrs)

II Law of thermodynamics – importance, different ways of stating the II law and its significance.

Conversion of heat into work – Carnot's Theorem and cycle, Thermodynamicefficiency.Efficiency and thermodynamic scale of temperature.

Entropy – definition – dependence of entropy on variables of the system – entropy changes in ideal gases and mixing of gases, physical transformations in chemical reactions and in irreversible processes, Entropy and probability – physical significance.

Free energy functions:

(i) Helmoltz free energy (A) – definition and temperature dependence.

(ii) Gibbs free energy (G) - definition and temperature dependence, properties and significance. Relation between free and total energies – Gibbs Helmholtz equation and applications.Maxwell equation, derivation of state from Maxwell relation.

(iii) Partial molar quantities and chemical Potential, Physical equilibria involving pure substances.

(iv) Clapeyron equation – derivation and general form – applications to various physical equilibriaviz, melting, vapourisation, sublimation and transition.

(v) Clausius – Clapeyron equation – derivation and its applications.

UNIT – III –APPLICATIONS AND III LAW OF THERMODYNAMICS (18 Hrs)

Applications of thermodynamics to various types of equilibria – equilibrium constant and free energy changes. Reaction isotherm and Van't Hoff isochore – Thermodynamic interpretation of the law of mass action andLe Chatlier's principle -derivation.

Nernst heat theorem and its applications,

III law of thermodynamics. A simple treatment of the law, temperature dependence of the heat capacity and its use in the determination of absolute entropy, comparison between statistical(exception to III law) and III law entropy, Zeroth law of thermodynamics and its significance.

UNIT –IV GROUP THEORY (18 Hrs)

Introduction- symmetry elements and symmetry operations- groups- definitions and rules of a group-group multiplication table- classes, similarity transformation-point group classification.

Matrix representation of symmetry operations, rotation, reflection, reducible and irreducible representation- decomposition of reducible representations- other properties-notation-some theorems-projection operators- general theorems of representation theory problems.

Construction of character table C_{2V}, C_{3V}, - Direct product representation.-Chemical application of Group theory- normal

mode analysis- selection rule for IR & Raman spectroscopy.

SELF STUDY: To predict the point groups of Naphthalene, ethylene and cisand trans dichloroethylene

UNIT V -PHASE RULE (18Hrs)

Definition of the terms- phase, component and degrees of freedom, Types of equilibrium and derivation of phase rule.

One component system – (e.g.) water system, Sulphur system, CO_2system,Effect of temperature and pressure on these systems

Two component system- (solid-liquid equilibrium):
Simple eutectic - (e.g.) Lead-Silver system.Compound formation – General description

.

Solid-solid equilibrium: Salt hydrate- water system, incongruent melting point, Potassium iodide-water system, Ferric chloride – Water system, Sodium- Potassium system, Copper Sulphate – Water system. Transition temperature and its determination.

SELF STUDY: Zinc – Magnesium system

REFERENCES:

Text Book:

Unit I - III –Puri, Sharma &Pathania.- Physical chemistry by 3rdEdn, Vishalpublishing Company.

Unit IV 1. V. Ramakrishnan& M.S. Gopinathan -Group theory -Vishal publishing House, 2ndEdn, 1991.

2. Barrow -Spectroscopy , Tata Mc-Graw Hall, 5thEdn, 1992.P.No. 104 & 105

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	UNIT -1 TITLE			
	THERMODYNAMICS – I: Definition and importance, energy and its units. Mechanical work and heat and its relation,			

1.1	Thermodynamic systems and their characteristics, state of a system, state function and its characteristics- thermodynamic function, thermodynamic processes, thermodynamic equilibrium, - . .	1	Chalk & Talk	Black Board
1.2	first law – statement, different forms, mathematical formulation – work of expansionat constant pressure. Heat of reaction at constant volume E and constantpressure. H – Relation between H and E and their inter conversion.	3	Chalk & Talk	LCD
1.3	Heat capacities at constant volume, Cv.and at constant pressure, Cp. Relation between Cp and Cv - Application of first law to ideal gas and real gas obeying van-der waals equationof state	3	Lecture	PPT & White board

1.4	work done, heat absorbed and change in E during adiabatic and isothermal changes. Joule Thomson expansion coefficient,inversion temperature and its significance, Equipartition energy.Thermodynamic equilibrium of state.	3	Lecture	Smart Board
1.5	Thermo chemistry – Definitionsand enthalpies of reaction, theirdetermination and application, variation of enthalpies with temperature - Kirchoff equation	2	Lecture	Black Board
1.6	Laws of thermo chemistry – (i) Lavoisier and Laplaces law (ii) Hess's law of constant heat summation – statement-	2	Discussio n	Google classroom
1.7	thermodynamic derivation and application (iii) Law of Thermo – neutrality of solutions.	2	Specimen	Microscope
1.8	Bond Energies – definitions, calculation from thermo chemistry and applications	2	Discussio n	Black Board
UNIT -2 THERMODYNAMICS – II:				
2.1	II Law of thermodynamics – importance, different ways of stating the II law and its significance.	1	Lecture	Gree n Board Charts

2.2	Conversion of heat into work – Carnot's Theorem and cycle, Thermodynamic efficiency. Efficiency and thermodynamic scale of temperature.	2	Chalk & Talk	Green Board
2.3	Entropy – definition – dependence of entropy on variables of the system – entropy changes in ideal gases and mixing of gases, physical transformations in chemical reactions and in irreversible processes, Entropy and probability – physical significance.	2	Chalk &Talk	Black Board
2.4	**Free energy functions:** (i) Helmoltz free energy (A) – definition and temperature dependence. (ii) Gibbs free energy (G) - definition and temperature dependence, properties and significance. Relation between free and total energies –Gibbs Helmholtz equation and applications. Maxwell equation, derivation of state from Maxwell relation.	3	Chalk &Talk	Black Board
2.5	Partial molar quantities and chemical Potential, Physical equilibria involving pure substances.	1	Chalk &Talk	Black Board

2.6	Clapeyron equation – derivation and general form – applications to various physical equilibriaviz, melting, vapourisation, sublimation and transition Clausius – Clapeyron equation – derivation and its applications.	2	Chalk &Talk	Black Board
	APPLICATIONS AND III LAWOF THERMODYNAMICS (18 Hrs)			
3.1	**Applications of thermodynamics** to various types of equilibria – equilibrium constant Thermodynamic interpretation of the law of mass action and Le Chatlier's principle -derivation.	2	Chalk &Talk	Black Board
3.2	and free energy changes. Reaction isotherm and Van't Hoff isochore –	1	Chalk &Talk	Black Board
3.3	Nernst heat theorem and its applications, **III law of thermodynamics**. A simple treatment of the law, temperature dependence of the heat capacity and its use in the determination of absolute entropy,	2	Chalk &Talk	Black Board
3.4	comparison between statistical(exception to III law) and III law entropy, Zeroth law of thermodynamics and its significance.	2	Chalk &Talk	Black Board
	GROUP THEORY			

4.1	**Introduction**- symmetry elements and symmetry operations-	2	Lecture	PPT & White board
4.2	groups-definitions and rules of a group-group multiplicatio ntable-classes,	2	Lecture	PPT & White board
4.3	similarity transformation-point group classification.	2	Lecture	PPT & White board
4.4	Matrix representation of symmetry operations, rotation, reflection,	3	Lecture	PPT & White board
4.5	reducible and irreducible representation- decomposition of reducible representations- other properties-notation-	3	Lecture	PPT & White board
4.6	some theorems-projection operators- general theorems of representation theory problems. Construction of character table C_{2V}, C_{3V},	3	Lecture	PPT & White board
4.7	Direct product representation.- Chemical application of Group theory- normal mode analysis- selection rule for IR & Raman spectroscopy.	3	Lecture	PPT & White board
	PHASE RULE			
5.1	Definition of the terms- phase, component and degrees of freedom, Types of equilibrium and derivation of phase rule.	3	Chalk &Talk	Black Board

5.2	One component system – (e.g.) water system, Sulphur system, CO_2system, Effect oftemperature and pressure onthese systems	3	Chalk &Talk	Black Board
5.3	Two component system- (solid-liquid equilibrium): Simple eutectic - (e.g.) Lead-Silver system.	3	Chalk &Talk	Black Board
5.4	Compound formation – General description	3	Chalk &Talk	Black Board
5.5	Solid-solid equilibrium: Salt hydrate- water system, incongruent melting point, Potassium iodide-water system, Ferric chloride – Water system,	3	Chalk &Talk	Black Board
5.6	Sodium- Potassium system, Copper Sulphate – Water system. Transition temperature and its determination.	3	Chalk &Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session -wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non Scholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

✔**All the course outcomes are to be assessed in the various CIA components.**

✔The levels of CIA Assessment based on Revised Bloom's Taxonomy **for I UG are :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

✔The I UG course teachers are requested to start conducting S1,W1, M1,

in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explain all the terms in thermodynamics and mathematically formulate it.	K1	PSO1& PSO2

CO 2	Understand the three laws of thermodynamics and evolve the concepts of enthalpy,entropy and free energy	K1, K2,	PSO3

CO 3	Explain the parts of phase diagramsof unary and binary component system	K1 & K3	PSO5
CO 4	Explain the behaviour of the systemsin equilibrium using Pressure- Temperature and Composition Temperature curves	K1, K2, K3 &	PSO6
CO 5	Classify the molecules on the basis Of symmetry elements into differentpoint groups using the rules of groups	K2 & K4	PSO7

Mapping of C0s with PSOs

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	2	2	1	1	2	3	2	1
CO5	1	2	1	2	2	2	3	1

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

DR.S.SELVARANI

DR.B.MEDONA

Forwarded By

B-Medona.

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc.CHEMISTRYSEMESTER –V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5CC15	Inorganic practicals (GRAVIMETRIC ANALYSIS)	Lab In	4	2

COURSE OBJECTIVE: This paper deals with the preparation of someinorganic complexes and gravimetric estimation of metal ions

- Estimation of Lead as lead chromate.
- Estimation of chloride as silver chloride.
- Estimation of barium as barium chromate.
- Estimation of barium as barium sulphate.

Inorganic Complex preparations:

- Thiourea complex
- Tetrammine Cu complex
- Ferrous oxalate

References:

Venkatesan, Kulandhaivelu, “Practical chemistry”, 2002.

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	Acquire the knowledge of concept of gravimetric estimations	PSO1& PSO2
CO 2	Recognise the role of reagents in chemistry	PSO3
CO 3	Determine the amount of analyte precipitate.	PS03, PSO5

CO 4	Analyse the experimental observations and inferences with theory behind practicals	PSO1,PSO5
CO 5	Gain knowledge of preparing complexes	PSO2,PSO5

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	3	2	3	2	1	2
CO4	3	2	1	1	3	3	2	1
CO5	1	3	1	2	3	2	2	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	3	3	1	1
CO3	3	2	2	1
CO4	2	3	1	1
CO5	3	2	2	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr.A.Rajeswari

2.Dr.B.Vinosha

Forwarded By

HOD'S

Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc chemistry

SEMESTER –VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	22C5CC16	CONVENTIONAL AND GREEN SYNTHESIS	Lab IN	4	2

COURSE OBJECTIVE: This paper includes the greener methods of preparationof Organic compounds and nano particles

After the completion of the course the students are able to

- To understand the green synthesis methods
- To know about the Acetylatation/ Propionelation of aniline using water as eco friendly solvent.
- To familiarise about the silver nanoparticles by green synthesis
- To learn about the preparation of organic compounds by using clay.
- To equip the Preparation of Schiff base by microwave technique.·

i) Greener methods of preparation of organic compounds

1. Preparation of bis-naphthol in solvent free conditions
2. Preparation of Aryl nitro compounds using greener nitrating mixture.
3. Preparation of *p*-bromoacetanilide from acetanilide using greener brominating agent.
4. Preparation of Aspirin using micro wave irradiation
5. Preparation of Benzillic acid from Benzil using greener method.

ii) Greener methods of preparation of Nanomaterials (Demonstration)

1. Preparationof Silver nanoparticles from Silver nitrate
2. Preparation of Zinc oxide from Zinc acetate

Conventional Methods:

1) Preparation of Benzoic acid from Benzaldehyde

2 Preparation of Salicylic acid from methyl salicylate

3) Preparation of Benzoic acid from Benzamide.

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	To understand the green synthetic methods	PSO1,PSO5 &PSO6
CO 2	To know about the eco friendly solvents for greensynthesis.	PSO1, PSO5& PSO6
CO 3	To familiarise about the silver nanoparticles bygreen synthesis	PSO1,PSO5 &PSO6
CO 4	To learn about the preparation of organic compounds by using clay	PSO1, PSO5& PSO6
CO 5	To equip the Preparation of Schiff base by microwave technique.	PSO1,PSO5 ,PSO6 & PSO7

Mapping of COs with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	1	1	1	3	3	3	1
CO2	3	1	1	1	3	3	3	1
CO3	3	1	1	1	3	3	3	1
CO4	3	1	1	1	3	3	3	1
CO5	3	1	1	1	3	3	3	1

Mapping of COs with POs

CO / PSO	PO1	PO2	PO3	PO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER

1.Dr.Sr.ArulMary.J

1. Dr. S.Sukumari

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRYSEMESTER –V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5ME1	SPECTROSCOPY	UG Core	5	5

COURSE DESCRIPTION

This course will focus on interpretation of spectra and application of these tools to address questions of structures.

COURSE OBJECTIVES

In this course the students are exposed to various spectroscopic techniques that are used in structural elucidation. This paper will be of much use of the students to take up higher studies.

UNITS

UNIT –I UV-VISIBLE SPECTROSCOPY (15HRS.)

Introduction, Absorption laws – instrumentation. Types of electronic transitions Absorption and intensity shifts – solvents effects.λmax calculation using Woodward rules for dienes (Open chain and alicyclic) and unsaturated carbonyl compounds.

Self Study: Applications of UV spectroscopy.

UNIT –II FT-IR SPECTROSCOPY (15HRS.)

Introduction, molecular vibrations vibrational frequency – Number of fundamental vibrations – Factors influencing vibrational frequencies – Instrumentation – Sampling technique Finger print region – skeletal and groupvibrations. Problems involving small molecules only

Self Study: Applications of FT-IR spectroscopy.

UNIT –III ^{1}H-NMR SPECTROSCOPY (15HRS.)

Introduction, principle, Number of signals, position of signals(chemical shift) – shielding and deshielding effects. Factors influencing chemical shift. Instrumentation, Solvents used -peak area – splitting of the signals. Coupling constant (J) geminal Vicinal (cis&trans) and aromatic coupling (J- ortho, J-meta & J-para).

Self Study: Applications of ^{1}H-NMR spectroscopy.

UNIT –IV ^{13}C AND ESR SPECTROSCOPY (15HRS.)

Natural abundance of ^{13}C – Resolution, multiplicity – H_1 decoupling – Noise decoupling. NOE Signal enhancement -broad bands – off resonance – proton decoupling. Chemical shifts for ^{13}C in various kind of carbon. (sp^3,sp^2, sp, hybridized carbon and carbonyl carbon) comparison of ^{13}C NMR &PMR (elementary level).

Introduction, Hyperfine splitting in Hydrogen atom, CH_3 free radicals, Benzene anion radical, bis salicylaldimine Copper(II)Complex.

Self Study: Zero field splitting & Kramers's degeneracy.

UNIT –V MASS SPECTROSCOPY (15HRS.)

Basic principles, Instrumentation, Determination of molecular formula using nitrogen rule – Molecular ion peal – base peak (M+1), (M+2) peaks metastable peaks. General fragmentation modes, simple cleavage – Retro Diels Alder reaction. Hydrogen transfer rearrangements – McLafferty rearrangement, Problems involving simple fragmentation (150-200) with Nitrogen and halogen functional groups.

Self Study: Applications in Mass spectroscopy.

REFERENCES:

5. Y.R. Sharma, Organic Spectroscopy, Fourth revised and

enlarged Edn.,2007, S. Chand & Co.

6. Puri, Sharma & Pathania, Principles of Physical Chemistry, 3rd Edn.,Vishal publishing Company.
7. P. S. Kalsi, Stereochemistry of carbon compounds, 3rd Edn., New AgeInternational Publishers, 1995.
8. R. S. Drago, *PhysicaI Methods in Chemistry*; Saunders:Philadelphia, 1977.
9. C. N. Banwell and E. M. Mc Cash, *Fundamentals of MolecularSpectroscopy*, 4th Edn., Tata Mc Graw Hill, New Delhi, 2000.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 UV-VISIBLE SPECTROSCOPY				
1.1	Introduction, Absorption laws	2	Chalk & Talk	Black Board
1.2	Instrumentation	1	Chalk & Talk	LCD
1.3	Types of electronic transitions	1	Lecture	Black Board
1.4	Absorption and intensity shifts	3	Lecture	Black Board
1.5	Solvents effects	3	Lecture	Black Board
1.6	max calculation usingWoodward rules for dienes	2	Lecture	Chalk and Talk
1.7	max calculation using Woodward rules for Open chain and alicyclic compounds	1	Lecture	PPT & White board

1.8	□ max calculation using Woodward rules for unsaturated carbonyl compounds.	2	Discussion	Black Board
UNIT -2 FT-IR SPECTROSCOPY				
2.1	Introduction	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	Molecular vibrations vibrational frequency	2	Chalk & Talk	Green Board
2.3	Number of fundamental vibrations	2	Chalk & Talk	Black Board
2.4	Factors influencing vibrational frequencies	3	Lecture	PPT & White board
2.5	Instrumentation	2	Discussion	LCD
2.6	Sampling technique Finger printregion	1	Lecture	Black Board
2.7	Skeletal and group vibrations.	4	Lecture	PPT & White board
UNIT -3 ^{1}H-NMR SPECTROSCOPY				
3.1	Introduction, principle	2	Lecture	Black Board
3.2	Number of signals, position of signals(chemical shift).	3	Discussion	LCD
3.3	Shielding and deshielding effects.	3	Lecture	PPT & White Board
3.4	Factors influencing chemical shift.	2	Lecture	Black Board
3.5	Instrumentation	1	Discussion	LCD

3.6	Solvents used -peak area – splitting of the signals.	2	Lecture	Black Board
3.7	Coupling constant (J) geminal Vicinal (cis&trans)	1	Lecture	Black Board
3.8	Aromatic coupling (**J**- ortho, **J**- meta & J-para).	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -4 ^{13}CAND ESR SPECTROSCOPY				
4.1	Natural abundance of ^{13}C – Resolution, multiplicity.	1	Lecture	Black Board
4.2	H_1 decoupling – Noisedecoupling.	3	Chalk & Talk	Green Board
4.3	NOE Signal enhancement - broad bands – off resonance – protondecoupling.	2	Chalk & Talk	Black Board
4.4	Chemical shifts for ^{13}C in various kind of carbon. (sp^3,sp^2, sp, hybridized carbon and carbonyl carbon)	3	Lecture	PPT & White board
4.5	Comparison of ^{13}C NMR &PMR (elementary level).	1	Discussion	LCD
4.6	Introduction, Hyperfine splittingin Hydrogen atom	1	Lecture	Black Board
4.7	CH_3 free radicals, Benzene anionradical	2	Lecture	PPT & White board
4.8	bissalicylaldimine Copper(II)complex.	2	Lecture	Black Board
UNIT -5 MASS SPECTROSCOPY				
5.1	Basic principles, Instrumentation	2	Lecture	Black Board
5.2	Determination of molecular formula using nitrogen rule	2	Chalk &	Green Board

			Talk	
5.3	Molecular ion peak – base peak (M+1), (M+2) peaks metastable peaks	3	Chalk & Talk	Black Board
5.4	General fragmentation modes	1	Lecture	PPT & White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.5	Simple cleavage	2	Discussion	LCD
5.6	Retro Diels Alder reaction	1	Lecture	Black Board
5.7	Hydrogentransfer rearrangements	2	Lecture	PPT & White board
5.8	McLafferty rearrangement, problems.	2	Lecture	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average	Better of W1, W2	M1+M2	MID - SEM TEST				
	5 Mks.	5 Mks	5+5=10 Mks.	15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %

Non Scholastic	**-**	**-**	**-**	**-**		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	to calculate λmax values for different organic molecules and to identify the systems using UV spectroscopy.	K1, K2,K3 &K4	PSO1& PSO2
CO 2	to identify various functional groups present in organic molecules using IRfrequency.	K1, K2,K3 &K4	PSO3
CO 3	to predict the number and nature of protons/ carbons in organic moleculesin ^{1}H-NMR/ ^{13}C-NMRspectroscopy.	K1, K2,K3 &K4	PSO5
CO 4	to study the structures of systems with unpaired electrons using ESR spectroscopy.	K1, K2,K3&K4	PSO3
CO 5	to findoutthe mass of the molecule and to arrive at the formulae of the molecules using fragmentation patterns.	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	2	2	1	1	2	3	2	1
CO5	1	2	1	2	2	2	3	1

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**
♦ WeaklyCorrelated **-1**

COURSE DESIGNER:

1.Dr.M.Priyadharsani

2.Dr.V.Aruldeepa

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

B.Sc.Chemistry -V

SEMESTERBIO

CHEMISTRY-

19C5ME2

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5ME2	BIO CHEMISTRY	Lecture	5	5

Course Description:

This course deals with the structure of RNA and DNA and their function. It gives an overview of classification of enzyme and mechanism of enzyme action. This course also deals with bio- energetics.

COURSE OBJECTIVES

In this course the students are exposed to various Biomolecules, bioenergetics and spectroscopy of biomolecules. This paper will be of much use of the students to take up higher studies.

UNIT I-NUCLEIC ACID **15 Hrs**
UNIT II- ENZYMES **15 Hrs**
UNIT III –METABOLISM **15 Hrs**
UNIT IV BIOENERGETICS-I **15 Hrs**
UNIT V BIOENERGETICS- II **15 Hrs**

Unit I-NUCLEIC ACID **(15 Hrs)**

Definition, Three components, Phosphoric acid, Pentose sugar,

Nitrogenous bases(Purine and Pyrimidine derivatives)

Nucleosides, nucleotides, Deoxyribonucleic acid, Internucleotide linkages, Base composition, Double helical structure, Denaturation and renaturation, Molecular weight, shape and size, single stranded DNA, Ribonucleic acid, differences with RNA, Types of RNA , Ribosomal and transfer RNA, Messenger and heteronucleic RNA.

UNIT II- ENZYMES (15 Hrs)

Classification- Isozymes, Multienzyme systems- Biological role of enzymes. Mechamism- Activation energy, Michaelis Menten Hypothesis, Michaelis Menten equation, Line weaver Burk equation, Active site –fisher's lock and key model. Modifiers of enzyme activity- Inorganic modifiers or
enzyme activators. Organic modifiers or enzyme inhibitors, competitive inhibition, Non-competitive inhibition.

Unit III – METABOLISM (15 Hrs)

Metabolism of carbohydrates – Glucose metabolism – Glucose uptake,Phosphorylation, Glycolysis and oxidation and Glucose storage, Fructose metabolism. Metabolism of Proteins .

Unit IV BIOENERGETICS -I (15 Hrs)

Coupling, concept of energy, Thermodynamic principles ATP as universal currency of free energy in Biological systems. Free energy of hydrolysis of ATP and other organo phosphates.

Unit V BIOENERGETICS II (15 Hrs)

Structural basis of the high group transfer potential of ATP. ATP hydrolysisand equilibria of coupled reactions. Role of high energy

phosphates as the energy currency of the cell, Heme

Text Book:

1.Fundamentals of Bio Chemistry – J.L.Jain.

2. J. Ghosh, A Textbook of Pharmaceutical Chemistry, New Delhi: S. Chand &Company, 1999.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 UV-VISIBLE SPECTROSCOPY				
1.1	Definition, three components, phosphoric acid and pentose sugar.	2	Chalk & Talk	Black Board
1.2	Nitrogenous bases(Purine and Pyrimidine derivatives).	1	Chalk & Talk	LCD
1.3	Nucleosides, nucleotides ,Deoxyribonucleic acid, Internucleotide linkages,	1	Lecture	Black Board
1.4	Denaturation and renaturation,	3	Lecture	Black Board
1.5	single stranded DNA,Ribonucleic acid	3	Lecture	Black Board
1.6	Ribonucleic acid, differences with RNA, Types of RNA	2	Lecture	Chalk and Talk

1.7	Ribosomal and transfer RNA	1	Lecture	PPT & White board
1.8	Messenger and heteronucleic RNA.	2	Discussion	Black Board
UNIT - 2	**FT-IR SPECTROSCOPY**			
2.1	Classification- Isozymes, Multienzyme systems-	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	Biological role of enzymes.	2	Chalk & Talk	Green Board
2.3	Mechamism- Activation energy, Michaelis Menten Hypothesis	2	Chalk & Talk	Black Board
2.4	Michaelis Menten equation, Line weaver Burk equation,	3	Lecture	PPT & White board
2.5	Line weaver Burk equation, Active site –fisher's lock and key model	2	Discussion	LCD
2.6	Modifiers of enzyme activity- Inorganic modifiers or enzyme activators.	1	Lecture	Black Board
2.7	Organic modifiers or enzyme inhibitors, competitive inhibition, Non-competitive inhibition.	4	Lecture	PPT & White board
UNIT -3	**^{1}H-NMR SPECTROSCOPY**			

3.1	Metabolism ofcarbohydrates –	3	Lecture	Black Board
3.2	– Glucose metabolism – Glucose uptake	3	Discussion	LCD
3.3	Phosphorylation, Glycolysis	3	Lecture	PPT & White Board
3.4	Fructose metabolism	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.5	Metabolism of Proteins .	3	Discussion	LCD
UNIT -4 ^{13}CAND ESR SPECTROSCOPY				
4.1	Coupling, concept of energy, .	5	Lecture	Black Board
4.2	Thermodynamic principles ATP as universal currency of free energy in Biological systems.	5	Chalk & Talk	Green Board
4.3	Free energy of hydrolysis of ATP and other organo phosphates.	5	Chalk & Talk	Black Board

UNIT -5 MASS SPECTROSCOPY				
5.1	Structural basis of the high group transfer potential of ATP	2	Lecture	Black Board
5.2	ATP hydrolysis and equilibria of coupled reactions.	3	Chalk & Talk	Green Board
5.3	Role of high energy phosphates as the energy currency of the cell	5	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.4	Heme.	5	Lecture	PPT & White board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non Scholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	**35**

Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Have an in-depth knowledge on various organic biomolecules	K1, K2,K3 &K4	PSO1& PSO2
CO 2	Have an in-depth knowledge on various inorganic biomolecules	K1, K2,K3 &K4	PSO3
CO 3	to predict the number and nature of protons/ carbons in inorganic biomoleculesin using different spectroscopic techniques.	K1, K2,K3 &K4	PSO5
CO 4	to analyze the redox behaviours of biomolecules using electroanalytical techniques.	K1, K2,K3&K4	PSO3
CO 5	To gain in-depth knowledge on biopolymers.	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	2	2	1	1	2	3	2	1
CO5	1	2	1	2	2	2	3	1

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**
♦ WeaklyCorrelated -**1**

COURSE DESIGNER:

1. **Dr.M.Priyadharsani**
2. Dr.B. Vinosha

Forwarded By

HOD'S

Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc chemistry

SEMESTER –V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	**19C5SB3**	**Medicinal chemistry**	**Skill Based**	**2**	**2**

COURSE DESCRIPTION

This paper focuses on all the important aspects of drugs, mechanism ofdrugs and also highlights the causes of common diseases, role of Indian medicinal plants and the importance of hormones.

COURSE OBJECTIVES

This course gives an introduction to the types of drugs and metabolism in the body. It also highlights the causes of common diseases, role of Indian medicinal plants and the importance of hormones.

UNITS

UNIT –I DRUGS (6 HRS.)

Drugs – Introduction – source, study, classification – Biological, Chemical and by Lay Public, Nomenclature of Drugs – IUPAC system, Heterocyclic systems and stereochemical system.

UNIT –II MECHANISM OF DRUGACTION (6 HRS.)

Mechanism of Drug action and metabolism of Drugs,

Absorption ofDrugs and Assay of Drugs.

UNIT –III COMMON DISEASES (6 HRS.)

Causes of common Diseases – Classification of diseases and theirtreatment.

UNIT –IV INDIAN MEDICINAL PLANTS (6 HRS.)

Indian Medicinal plants – tulsi, aloevera, basil, gotu kola, neem and their medicinal properties.

UNIT –V HORMONES (6 HRS.)

Definition, Classification, Hormones with special reference to Testosterone, Progesterone and Thyroxine (structural elucidations notnecessary).

REFERENCES:

Test Books

1. J. Ghosh, A Textbook of Pharmaceutical Chemistry, New Delhi: S. Chand &Company,
1999.
2. P. Parimoo, A Textbook of Medical Chemistry, New Delhi: CBSPublishers.1995.
3. S. Ramakrishnan, K. G. Prasannan and R. Rajan, Textbook of MedicalBiochemistry,
Hyderabad: Orient Longman. 3rd ed, 2001.

Reference Books

1. F. S. K. Barar, Essential of Pharmacotherapeutics, New Delhi: S. Chand &Company, 2000.
2. S. N. Pandeya and J. R. Dimmock, An Introduction to Drug Design, NewDelhi: New Age
International, 1997.
3. G. Patrick, Medical Chemistry, New Delhi: Viva Books, 2002.

4. Richard B. Silverman. The organic chemistry of drug design and drugaction, 2nd ed.,
Academic Press, 2004.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I DRUGS				
1.1	Drugs – Introduction, source,study,	1	Chalk &Talk	Black Board
1.2	classification of drugs - biological	2	Chalk &Talk	Black Board
1.3	classification of drugs – Chemical and by Lay Public	1	Chalk &Talk	Black Board
1.4	Nomenclature of Drugs – IUPA system	1	Chalk &Talk	Black Board
1.5	Heterocyclic systems and stereochemical system.	1	Chalk &Talk	Black Board
UNIT II MECHANISM OF DRUG ACTION				
2.1	Mechanism of Drug action	2	Chalk &Talk	Black Board
2.2	metabolism of Drugs	2	Chalk &Talk	Black Board
2.3	Absorption of Drugs	1	Chalk &Talk	Black Board
2.4	Assay of Drugs.	1	Chalk &Talk	Black Board
UNIT III COMMON DISEASES				
3.1	Causes of common Diseases	1	Chalk &Talk	Black Board

3.2	Classification of diseases and their treatment	5	Chalk &Talk	Black Board
UNIT IV INDIAN MEDICINAL PLANTS				
4.1	Indian Medicinal plants – tulsi, and their medicinal properties.	2	Chalk &Talk	Black Board
4.2	Indian Medicinal plants – aloevera and their medicinal properties.	1	Chalk &Talk	Black Board
4.3	Indian Medicinal plants – basil and their medicinal properties.	1	Chalk &Talk	Black Board
4.4	Indian Medicinal plants - gotu kola and their medicinal properties.	1	Chalk &Talk	Black Board
4.5	Indian Medicinal plants – neem and their medicinal properties.	1	Chalk &Talk	Black Board
UNIT V HORMONES				
5.1	Definition, Classification ofhormones	2	Chalk &Talk	Black Board
5.2	Testosterone	2	Chalk &Talk	Black Board
5.3	Progesterone	1	Chalk &Talk	Black Board
5.4	Thyroxine	1	Chalk &Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session-wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID-SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non Scholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

✔All the course outcomes are to be assessed in the various CIA components.

✔**The levels of CIA Assessment based on Revised Bloom's Taxonomy**

for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

✔The I UG course teachers are requested to start conducting S1,W1, M1,

in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED

CO 1	To acquire basic awareness on drugsand its sources	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 2	To study the mechanism of drugs and its effect on human system	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 3	To study the symptoms, preventions and therapeutic methods of commondiseases	K1,K2,K3,K4	PSO1,PSO5, PSO7

CO 4	To predict the healing properties andapplications of the Indian medicinal plants	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 5	To state the definition and function of testosterone, progesterone and thyroxine	K1,K2,K3,K4	PSO1,PSO5, PSO7

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	2	2	2	3	2	3	2
CO2	3	2	2	2	3	2	3	2
CO3	3	2	2	2	3	2	3	2
CO4	3	2	2	2	3	2	3	2
CO5	3	2	2	2	3	2	3	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	3
CO2	2	2	3	3
CO3	2	1	1	3
CO4	3	1	2	3
CO5	2	2	1	3

Note: □ Strongly Correlated – **3**□ ModeratelyCorrelated – **2** □ WeaklyCorrelated **-1**

COURSE DESIGNER:
Mrs.Rm.Nagalakshmi

Forwarded By

HoD Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc chemistry. SEMESTER –V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5SB4	NANO SCIENCE	SKILL BASED	2	2

Course Objective: This paper deals with study of synthesis, properties,structure and applications of nano particles.

Unit-I: BASICS OF NANOCHEMISTRY (6Hrs)

Basics of nanomaterials: Properties of nanomaterials, quantum confinement effect, surface properties of nanoparticles. Classification of the nano materials

– zero dimensional, one dimensional, two dimensional and three dimensionalnanostructures.

Unit-II: PROPERTIES OF NANOMATERIALS AND CNTS: (6Hrs)

Mechanical, optical, electronic, magnetic, thermal and chemical properties ofnanomaterials.

Carbon nano structures: Introduction – Carbonmolecules – Carbon clusters,Carbon nanotubes – application of Carbon nano tubes.

Unit-III: SYNTHETIC TECHNIQUES (6Hrs)

Chemical methods: sol-gel synthesis, solvothermal synthesis, thermolysisroute.

Physical methods: Pulsed laser deposition- Magnetron sputtering.

Unit-IV: APPLICATIONS OF NANOMATERIALS (6Hrs)

Application of nano materials as sensors, catalysts, and nano medicine.

.

Unit-V: Characterization Techniques (6Hrs)

X-ray diffraction(XRD) - Electron microscopes – scanning electron microscopes(SEM) –transmission electron microscopes (TEM) – scanning probe microscopy

– atomic force microscopy (AFM) **–basic principles only.**

Text Books:

1. Introduction to nanotechnology – Charles P. Poole Jr, Frank J. Owens.
2. Understanding nanoscience and nanotechnology – T. Pradeep

Reference Books:

1. S.Shanmugam, Nanotechnology, , MJP Publishers, Chennai (2010).
2. Patrick Salomon , A Handbook on Nanochemistry,, Dominant PublishersandDistributers, New Delhi.
3. S. Balaji ,Nanobiotechnology, MJP Publishers, Chennai (2010).
4. CNR RaoThe Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, Springer (2006).
5. Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson,Kamali Kannangara, Geoff Smith, Michelle Simmons, BurkhardRaguse, OverseasPress, (2005).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I : BASICS OF NANOMATERIALS				
1.1	Basic concepts	2	Chalk & Talk	Black Board
1.2	surface properties ofnanoparticles	2	Chalk & Talk	Black Board
1.3	classification of nanomaterials - one dimentional,twodimentional and three dimentional nanostructures	2	Chalk &Talk	Black Board
1.4	Carbon nanostructures-carbonmolecules	2	Chalk &Talk	PPT & White board
1.5	carbon nanotubes	2	Chalk &Talk	Black Board

1.6	Nanopolymers	1	Chalk & Talk	LCD
1.7	Nnocrystals	1	Chalk & Talk	Black Board
UNIT II : SYNTHETIC METHODS OF NANOMATERIALS				
2.1	Synthesis of semiconductors .	2	Chalk & Talk	Black Board
2.2	synthesis of ceramics.	3	Chalk & Talk	Black Board
2.3	synthesis of carbon nanotubes	3	Chalk & Talk	PPT & White board
2.4	Synthesis of fullerenes	4	Chalk & Talk	Black Board
UNIT III :PROPERTIES OF NANOMATERIALS				
3.1	Properties of carbon nanotubes –Thermal conductivity and Kinetic property	2	Chalk & Talk	Black Board
3.2	Elecrical and electronical properties of CNT	2	Chalk & Talk	Black Board
3.3	Mechanical properties of CNT	1	Chalk & Talk	LCD
3.4	Electrical and electronicproperties of CNT	1`	Chalk & Talk	Black Board
3.5	Vibrational properties and tensile strength	1	Chalk & Talk	Black Board
3.6	Physical properties of fullerene	1	Chalk & Talk	Black Board

3.7	Chemical properties offullerenes	2	Chalk & Talk	Black Board
3.8	Inert gas cluster and rare gas clusters.	2	Chalk & Talk	Black Board

UNIT IV : CHARACTERIZATION TECHNIQUES				
4.1	Microscopy-Atomic force microscope(AFM), scanning electronmicroscope(SEM)	3	Chalk & Talk	Black Board
4.2	Transmission electron microscope(TEM), scanning probe microscope(SPM), scanning tunelling microscope (STM)	2	Chalk & Talk	Black Board
4.3	Spectroscopy-UV-visible	2	Chalk & Talk	Black Board
4.4	Nuclear magnetic resonancespectroscopy	1	Chalk & Talk	Black Board
4.5	Raman spectroscopy	1	Chalk & Talk	Black Board
4.6	Photo electron spectroscopy.	1	Chalk & Talk	Black Board
4.8	Infra-red spectroscopy,	2	Chalk & Talk	Black Board
UNIT V : APPLICATIONS OF NANOMATERIALS				
5.1	Applications of optical nanosensors chemical nanosensors,	2	Chalk & Talk	Black Board

5.2	Electrochemical nanosensors,	1	Chalk & Talk	Black Board
5.3	Biosensors	1	Chalk & Talk	PPT & White board
5.4	micro-electro mechanical sensors,	1	Chalk & Talk	Black Board
5.5	platinum,palladium,silver,cobalt nanoparticles as nanocatalyst	2	Chalk & Talk	Black Board
5.6	CNTs and polymeric naomaterials as nanocatalyst	1	Chalk & Talk	Black Board
5.7	Nanomaterials in drug delivery,photodynamic therapy, molecular imaging	2	Chalk & Talk	PPT & White board
5.8	Cancer treatment,molecularmotors,neuro-electronic interfaces and tissue engineering	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %

Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✓ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Distinguish between bulk material and nanomaterials	K1, K2, K3 &K4	PSO1& PSO2
CO 2	Choose the suitable synythetic methodsto prepare particular nanomaterials	K1, K2, K3 &K4	PSO1& PSO3
CO 3	Interpret the structure of nanomaterialsusing various characterisation techniques	K1, K2, K3 &K4	PSO1&PSO6
CO 4	Catagorize and identify the different types Carbon nano structures	K1, K2, K3 &K4	PSO1& PSO3
CO 5	Summarise the uses of nanomaterials in various fields	K1, K2, K3 &K4	PSO3 & PSO6

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8

CO1	**3**	**3**	**2**	**1**	**1**	**1**	**1**	**1**
CO2	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**1**
CO3	**3**	**2**	**1**	**1**	**1**	**3**	**1**	**1**
CO4	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**
CO5	**2**	**1**	**3**	**1**	**1**	**3**	**1**	**1**

Mapping of C0s with POs

CO / PSO	**PO1**	**PO2**	**PO3**	**PO4**
CO1	**3**	**2**	**2**	**2**
CO2	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**3**	**3**
CO5	**3**	**2**	**2**	**3**

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. B.SUGANTHANA

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRY

SEMESTER –VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6CC17	ORGANIC CHEMISTRY – IV	Major Core	5	4

COURSE DESCRIPTION

This paper includes the topics, Polynuclear Hydrocarbons, Heterocyclic Compounds, Amino Acids and Proteins, Terpenes and Alkaloids.

COURSE OBJECTIVES

In this course the students are exposed to develop efficient, synthetic methods in organic chemistry. And to be familiar with properties and reactions of most important poly nuclear hydrocarbons, heterocyclic compounds, amino acids, peptides, proteins. And gain advanced knowledge and understanding in aspect of alkaloids and terpenes.

UNITS

UNIT I. POLY NUCLEAR HYDROCARBONS (15 Hrs.)

Structure of Naphthalene, aromaticity, preparation-Haworth and Fitting's synthesis. Chemical properties- reduction, oxidation, electrophilic substitution. Derivatives of naphthalene 1- Naphthol and 2- Naphthol – Preparation and chemical properties. 1-Naphthylamine and 2-Naphthylamine, Preparation- Bucherer reaction, and Chemical properties.

Structure of Anthracene, aromaticity, preparation- Fridel-Crafts reaction. Chemical properties- Electrophilic substitution, oxidation, reduction and Diels –Alder reaction. Preparation and property of 9,10- Anthraquinone.

Preparation- Pschorr and Haworth synthesis and properties of Phenanthrene.

Fused polynuclear heterocyclic systems- Quinoline and Isoquinoline- Preparation of quinoline –Skraup's and Friedlander's synthesis, Chemical properties of quinoline- electrophilic, nucleophilic substitution, oxidation, and reductions reactions. Preparation of isoquinoline –Bischler-Napieralski reaction, and chemical properties.

UNIT II. HETEROCYCLIC COMPOUNDS (15 Hrs.)

Introduction, numbering the position in heterocyclic compounds. Five membered heterocyclic compounds of pyrrole, furan, thiophene. Structure and aromaticity,general methods of preparations of pyrrole, furan, thiophene, Preparation of pyrrole (Knorr-pyrrole, Hanstzchsynthesis),Chemical properties of pyrrole, furan, thiophene- electrophilic substitution, reduction reactions, Kolbes-Schmitt reaction in pyrrole and Diels-Alder reaction of furan. Comparison of reactivity of furan, pyrrole and thiophene.

Six- membered heterocyclic compound – Pyridine- Structure aromaticity and basicity. Preparation and Chemical properties of pyridine- electrophilic, nucleophilic substitution and reduction reactions. Indole- preparation- Fischer's indole, Madelung, Reissert synthesis. Electrophilic substitution and reduction reactions. Five membered heterocyclic containing two hetero atoms: Pyrazole

UNIT III. AMINO ACIDS AND PROTEINS (15 Hrs.)

Amino acids – Classification based on chemical structure and on nutrition importance, methods of preparation- Perkin et al., Gabriel phthalimide, Strecker, Malonicester, The

Darapsky, and Erlenmeyer azalctone synthesis. Physical properties - Zwitterions and isoelectric points. Chemical properties- Reactions due to amino groups, Reactions due to carboxylic group and reactions due to both - NH_2 and – COOH groups.

Peptides and their synthesis- Use of protecting group in synthesis of polypeptides, protection of amino group, synthesis of peptide using

protected amino and carboxylic acid ends, and Merrifield solid phase polypeptide synthesis. End group Analysis - N- terminal - DNP, Dansyl methods and Edman's degradation. C- terminal- Carboxypeptidase and Kumpfs method. Secondary and Tertiary structure of proteins. Colour reactions of proteins.

UNIT IV.TERPENES **(15Hrs.)**

Introduction, Occurrence classification, Isolation, general properties, isoprene and special isoprene rule. Gem-dialkylerule. Structure, synthesis of Citral and Limonene.

UNIT V. ALKALOIDS (15Hrs.)

Definition, occurrence, extraction and general methods for determining the structure-functional nature of oxygen, Nitrogen, Herzigmayer and Kuhnroth method for estimation of C-methyl group.Degradation of alkaloids- Hofmann exhaustive methylation, Emde's degradation, Von Braun's.Reductive degradation, alkali fusion and oxidation. Structure and synthesis of Coniine, Piperine, Nicotine.

Text Books Unit I

,II andIII

1. I.L.Finar Organic Chemistry Vol II, 5thEdn, ELBS &Longmann group Ltd.
2. I.L FinarOrganic ChemistryVol. I –, 6thEdn., ELBS &Longmann group Ltd.
3. BhupinderMetha and Manjumetha – organic chemistry-Fifth printing Published by Asoke. K.Ghosh

Unit IV

1. GurdeepR.Chatwal Organic chemistry of Natural products Vol.II, 5thEdn, Himalaya publishing housePvt.ltd.

Unit V

1. Gurdeep .R.Chatwal Organic chemistry of Natural products Vol.I, 4thEdn, Himalaya publishing house Pvt.ltd.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I. POLY NUCLEAR HYDROCARBONS				
1.1	Structure of Naphthalene, aromaticity, preparation- Haworth and Fitting's synthesis.	2	Chalk & Talk	Black Board
1.2	Chemical properties- reduction, oxidation,electrophilic substitution. Derivatives of naphthalene 1- Naphthol and 2- Naphthol – Preparation andchemical properties.	1	Chalk & Talk	LCD
1.3	Preparation and chemical properties of 1-Naphthylamine and 2-Naphthylamine,Bucherer reaction, and Chemical properties. Naphthaquinone- Preparation and properties of 1, 2-Naphthaquinone	1	Lecture	Black Board
1.4	Preparation and properties of 1,4- Naphthaquinone and 2,6-Naphthaquinone, Naphthoic acids, Structure of Anthracene,	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	aromaticity, preparation- Fridel-Crafts reaction.Chemical properties- Electrophilic substitution.			

1.5	oxidation, reduction and Diels –Alder reaction. Preparation and property of 9,10-Anthraquinone. Preparation-Pschorr and Haworth synthesis and properties of Phenanthrene. Preparation andproperty and phenanthraquinone.	3	Lecture	Black Board
1.6	Preparation of quinoline – Skraup's and Friedlander's synthesis, Chemical properties of quinolone.	2	Lecture	Chalk and Talk
1.7	electrophilic,nucleophilic substitution, oxidation, and reductions reactions.	1	Lecture	PPT & White board
1.8	Preparation of isoquinoline – Bischler-Napieralski reaction, and chemical properties.	2	Discussion	Black Board
UNIT II. HETEROCYCLIC COMPOUNDS				**(12 Hrs)**
2.1	Introduction,numbering the position in heterocyclic compounds.	1	Lecture	Black Board
2.2	Structure and aromaticity,general methods of preparations ofpyrrole ,	3	Chalk & Talk	Green Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Preparation of pyrrole (Knorr-pyrrole, Hanstzchsyntesis),			

2.3	Structure and aromaticity,general methods of preparations offuran ,thiophene,	2	Chalk & Talk	Black Board
2.4	Chemical properties of pyrrole,furan, thiophene-electrophilic substitution,reduction reactions,	1	Lecture	PPT & White board
2.5	Kolbes-Schmitt reaction in pyrrole and Diels-Alder reaction of furan.Comparison of reactivity of furan, pyrrole and thiophene.	2	Lecture &Discussion	Black Board &LCD
2.6	Six- membered heterocyclic compound – Pyridine- Structure aromaticity and basicity.Preparation,	2	Lecture	Black Board
2.7	Chemical properties of pyridine- electrophilic, nucleophilic substitution and reduction reactions.Indole-preparation- Fischer's indole, Madelung, Reissert synthesis.Electrophilic substitution and reduction reactions.Five membered heterocyclics containing two hetero atoms: Pyrazole	4	Lecture	PPT &Black Board
UNIT III. AMINO ACIDS AND PROTEINS				
3.1	Amino acids – Classification based on chemical structure and on nutrition importance	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.2	Stereochemistry of amino acids - methods of preparation-Perkin et al., Gabriel phthalimide of amino acids.	2	Chalk & Talk	Black Board &LCD

3.3	Strecker, Malonicester, The Darapsky, and Erlenmeyer azalctone synthesis of amino acids.	2	Chalk & Talk	PPT & White Board
3.4	Physical properties - Zwitterions and isoelectric points. Chemical properties- Reactions due to amino groups	3	Chalk & Talk	Black Board
3.5	Reactions due to carboxylic group and reactions due to both $-NH_2$ and –COOH groups.	2	Chalk & Talk	Black Board &LCD
3.6	Use of protecting group in synthesis of polypetides, protection of amino group, synthesis of peptide using protected amino and carboxlic acid ends.	1	Lecture	Black Board
3.7	Merrifield solid phase polypeptide synthesis. End group Analysis - N- terminal - DNP, Dansyl methods and Edman's degradation.	2	Chalk & Talk	Black Board
3.8	C- terminal- Carboxypeptidase and Kumpfs method. Primary, Secondary and Tertiary structure of proteins. Colour reactions of proteins and denaturation of proteins – Fibrous & globular proteins	2	Lecture & Discussion	Black Board& LCD
UNIT -4 TERPENES				
4.1	Introduction, Occurrenc eclassification, Isolation.	2	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.2	general properties.	1	Chalk & Talk	Green Board
4.3	Isopreneand special isoprene rule. Gem-dialkylerule.Structure,synthesisof Citral,	3	Chalk & Talk	Black Board

4.4	Structure,synthesis of Limonene	2	Chalk & Talk	Black Board
4.5	Structure,synthesis of Limonene ,Camphor.	1	Chalk & Talk	Black Board
4.6	Structure,synthesis of Camphor.	1	Chalk & Talk Lecture	Black Board
4.7	Structure,synthesis of Camphor, Zingiberene.	3	Chalk & Talk Lecture	PPT & White board
4.8	Structure,synthesis of Zingiberene.	2	Chalk & Talk Lecture	Black Board
UNIT -5 ALKALOIDS				
5.1	Definition, occurrence	1	Lecture	Black Board
5.2	extraction and general methods for determining the structure-functional nature of oxygen, Nitrogen.	2	Chalk & Talk	Green Board
5.3	Herzigmayer and Kuhnroth method for estimation of C-methyl group.	3	Chalk & Talk	Black Board
5.4	Degradation of alkaloids-Hofmannexhaustive methylation,Emde's degradation, Von Braun's.	2	Chalk & Talk	White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.5	Reductive degradation,alkali fusion and oxidation.	2	Discussion	LCD
5.6	Structure and synthesis of Coniine.	1	Chalk & Talk Lecture	Black Board
5.7	Structure and synthesis of Piperine, Nicotine.	2	Chalk & Talk	White board

5.8	Structure and synthesis of Quinine.	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To develop novel, efficient, convenient, selective synthetic methods in organic chemistry.	K1	PSO1& PSO2

CO 2	To get familiar with particular properties and reactions for the most important heterocyclic as well as different systems of nomenclature.	K1, K2	PSO3

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	**3**	**3**	**1**	**1**	**1**	**1**	**2**	**1**
CO2	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**1**
CO3	**3**	**3**	**2**	**1**	**2**	**2**	**2**	**1**
CO4	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**1**

CO 3	To fully comprehend the chemistry of amino acids, peptides, proteins.	K1 & K3	PSO5
CO 4	To provide an advanced understanding of the core principles and topics of chemistry of natural products.	K1, K2 & K3	PSO1
CO 5	To demonstrate advanced knowledgeand understanding in aspect of alkaloids.	K2 & K4	PSO1

apping of C0s with POs

CO / PSO	PO1	PO2	PO3	PO4
CO 1	**3**	**3**	**2**	**2**
CO	**3**	**3**	**1**	**1**

2				
CO 3	**3**	**3**	**1**	**2**
CO 4	**3**	**3**	**1**	**2**
CO 5	**3**	**3**	**2**	**1**

Note: Strongly Correlated – **3** Moderately Correlated – **2**
Weakly Correlated **-1**

COURSE DESIGNER:
Dr.Sr.ArulMary.J

Forwarded By

HOD'S Signature
& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc chemistry.SEMESTER –VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSETITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	**19C6CC18**	**Physical chemistry-IV (ELECTROLYTIC CONDUCTANCE AND ELECTROCHEMISTRY)**	**UG Core**	**5**	**4**

COURSE DESCRIPTION

This course gives a detailed study of electrochemistry & photochemistry

UNIT –I ELECTROLYTIC CONDUCTANCE (15 HRS.)

a) Electrolytic Conductance –specific and equivalent conductance and their determination – effect of temperature, pressure, concentration, solvents and viscosity on conductance. Effect of dilution on specific and equivalent conductance.

b) Migration of ions – transport number and their determinations – Kohlrausch's law of ionic mobility and their application – absolute velocities of ions and their determination.

c) Theories of electrolytic dissociation – Grotthus theory- Arrhenius theory of electrolytic dissociation – defects of the theory – strong and weak electrolytes -Debye Huckel theory – Onsagar's equation.

d) Application of conductivity measurements – determination of degree of dissociation , solubility of a sparingly soluble salt , degree of hydrolysis&ionic product of water. Conductivity titrations-acid-base and precipitation titrations –.

SELF STUDY: Ohm's law, Faraday's law of electrolysis

UNIT –II IONIC EQUILIBRIUM

(15HRS.)

Acids and bases.(Different concepts just mention) – dissociation of weak acids and bases, Dissociation constants of weak acid and base, relative strengths of weak acid and bases -ionic product of water, pH scale, common ion effect-Buffer solutions-mechanism of Buffer action-calculation of pH ofBuffer mixtures.

Hydrolysis of salts-salts of strong acid and strong base, weak acid and strong base, strong acid and weak base and weak acid and weak base-Hydrolysis constants, Kh-. Indicators- Theory of acid –base indicators-Solubility product and its applications.

SELF STUDY: Acids and bases.(Different concepts)

UNIT –III ELECTRO CHEMISTRY - I (15HRS)

Galvanic cells and EMF – electrode reactions – electrode potentials and cell reactions – representations of electrodes – sign conventions , electrochemical series– measurements of EMF.

Thermodynamics of the reactions in a galvanic cells – Relation between EMF and ⊗G, ⊗H, ⊗S electrode potentials – different types of electrode potentials – thermodynamics of reversible cells and reversible electrodes – EMF and equilibrium constant – Nernst equation – Standard electrode potential – electrochemical series – EMF of galvanic cells – the cell reactions – concentration cell – activity co-efficient- determination of activity by solubility.

SELF STUDY: redox indicators

UNIT –IV ELECTRO CHEMISTRY - II (15 HRS.)

Application of EMF measurements- determination of pH using quinhydrone and glass electrode - determination of transport number,

solubility of sparingly soluble salt, degree of hydrolysis, ionic product of water- acid – base, oxidation – reduction and precipitation titration potentiometrically – free energy and EMF. Determination of the valency of an ion.

Polarisation – over voltage – decomposition potential and deposition potential- storage battery- Lead –acid battery, dry cells and fuel cells – electrochemical principles of corrosion and passivity – polarography –limiting diffusion current.

SELF STUDY: half wave potential

UNIT–V PHOTO CHEMISTRY: (15 HRS.)

Introduction - Laws of photo chemistry – Beer – Lamberts law, Grotthus Draper law and Stark Einstein law, Quantum efficiency and determination, Consequences of light absorption by atoms and molecules (Jablonsky diagram), Comparison between thermal and photochemical reactions.

Kinetics of photochemical reactions:

Gaseous reactions: Hydrogen – Halogen reaction (HCl, HBr and HI). Photolysis of ammonia and formation of $COCl_2$.

Reactions of liquid phase (in solution): Isomeric transformation of maleic to fumaric acid, polymerization of Anthracene.

Photochemical equilibrium – flash photolysis, photosensitization, chemiluminescenceBiological application – Photosynthesis.

Radiation Chemistry – photolysis of

waterSELF STUDY: Hazards of radiation.

REFERENCES:

Text Book:

1. The principles of Physical chemistry by Puri, Sharma and Pathania.

Reference Book:

2. Introduction to Electrochemistry By Samuel Glasstone

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	UNIT -1 TITLE			
1.1	Electrolytic Conductance specific and equivalent conductance and their determination.	1	Chalk & Talk	Black Board
1.2	Effect of temperature, pressure, concentration, solvents and viscosity on conductance. Effect of dilution on specific and equivalent conductance.	1	Chalk & Talk	LCD
1.3	Migration of ions – transport number and their determinations –	4	Lecture	PPT & White board
1.4	Kohlrausch's law of ionic mobility and their application – absolute velocities of ions and their determination.	1	Lecture	Smart Board
1.5	Theories of electrolytic dissociation – Grotthus theory-Arrhenius theory of electrolytic dissociation – defects of the theory – strong and weak electrolytes -.	1	Lecture	Black Board
1.6	Debye Huckel theory – Onsagar's equation	2	Discussion	Google classroom
1.7	Application of conductivity measurements – determination of degree of dissociation , solubility of a sparingly soluble salt , degree of hydrolysis	2	Specimen	Microscope
1.8	Ionic product of water, Conductivity titrations-acid-base and precipitation titrations –.	2	Discussion	Black Board

UNIT -2	**IONIC EQUILIBRIUM**			
2.1	Acids and bases. (Different concepts just mention) – dissociation of weak acids and bases, Dissociation constants of weak acid and base, relative strengths of weak acid and bases	3	Lecture	Green Board Charts
2.2	Ionic product of water, pH scale, common ion effect-Buffer solutions-mechanism of Buffer action-calculation of pH of Buffer mixtures.	3	Chalk & Talk	Green Board
2.3	Hydrolysis of salts of strong acid and strong base, weak acid and strong base,	3	Chalk &Talk	Black Board
2.4	Strong acid and weak base andweak acid and weak base- Hydrolysis constants, Kh- Solubility product and its applications.	3	Chalk &Talk	Black Board
2.5	Indicators- Theory of acid – baseindicators-	3	Chalk &Talk	Black Board
UNIT- 3	**ELECTRO CHEMISTRY – I**			
3.1	Galvanic cells – electrode reactions – electrode potentials and half cell reactions – representations of electrodes – –.	3	Chalk &Talk	Black Board
3.2	Different types of electrode potentials – thermodynamics of reversible cells and reversible electrodes – EMF and	3	Chalk &Talk	Black Board

	equilibrium constant – Nernst equation – Standard electrode potential – electrochemical series.			
3.3	Thermodynamics of the reactions in a galvanic cells – Relation between EMF and ⊗G, ⊗H, ⊗S electrode potentials –	3	Chalk &Talk	Black Board
3.4	EMF of galvanic cells – the cellreactions –––	3	Chalk &Talk	Black Board
3.5	Concentration cells activity co-efficient- determination of activity by solubility& redox indicators	3	Chalk &Talk	Black Board
UNIT- 4	**ELECTRO CHEMISTRY – II**			
4.1	Application of EMF measurements- determination of pH using quinhydrone and glass electrode -- free energy and EMF. Determination of the valency of an ion.	3	Chalk &Talk	Black Board
4.2	Determination of transport number, solubility of sparingly soluble salt, degree of hydrolysis,ionic product of water-	3	Chalk &Talk	Black Board
4.3	Acid – base, oxidation – reduction and precipitation titration potentiometrically	3	Chalk &Talk	Black Board
4.4	Storage battery- Lead –acid battery, dry cells and fuel cells –	3	Chalk &Talk	Black Board
4.5	Polarisation – over voltage – decomposition potential and deposition potential-	3	Chalk &Talk	Black Board

	electrochemical principles ofcorrosion and passivity – polarography – half wave potential, limiting diffusion current.			
UNIT-5	**PHOTO CHEMISTRY**			
5.1	Introduction - Laws of photo chemistry – Beer – Lamberts law, Grotthus Draper law and Stark Einstein law,.	3	Chalk &Talk	Black Board
5.2	Quantum efficiency and determination, Consequences oflight absorption by atoms and molecules (Jablonsky diagram), Comparison between thermal and photochemical reactions	3	Chalk &Talk	Black Board
5.3	Kinetics of photochemical reactions: Gaseous reactions: Hydrogen – Halogen reaction (HCl, HBr and HI). Photolysis of ammonia and formation of $COCl_2$.	3	Chalk &Talk	Black Board
5.4	Reactions of liquid phase (in solution): Isomeric transformation of maleic to fumaric acid, polymerization of Anthracene.	3	Chalk &Talk	Black Board
5.5	Photochemical equilibrium – flash photolysis, photosensitization, chemiluminescenceBiological application – Photosynthesis. Radiation Chemistry – photolysis of water, Hazards of radiation.	3	Chalk &Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session-wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non Scholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

✔All the course outcomes are to be assessed in the various CIA components.

✔**The levels of CIA Assessment based on Revised Bloom's Taxonomy**

for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

✔The I UG course teachers are requested to start conducting S1, W1, M1,

in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED

CO 1	Understand the different types of condutances and their relations andthe effect of dilution	K1	PSO1& PSO2
CO 2	Apply the conductance measurementto calculate degree of dissociation , ionic product etc… and to estimate the unknown concentration using conductivity titrations	K1, K2,	PSO3
CO 3	Use Nernst equation to calculate the electrode potential and emf of electrochemical cells	K1 & K3	PSO5
CO 4	Study the applications of electrochemical measurements	K1, K2, K3 &	PSO3
CO 5	Understand the basics of photochemistry using laws of photochemistry and Jablonsky diagram Derive the rate constants of certain photochemical reactions	K2 & K4	PSO2

Mapping of C0s with PSOs

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	2	2	3	1	2	1	2	1
CO5	1	3	1	2	2	2	2	1

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

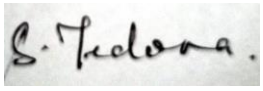
Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:
1.Dr. B. Medona 2.Dr. P.

Silviya Reeta

Forwarded By



(Dr. B. Medona)

HOD'S Signature & Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRYSEMESTER –VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6ME3	ADVANCED ORGANIC CHEMISTRY	UG Core	5	5

COURSE DESCRIPTION

The course is offered to expose the advanced topics in the field of organicchemistry.

COURSE OBJECTIVES

This course helps the students to acquire a thorough knowledge of the advanced topics of organic chemistry related to conformational analysis of cyclohexanes, Photochemistry and molecular rearrangements.

UNIT –I CONFORMATIONAL ANALYSIS- I (15 HRS.)

Stereoisomerism of ring systems- number and kind of stereoisomers- cyclopropane, cyclobutane, cyclopentane and cyclohexane. Conformations of ethane and n-butane-conformational energy diagram. Conformation of mono substituted cyclohexane-stability and optical activity-conformation of disubstitutedcyclohexanes-stability and optical activity and decalins their stability and optical activity.

UNIT –II CONFORMATIONAL ANALYSIS- II (15 HRS.)

Conformation and physical properties, and conformation and chemical reactivity-S_N1, S_N2, ionic eliminations, rearrangements,

NGP, epoxide ring closure and ring opening reactions, addition to cyclohexene derivatives, pyrolysis of acetates, xanthates and amine oxides.

UNIT –III ORGANIC PHOTOCHEMISTRY (15 HRS.)

Organic photochemistry –Photochemical Elimination in carbonyl compounds and nitrites- Norrish type-I & Norrish type-II, Barton reaction. Photochemical reduction, oxidation and cis-trans isomerisation, Intermolecular cycloaddition (2π +2π) & (4π +2π) cycloadditions, supara and antara overlap-FMO approach, and electrocyclic reactions- 4n & 4n+2 systems. Conrotation, disrotation. FMO approach to predict stereochemistry.

UNIT –IV MOLECULAR REARRANGEMENTS-I (15 HRS.)

Mechanism of Pinacol-Pinacolone, Wagner-Meerwin, Hoffman and benzilic acid rearrangement. – Stevens rearrangements. Aromatic rearrangements – Claisen, Benzidine and Fries rearrangement.

UNIT –V MOLECULAR REARRANGEMENTS –II & Reagents (15 HRS.)

Favorski, Baeyer Villiger, Cope, Curtius and Beckmann rearrangements, Synthetic importance of N – Bromosuccinimide, Osmium tetroxide, Selenium dioxide, PyridiniumChloro Chromite, Lithium Aluminium Hydride and Sodium Boro Hydride.

REFERENCES:

1. Eliel- Stereochemistry of carbon compounds, Tata Mc-Graw Hill Edn, 1995.

2. Dr.P. Ramesh, Basic principles of Organic Stereochemistry, First Edn,Meenu Publications.

3. Morrison & Boyd, -Organic chemistry , 6th Edn, Prentice-hall of India pvt,Ltd, 2005.

4. Jagdamba Singh, Photochemistry and Pericyclic

Reactions, New ageinternational publishers, 2009.

5.I.L.Finar, Vol-I, Organic Chemistry, sixth Edn., ELBS & Longmann groupLtd.

6.V.K.Ahluwalia & R.K.Prashar, Organic Reaction Mechanism, First Edn,2002, Narosa publishing House.

7. K. K. Rohatgi-Mukherjee, fundamentals of photochemistry, New ageinternational publishers, 2006.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 CONFORMATIONAL ANALYSIS-I				
1.1	Stereoisomerism of ring systems-number and kind of stereoisomers - cyclopropane, cyclobutane, cyclopentane and cyclohexane.	2	Chalk & Talk	Black Board
1.2	Conformations of ethane	1	Chalk & Talk	LCD
1.3	Conformations of n-butane-conformational energy diagram	1	Lecture	Ball & Stick Models
1.4	Conformation of mono substituted cyclohexane-stabilityand optical activity	3	Lecture	Black Board

1.5	conformation of disubstituted cyclohexanes stability	3	Lecture	Ball & Stick Models
1.6	conformation of disubstituted cyclohexanes optical activity	2	Lecture	Ball & Stick Models
1.7	decalins their stability	1	Lecture	PPT & White board
1.8	Decalins optical activity.	2	Discussion	Black Board
UNIT - 2	**CONFORMATIONAL ANALYSIS- II**			
2.1	Conformation and physicalproperties	1	Lecture	Black Board
2.2	conformation and chemicalreactivity	2	Chalk & Talk	Green Board
2.3	S_N1, S_N2, ionic eliminations	2	Chalk & Talk	Black Board
2.4	Rearrangements, NGP	3	Lecture	PPT & White board
2.5	Epoxide ring closure and ringopening reactions	2	Discussion	LCD
2.6	Addition to cyclohexene derivatives	1	Lecture	Black Board
2.7	Pyrolysis of acetates	2	Lecture	PPT & White board
2.8	Pyrolysis of xanthates and amineoxides	2	Lecture	Black Board
UNIT - 3	**ORGANIC PHOTOCHEMISTRY**			
3.1	Organic photochemistry – Photochemical Elimination in carbonyl compounds and nitrites	2	Lecture	Black Board
3.2	Norrish type-I & Norrish type-II,Barton reaction	3	Discussion	LCD

3.3	Photochemical reduction, oxidation and cis-trans isomerisation	3	Lecture	PPT & Whit e Board
3.4	Intermolecular cycloaddition (2π +2π) & (4π +2π) cycloadditions	2	Lecture	Black Board
3.5	supara and antara overlap-FMOapproach	1	Discussio n	LC D
3.6	electrocyclic reactions- 4n &4n+2 systems	2	Lecture	Black Board
3.7	Conrotation, disroattion	1	Lecture	Black Board
3.8	FMO approach to predict stereochemistry	1	Lecture	Black Board
UNIT - 4	**MOLECULAR REARRANGEMENTS-I**			
4.1	Rearrangement to electron deficient atom or nucleophilic rearrangements	1	Lecture	Black Board
4.2	Mechanism of Pinacol-Pinacolone rearrangement	3	Chalk & Talk	Gree n Board
4.3	Mechanism of Wagner-Meerwin rearrangement	2	Chalk & Talk	Black Board
4.4	Mechanism of Hoffman and benzilic acid rearrangements	3	Lecture	PPT & White board
4.5	Rearrangements to electron richatom or electrophilic rearrangements	1	Discussio n	LC D
4.6	Mechanism of Stevens rearrangement	1	Lecture	Black Board
4.7	Aromatic rearrangements –Mechanism of Claisen rearrangement	2	Lecture	PPT & White board
4.8	Mechanism of Benzidine and Fries rearrangements.	2	Lecture	Black Board
UNIT - 5	**MOLECULAR REARRANGEMENTS-I I**			
5.1	Favorski rearrangement	2	Lecture	Black Board
5.2	Baeyer Villiger rearrangement	2	Chalk &	Gree n

			Talk	Board
5.3	Cope and Curtius rearrangements	3	Chalk & Talk	Black Board
5.4	Beckmann rearrangement	1	Lecture	PPT & White board
5.5	Synthetic importance of N – Bromosuccinimide and Osmiumtetroxide	2	Discussion	LCD
5.6	Synthetic importance ofSelenium dioxide	1	Lecture	Black Board
5.7	Synthetic importance ofPyridinium Chloro Chromite	2	Lecture	PPT & White board
5.8	Synthetic importance of Lithium Aluminium Hydride and Sodium Boro Hydride	2	Lecture	Black Board

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session-wise Average 5 Mks.	**Better of W1, W2 5 Mks**	**M1+M2 5+5=10 Mks.**	**MID-SEM TEST 15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %

Non Scholastic	**-**	**-**	**-**	**-**		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

Scholastic **35**

Non Scholastic **5**

40

✔**All the course outcomes are to be assessed in the various CIA components.**

✔The levels of CIA Assessment based on Revised Bloom's Taxonomy **for :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To interpret the concept of conformations of acyclic and cyclic alkanes and to discuss mono and disubstituted cyclohexanes.	K1, K2, K3 &K4	PSO1& PSO2
CO 2	To explore reactivity patterns of cyclohexanes and to employ conformational reactivity in cis and trans decalins.	K1, K2, K3 &K4	PSO2 &PSO3
CO 3	To sketch Frontier molecular orbitals in photochemistry and to dramatize photochemical and electrocyclic reactions	K1, K2, K3 &K4	PSO3 &PS05
CO 4	To differentiate the molecular rearrangements and to solve the simple problems	K1, K2, K3 &K4	PS03&PS05
CO 5	To prepare the various organic reagents and to recall its synthetic importance and to categorize the reducing and oxidizing agents and its applications.	K1, K2, K3 &K4	PS05 &PSO7

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	1	1	1	1	1
CO2	2	3	3	1	1	1	1	1

CO3	**2**	**2**	**3**	**1**	**3**	**1**	**1**	**1**
CO4	**2**	**1**	**3**	**1**	**3**	**1**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**3**	**1**	**3**	**1**

Mapping of C0s with POs

CO / PSO	PO1	PO2	PO3	PO4
CO1	**3**	**2**	**2**	**2**
CO2	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**3**	**3**
CO5	**3**	**2**	**2**	**3**

Note: ♦ Strongly Correlated – **3** ♦ ModeratelyCorrelated – **2**
♦ WeaklyCorrelated **-1**

COURSE DESIGNER:

1.Dr.M.Priyadharsani

2.Dr.B.Vinosha Forwarded By

HoD Signature

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

B.Sc-Chemistry VI SEMESTER

POLYMER CHEMISTRY- 19C6ME4

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6ME4	POLYMER CHEMISTRY	Elective	5	5

COURSE DESCRIPTION

This course will focus on importance of polymers and application

COURSE OBJECTIVES

In this course the students are exposed to various polymer studies and the techniques that are used in their preparation and properties.

UNIT I INTRODCUTION

UNIT II CONDENSATION

POLYMERIZATION

UNIT III ADDITION POLYMERIZATION

UNIT IV COPOLYMERIZATION

UNIT V APPLICATIONS

UNIT I. - INTRODUCTION **(15Hrs)**

Historical introduction – Natural and synthetic polymer – Polymerization –Forms of polymers – Co-polymerization.

UNIT II - CONDENSATION POLYMERIZATION: **(15Hrs)**

Introduction – Types of condensation polymer – kinetic of linear condensationpolymerization – Somelinear condensation polymers – Three – dimensional polymers – Inorganic polymers – Ring opening polymerization.

UNIT III.- ADDITION POLYMERIZATION: **(15Hrs)**

Introduction – Addition polymerization – Inhibition and retardation – Variouspolymerization techniques – Ionic addition polymerization – Coordination polymerization – Some addition polymers-Ion exchange resing – Condensation polymerization versus addition polymerization.

UNIT IV. -CO-POLYMERIZATION **(15Hrs)**

Introduction, Co-polymerization composition equation - Block and graft co-polymers – Polymer blends – Step co-polymerization – Some important co-polymer.

UNIT V. APPLICATIONS **(15Hrs)**

(A) Elastomeric materials – introduction – structure property relationshipsin polymers, natural rubber, raw rubber – vulcanization of rubber – synthetic rubber buna rubber – buna rubber S(Sbr, Grs)rubber, neoprene rubber (Gr-M), Thiokol, poly butanes and butyl rubbers.

(B) Fiber – forming polymers – rayon's proteins nylons – polyesters – vinyls –spinning

(C) Fabrication of polymers – moulding of thermosetting resins, mouldingof thermoplastics, extrusion moulding, casting of films – calendaring.

(D) Naturally occurring polymer:

Cellulose, starch, lignin, proteins, nucleic acids.

TEXT BOOK:

Introductory Polymer Chemistry – G.S. Misra

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -I				
1.1	Historical introduction –	3	Chalk & Talk	Black Board
1.2	Natural and synthetic polymer –	3	Chalk & Talk	LCD
1.3	Polymerization –	3	Lecture	Black Board
1.4	Forms of polymers	3	Lecture	Black Board
1.5	– Co- polymerization	3	Lecture	Black Board
UNIT - II				
2.1	Introduction –	3	Lecture	Black Board
2.2	Types of condensation polymer – kinetic of linear condensation polymerization	3	Chalk & Talk	Green Board
2.3	– Somelinear condensation polymers –	3	Chalk & Talk	Black Board
2.4	Three – dimensional polymers –	3	Lecture	PPT & White board
2.5	Inorganic polymers – Ring opening polymerization	2	Discussion	LCD
UNIT -				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids

3.1	Introduction –	2	Lecture	Black Board
3.2	Addition polymerization – Inhibition and retardation – Various polymerization techniques	3	Discussion	LCD
3.3	– Ionic addition polymerization – Coordination polymerization – Some addition	3	Lecture	PPT & White Board
3.4	polymers-Ion exchange resing –	3	Lecture	Black Board
3.5	Condensation polymerizatio nversus addition polymerization	3	Discussion	LCD
UNIT -				
4.1	Co-polymerization	3	Lecture	Black Board
4.2	composition equation	3	Chalk & Talk	Green Board
4.3	- Block and graft co-polymers –	3	Chalk & Talk	Black Board
4.4	Polymer blends –	3	Lecture	PPT & White board
4.5	Step co-polymerization – Some important	3	Discussion	LCD
UNIT -5				
5.1	Elastomeric materials – introduction – structure property relationships in polymers, natural rubber, raw rubber – vulcanization of rubber	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids

5.2	buna rubber – buna rubber S(Sbr, Grs)rubber, neoprene rubber (Gr-M), Thiokol, poly butanes and butyl rubbers	3	Chalk & Talk	Green Board
5.3	Fiber – forming polymers – rayon's proteins nylons – polyesters – vinyls – spinning	3	Chalk & Talk	Black Board
5.4	Naturally occurring polymer:	3	Lecture	PPT & White board
5.5	Cellulose, starch, lignin,proteins, nucleic acids.	3	Discussion	LCD

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %

Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non – Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Able to understand Polymerization – Forms of polymers – Co- polymerization.	K1, K2,K3 &K4	PSO1& PSO2
CO 2	To gain knowledge theTypes of polymers- addition	K1, K2,K3 &K4	PSO3
CO 3	To gain knowledge theTypes of polymers- condensation	K1, K2,K3 &K4	PSO5
CO 4	To understand the properties of copolymerisation	K1, K2,K3&K4	PSO3
CO 5	Learn about application	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	2	2	1	1	2	3	2	1

CO5	**1**	**2**	**1**	**2**	**2**	**2**	**3**	**1**

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4
CO1	**3**	**2**	**1**	**1**
CO2	**2**	**3**	**1**	**1**
CO3	**3**	**2**	**1**	**1**
CO4	**2**	**3**	**1**	**1**
CO5	**3**	**2**	**1**	**1**

Note: Strongly Correlated – **3** Moderately Correlated – **2**
♦ WeaklyCorrelated **-1**

COURSE DESIGNER

1. **Dr.M.Priyadharsani**
2. **Dr.V.Aruldeep**

aForwarded By

S-Tedona.

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRY

SEMESTER –VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6ME5	ADVANCED PHYSICAL CHEMISTRY (QUANTUM MECHANICS, PHYSICAL SPECTROSCOPY AND MACROMOLECULES)	Lecture	5	5

COURSE DESCRIPTION

This course helps the students to acquire a thorough knowledge of the basics of physical chemistry related to quantum mechanics spectroscopy, and macromolecules.

COURSE OBJECTIVES

The course is offered to expose the advanced topics in the field of physical chemistry.

UNITS

UNIT –I QUANTUM MECHANICS I (15 HRS.)

Operator algebra- Linear operators, commutation of operator. Hamiltonian operators, Expressions for operators- Postulates of quantum mechanics. The Schrödinger time independent wave equation- Eigen values and Eigen functions- significance of wave function - statistical interpretation of & ^{2}. Solutions of Schrödinger equation for simple systems, particle in one-dimensional and three – dimensional box, rigid rotator and hydrogen atom (discussion of results only-

problems). Quantum numbers- probability distribution curves.

UNIT –II QUANTUM MECHANICS II (15 HRS.)

Application of quantum mechanics to multi electron system – Approximation methods – variation and perturbation methods (elementary idea) – application of variation method to helium atom, symmetric and antisymmetric wave function, Pauli's exclusion principle.

UNIT –III SPECTROSCOPY-I (15 HRS.)

Introduction to molecular spectroscopy,

Rotational spectroscopy (micro wave) spectra of diatomic molecules.Relativeintensities of rotational spectral lines and application.

Vibrational spectra (IR) spectra of diatomic molecules, Rotational – Vibrational spectra of diatomic molecules, Vibrational spectra of polyatomic molecules.

Raman Spectroscopy – Selection rules, rotation vibration – Ramanspectrum, mutual exclusion principle.

UNIT –IV SPECTROSCOPY-II (15 HRS.)

Electronic spectroscopy- Introduction- various transitions –Frank Condon principle

Nuclear Magnetic Resonance Spectroscop-nmr equation – Larmor frequency- chemical shift- simple problems

Electron Spin Resonance Spectroscopy.- ESR spectrum of of an unpaired electron- Hyperfine structure in ESR spectra- Hydrogen atom,methyl radical,1,4- Benzosemiquinone radical anion, Naphthalene and anthracene negative ion, triphenylmethyl free radical,g factor- Applications

UNIT –V MACROMOLECULES (15 HRS.)

Types of macro molecules, classification of polymers, properties of polymers. Molecular weight of polymers – number average and weight

average molecularweight , determination of molecular weight – osmotic pressure method, sedimentation velocity method and viscosity method, kinetics of free radical polymerization.

REFERENCES:

1. V:Puri, Sharma and Pathania., Principles of physical chemistry , 3rdEdn, Vishal publishing Company.
2. A.K. Chandra -Quantum Mechanics, 4thEdn, tataMc-Graw hill, 1994 &B.K.Sen -Quantum Mechanics , Tata Mc-Graw Hill 2nd reprint 1995.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 QUANTUM MECHANICS-I				
1.1	Operator algebra- Linear operators, commutation of operator.	2	Chalk & Talk	Black Board
1.2	Hamiltonian operators, Expressions for operators- Postulates of quantum mechanics. The Schrödinger time independent wave equation	1	Chalk & Talk	LCD
1.3	Eigen values and Eigen functions- significance of wave function y	2	Lecture	Ball & Stick Models

1.4	Statistical interpretation ofy&y^2.	3	Lecture	Black Board
1.5	Solutions of Schrödinger equation for simple systems	3	Lecture	Ball & Stick Models
1.6	particle in one-dimensionaland three – dimensional box,	3	Lecture	Ball & Stick Models
1.7	rigid rotator and hydrogen atom (discussion of results only- problems).	2	Lecture	PPT & White board
1.8	Quantum numbers-probability distribution curves.	2	Discussion	Black Board
UNIT - 2	**QUANTUM MECHANICS-II**			
2.1	Application of quantum mechanics to multi electron system	1	Lecture	Black Board
2.2	Approximation methods	2	Chalk & Talk	Green Board
2.3	variation methods(elementary idea)	2	Chalk & Talk	Black Board
2.4	perturbation methods(elementary idea)	3	Lecture	PPT & White board
2.5	variation and perturbation methods (elementary idea)	2	Discussion	LCD

2.6	application of variation method to helium atom	1	Lecture	Black Board
2.7	symmetric and antisymmetric wave function	2	Lecture	PPT & White board
2.8	Pauli's exclusion principle.	2	Lecture	Black Board
UNIT -3 SPECTROSCOPY-I				
3.1	Introduction to molecular spectroscopy	2	Lecture	Black Board
3.2	Rotational spectroscopy (micro wave) spectra of diatomic molecules.Relative intensities of rotational spectral lines and application.	3	Discussio n	LC D
3.3	Vibrational spectra (IR) spectra of diatomic molecules	3	Lecture	PPT & Whit e Board
3.4	Rotational – Vibrational spectra of diatomic molecules	2	Lecture	Black Board
3.5	Vibrational spectra ofpolyatomic molecules.	1	Discussio n	LC D
3.6	Raman Spectroscopy – Selection rules	2	Lecture	Black Board

3.7	rotation vibration	1	Lecture	Black Board
3.8	Raman spectrum, mutualexclusion principle	1	Lecture	Black Board
UNIT -4 SPECTROSCOPY-II				
4.1	Electronic spectroscopy-Introduction- various transitions –Frank Condon principle	1	Lecture	Black Board
4.2	Nuclear Magnetic ResonanceSpectroscop-nmr equation	3	Chalk & Talk	Gree n Board
4.3	Larmor frequency- chemical shift- simple problems	2	Chalk & Talk	Black Board
4.4	Electron Spin Resonance Spectroscopy.- ESR spectrum of of an unpaired electron	3	Lecture	PPT & White board
4.5	Hyperfine structure in ESR spectra	1	Discussio n	LCD
4.6	Hydrogen atom, methylradical	1	Lecture	Black Board
4.7	1,4- Benzosemiquinon eradical anion	2	Lecture	PPT & White board

4.8	Naphthalene and anthracenenegative ion , triphenylmethyl free radical,gfactor-Applications	2	Lecture	Black Board
UNIT -5 MACROMOLECULES				
5.1	Types of macro molecules, classification of polymers	2	Lecture	Black Board
5.2	properties of polymers. Molecular weight of polymers	2	Chalk & Talk	Green Board
5.3	number average and weight average molecular weight	3	Chalk & Talk	Black Board
5.4	determination of molecular weight	1	Lecture	PPT & White board
5.5	osmotic pressure method	2	Discussion	LCD
5.6	sedimentation velocity method	1	Lecture	Black Board
5.7	viscosity method	2	Lecture	PPT & White board
5.8	kinetics of free radical polymerization	2	Lecture	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session -wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non Scholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

- ✓ All the course outcomes are to be assessed in the various CIA components.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for** I PG are :

K2-*Understand,* ***K3-****Apply,* ***K4-****Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To know the evolution of quantum mechanics and to know about the postulates and operators	K1	PSO1& PSO2
CO 2	Devise the Schrodinger equation for systems like particle in 1D and3D box, rigid rotor,hydrogen and helium and discuss the results	K1, K2	PSO3
CO 3	Understand the theories behind the spectral techniques like MW.IR,NMR and ESR	K1 & K3	PSO5
CO 4	Study the applications of the above techniques to elucidate the structures of molecules	K1, K2 & K3	PSO3
CO 5	Study some of the basic terminologies in polymers To learn about the different polymerization reactions	K2 & K4	PSO4

Mapping of C0s with PSOs

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	3	1	3	1	1	1	1	1	1
CO2	2	1	2	1	1	1	1	1	1
CO3	2	1	2	1	1	1	1	1	1
CO4	2	1	2	1	1	1	1	1	1
CO5	2	1	1	1	1	1	1	1	1

Mapping of C0s with POs

CO / PSO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	2	3	2	2
CO3	2	2	3	2
CO4	3	2	2	2
CO5	3	2	2	2

Note: Strongly Correlated – **3** Moderately Correlated – **2**

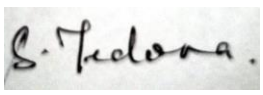
♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr. B. Medona

1. Dr. P. Silviya Reeta

Forwarded By



(Dr. B. Medona)

HOD'S Signature & Name

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

B.Sc-Chemistry-VI SEMESTER

ADVANCED INORGANIC CHEMISTRY-19C6ME6

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6ME6	ADVANCED INORGANIC CHEMISTRY	Lecture	5	5

COURSE DESCRIPTION

This course helps the students to acquire a thorough knowledgeof the basics of Bioinorganic chemistry and inorganic polymers

COURSE OBJECTIVES

The course is offered to expose the advanced topics in the field ofbio inorganic chemistry

UNIT I. - BIOINORGANIC CHEMISTRY-I **(15HRS)**

UNIT II - BIOINORGANIC CHEMISTRY-II (15RS)

UNIT III.-INORGANIC PHOTOCHEMISTRY **(15HRS)**

UNIT IV- ANALYTICAL CHEMISTRY (15HRS)

UNIT V - INORGANIC POLYMERS **(15HRS)**

UNIT I. - BIOINORGANIC CHEMISTRY-I: (15HRS)

Structure and function of chlorophyll – Role of Mg2+ ion – Structure and function of Haemoglobin – Cooperative effect in Haemoglobin – Role of Globin –Structure and function ofMyoglobin – Structure and function of Cytochrome C.

UNIT II - BIOINORGANIC CHEMISTRY-II: (15HRS)

Structure and function of Blue copper proteins – Structure and function of Vitamin B12 - Invivo nitrogen fixation – Fe-S proteins – Ionophores – Ion transport mechanism in cell membrane –Na-K pump. Role of metal ions in DNA replication.

UNIT III.-INORGANIC PHOTOCHEMISTRY: (15HRS)

Types of electronic transitions in transition metal complexes – Photo chemistry of transition metal complexes – Photo substitution – Photo aquation – Adamson's rules – Photo rearrangement – Photo redox reactions. Photo chemistry of organometallic compounds.

UNIT IV- ANALYTICAL CHEMISTRY (15HRS)

Electroanalytical techniques : voltametry, cyclic voltametry, polarography, amperometry, colorimetry and conductometry, ionelective electrodes, anodic strippingvoltammetry, TGA, DTA,DSC and online analysers.

UNIT V - INORGANIC POLYMERS: (15HRS)

Definition – special characteristics – glass transition temperature – solubility classification

– preparation, properties and uses of – boron nitride – silicones – polymeric sulphur nitride, chalcogenic glasses – polyphosphazene – borophosphate glass – coordinationpolymers – volan,quilon, metallophthalocyanine – factors affecting the formation of coordination polymer

TEXT BOOK:

1.Selected topics in Inorganic Chemistry - Madan, Malik &Tuli.

2.B.R.Puri, L.R.Sharma&Kalia.- Principles of Inorganic chemistry, VishalPublishing House, –13thEdn,, 2009.

3.James.E.Huheey, Inorganic Chemistry, pearson publications, 4thEdn, 2008

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 UV-VISIBLE SPECTROSCOPY				

1.1	Structure and function of chlorophyll	2	Chalk & Talk	Black Board
1.2	Role of Mg2+ ion Structure andfunction of Haemoglobin –	3	Chalk & Talk	LCD
1.3	Cooperative effect in Haemoglobin.	2	Lecture	Black Board
1.4	Role of Globin-Structure and function of Myoglobin	3	Lecture	PPT & White board
1.5	Structure and function ofCytochrome C	3	Lecture	Black Board
1.6	function of Cytochrome C	2	Lecture	Chalk and Talk
2.1	Structure and function of Blu copper proteins Structure	2	Chalk & Talk	Black Board
2.2	function of Vitamin B12	3	Chalk & Talk	LCD
2.3	- Invivo nitrogen fixation	2	Lecture	Black Board
2.4	– Fe-S proteins	3	Lecture	PPT & White board
2.5	– Ionophores – Ion transport mechanism in cell membrane – pump.	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.1	Types of electronic transition in transition metal complexe –	2	Chalk & Talk	Black Board
3.2	Photo chemistry o transitionmetal complexes –	3	Chalk & Talk	LCD
3.3	Photo substitution Photo aquation	2	Lecture	Black Board
3.4	Adamson's rules Photo rearrangement	3	Lecture	PPT & White board
3.5	Photo redox reactions.	3	Lecture	Black Board
3.6	Photo chemistry o organometallic compounds.	2	Lecture	Chalk and Talk
4.1	Electroanalytical techniques :	2	Chalk & Talk	Black Board
4.2	voltametry, cyclic voltametry,	3	Chalk & Talk	LCD
4.3	polarography,	2	Lecture	Black Board
4.4	amperometry, colorimetry and conductometry,	3	Lecture	PPT & White board
4.5	ionelective electrodes, anodic stripping ionelective electrodes,	3	Lecture	Black Board
4.6	anodicstripping voltammetry,	2	Lecture	Chalk and Talk

4.7	TGA, DTA, DSC and online analysers	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.1	Definition – special characteristics – glass transition temperature –	2	Lecture	Black Board
5.2	solubilityclassification– preparation, properties and uses of	2	Chalk & Talk	Green Board
5.3	– boron nitride – silicones – polymeric sulphur nitride, chalcogenic glasses –	3	Chalk & Talk	Black Board
5.4	polyphosphazene – borophosphate glass –	1	Lecture	PPT & White board
5.5	coordination polymers – volan, quilon,	2	Discussion	LCD
5.6	metallophthalocyanine – factors affecting the formation of coordination polymer	1	Lecture	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the various CIAcomponents.
- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomyfor :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	to calculate oxidation state and oxidation number of CMI.	K1, K2,K3 &K4	PSO1& PSO2
CO 2	to identify various functional groupspresent in Bio inorganic molecules	K1, K2,K3 &K4	PSO3
CO 3	to predict photochemical reactions	K1, K2,K3 &K4	PSO5
CO 4	to study Electroanalytical techniques	K1, K2,K3&K4	PSO3

CO 5	to find outthe mass of the polymers	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	2	2	1	1	2	3	2	1
CO5	1	2	1	2	2	2	3	1

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**
♦ WeaklyCorrelated **-1**

COURSE DESIGNER:

Mrs.RM.Nagalakshmi

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc.
CHEMISTRY
SEMESTER –VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6SB5	COMPUTERS IN CHEMISTRY	Skill based	2	2

COURSE DESCRIPTION

The course is offered to expose the software applications in the field of chemistry.

COURSE OBJECTIVES

This course deals with the use of computers in molecular modelling and drug design, the use of internet and its application in data search. It also highlights the programming in C language and its applications.

UNITS

UNIT –I INTRODUCTION TO MOLECULAR MODELLING (6 HRS.)

Structure drawing by Chem Draw - Representation of molecules - Properties calculation – NMR analysis - Molecular mechanics and molecular dynamics – simulations - Docking of simple molecules.

UNIT –II APPLICATION OF MOLECULAR MODELLING (6 HRS.)

Elements of cheminformatics and drug design. Use of crystallographic and NMR data as inputs for computation. 3D data base searching.

UNIT –III INTERNET AND ITS APPLICATION (6 HRS.)

Data base search- chemical data bank, CCDC, PDB - 3D pharmacophore, Structure based drug design-De Nova drug design.

UNIT –IV PROGRAMMING IN C LANGUAGE (6 HRS.)

Introduction, Character set in C, Style of C Language – Identifiers and Key words – Constants, Variables and Data types, Operators in C. Input and Outputin C, Control statements in C, Storage classes in C, Functions in C, Arrays and pointers, Preprocessors in C, The type def statement and Files in C language.

UNIT –V APPLICATIONS OF C LANGUAGE IN CHEMISTRY (6 HRS.)

Writing the Program using the various features of C language – Determination of lattice energy of a crystal using Born-Lande equation, Determination of Normality, Molarity and Molality of solutions, Determination of half life of a radioactive nucleus and Calculation of Binding energy.

REFERENCES:

1. Molecular Modeling -Andrew R. Leach
2. Guide Book in Molecular Modeling in Drug Design- N. Claude Cohen
3. Programming in ANSI C - E. Balagurusamy
4. Computers in Chemistry - K.V. Raman

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**INTRODUCTION TO MOLECULAR MODELLING**			
1.1	Structure drawing by Chem Draw - Representation of molecules - Properties calculation	2	Chalk & Talk	LCD
1.2	NMR analysis - Molecular mechanics and molecular dynamics	2	Chalk & Talk	LCD
1.3	Simulations - Docking of simplemolecules.	2	Chalk &	LCD

			Talk	
UNIT -2	**APPLICATION OF MOLECULAR MODELLING**			
Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
2.1	Elements of cheminformatics and drug design.	2	Chalk & Talk	LCD
2.2	Use of crystallographic and NMRdata as inputs for computation.	2	Chalk & Talk	LCD
2.3	3D data base searching.	2	Chalk & Talk	LCD
UNIT -3	**INTERNET AND ITS APPLICATION**			
3.1	Data base search- chemical databank	2	Lecture	Black Board
3.2	CCDC, PDB - 3D pharmacophore	2	Discussion	LCD
3.3	Structure based drug design-De Nova drug design.	2	Lecture	PPT & White Board
UNIT -4	**PROGRAMMING IN C LANGUAGE**			
4.1	Introduction, Character set in C, Style of C Language – Identifiers and Key words – Constants, Variables and Data types,Operators in C.	2	Lecture	Black Board
4.2	Input and Output in C, Control statements in C, Storage classes in C, Functions in C.	2	Chalk & Talk	Green Board
4.3	Arrays and pointers, Preprocessors in C, The type def statement and Files in C language.	2	Chalk & Talk	Black Board
UNIT -5	**APPLICATIONS OF C LANGUAGE IN CHEMISTRY**			
5.1	Writing the Program using the various features of C language – Determination of lattice energy of a crystal using Born-Lande equation.	2	Chalk & Talk	LCD

5.2	Determination of Normality, Molarity and Molality of solutions	2	Chalk & Talk	LCD
5.3	Determination of half life of a radioactive nucleus and	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Averag 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

- ✓ All the course outcomes are to be assessed in the

various CIA components.

- ✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy** for :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

EVALUATION PATTERN

SCHOLASTIC				NON – SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To study intergrating modeling tool, CHEMDRAW software and predict chemical properties and NMR analysis for a compound.	K1,K2,K3& K4	PSO1& PSO2

CO 2	To perform 2D and 3D data basesearching for a given chemical	K1,K2,K3& K4	PSO3
	compounds		
CO 3	To develop a greater basic aware of issues involving in C programming language design and implementation.	K1,K2,K3& K4	PSO5
CO 4	To specify the syntax of C programming language and in-depth understanding of functions, logic, array etc.	K1,K2,K3& K4	PSO1
CO 5	To write programs to determine lattice energy, half-life, normality, molarity, molality etc.	K1,K2,K3& K4	PSO2

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	3	3	2	2	1	2	1	1
CO2	2	1	3	2	2	1	2	1
CO3	2	1	2	2	3	2	1	2
CO4	2	2	1	1	2	3	2	1
CO5	1	2	1	2	2	2	3	1

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	2	3	1	1
CO3	3	2	1	1
CO4	2	3	1	1
CO5	3	2	1	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Dr.M.Priyadharsa

ni2.Dr.B.Vinosha

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI - 18

III B.Sc Chemistry

SEMESTER –VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6SB6	GREEN CHEMISTRY	Skill based	2	2

COURSE DESCRIPTION

This course highlights the need for green chemistry approach which is the need ofhour to protect the environment from hazardous chemical pollution.

Unit-I: BASICS OF NANOCHEMISTRY (6Hrs)

Definition for Green Chemistry, Need for Green Chemistry- Goals of Green Chemistry – Obstacles and Advantages of Green chemistry, Progress of GreenChemistry- Twelve principles of Green Chemistry and Examples.

UNIT –IIYIELD AND ATOM ECONOMY (6 HRS.)

Concept of Yield and its calculation, Atom economy – Definition, Calculation of Atom economy in rearrangement, addition, substitution and elimination reactions.

UNIT –IIISELECTIVITY IN GREEN CHEMISTRY (6 HRS.)

Concept of selectivity, Types of selectivity -Chemo-, regio-, enantio- and diastereoselectivities, Reactions using Green solvents - Super critical CO_2-Cleaner technology with CO_2.Ionic liquids-Friedel-crafts reaction, halogenation&Diels- Alder reaction. and water.

UNIT –IVSOLVENT FREE REACTIONS (6 HRS.)

Organic synthesis in solid state-Thermal reactions, rearrangements &photochemical reactions. Mode of supplying energy-microwave and ultrasonic-Advantages of MW techniques.Reactiona like oxidation, reduction &rearrangements.

UNIT –V DESIGNING OF GREEN SYNTHESIS (6 HRS.)

Basic concepts in designing Green synthesis - choice of starting materials, reagents, catalysts-catalytic approach in green chemistry. and solvents with suitable examples

References

1. V.K. Ahluwalia and M.R. Kidwai, *New Trends in GreenChemistry*,Anamalaya Publishers, 2005.
2. P.T. Anastas, and J.K . Warner,:*Green Chemistry - Theory and Practical*,OxfordUniversity Press, 1998.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	Definition for Green Chemistry	1	Chalk & Talk	Black Board
1.2	Need for Green Chemistry, Goalsof Green Chemistry	1	Chalk & Talk	Black Board
1.3	Obstacles and Advantages ofGreen chemistry	2	Chalk & Talk	PPT & White board
1.4	Progress of Green Chemistry-Twelve principles of Green Chemistry and Examples.	2	Chalk & Talk	Black Board

UNIT-2 YIELD AND ATOM ECONOMY				
2.1	Concept of Yield and itscalculation	2	Chalk & Talk	Black Board
2.2	Atom economy – Definition	1	Chalk & Talk	Black Board
2.3	Calculation of Atom economy inrearrangement	2	Chalk & Talk	Black Board
2.4	Addition, substitution, andelimination reactions.	1	Chalk & Talk	PPT & White board
UNIT -3SELECTIVITY IN GREEN CHEMISTRY				
3.1	Concept of selectivity, Types ofselectivity -Chemo-, regio-, enantio- anddiastereoselectivities.	2	Chalk & Talk	Black Board
3.2	Reactions using Green solvents -Super critical CO_2- Cleaner technology with CO_2.	2	Chalk & Talk	PPT & White board
3.3	Ionic liquids-Friedel-crafts reaction, halogenation &Diels-Alder reaction. and water.	2	Chalk & Talk	Black Board
UNIT -4SOLVENT FREE REACTIONS				
4.1	Organic synthesis in solid state-Thermal reactions, rearrangemen &photochemical reactions.	2	Chalk & Talk	PPT & White board
4.2	Mode of supplying energy-microwave and ultrasonic-Advantages of MW techniques.	2	Chalk & Talk	Black Board

4.3	Reactiona like oxidation, reductio&rearrangements.	2	Chalk & Talk	Black Board
UNIT-V DESIGNING OF GREEN SYNTHESIS				
5.1	Basic concepts in designing Green synthesis - choice ofstarting materials	2	Chalk & Talk	Black Board
5.2	Reagents,catalysts-catalytic approach in green chemistry	2	Chalk & Talk	Black Board
5.3	Solvents with suitable examples	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session-wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

✔All the course outcomes are to be assessed in the various CIAcomponents.

✔**The levels of CIA Assessment based on Revised Bloom's Taxonomy** for I UG are :

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

✔**The I UG course teachers are requested to start conductingS1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To understand the need for greenchemistry and goals of Green Chemistry	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 2	To differentiate between yield and atom economy	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 3	To interpret the concept of Stereo selectivity, Chemo selectivity and Regio selectivity	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 4	To describe the uses of Microwave and ultraTo describe the uses of Microwave and ultrasonic radiationsto carry our reaction.	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 5	To explain use of ionic liquids inorganic synthesis.	K1,K2,K3,K4	PSO1,PSO5, PSO7

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	2	2	2	3	2	3	2
CO2	3	2	2	2	3	2	3	2
CO3	3	2	2	2	3	2	3	2
CO4	3	2	2	2	3	2	3	2
CO5	3	2	2	2	3	2	3	2

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	1	1	3
CO2	2	2	3	3
CO3	2	1	1	3
CO4	3	1	2	3
CO5	2	2	1	3

Note: Strongly Correlated – **3** ModeratelyCorrelated – **2** WeaklyCorrelated **-1**

COURSE DESIGNER:
V.Arul Deepa

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI - 18

III B.Sc Chemistry

SEMESTER –VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6CC19	PHYSICAL PRACTICALS	Lab IN	6	4

COURSE OBJECTIVE: This paper involves the experimental studies on Rast method, determination of transition temperature, phase diagrams, & electro chemistry.

List of experiments

1. Determination of molecular weight by Rast method.
2. Transition temperature.
3. Simple phase diagram.
4. Critical solution temperature.
5. Ester hydrolysis.
6. Heat of solution by solubility method.
7. Determination of coefficient of viscosity.
8. Partition or Distribution coefficient.
9. Conductometric titration.
10. Inversion of sucrose.

Reference Book

B.Viswanathan, P.S. Raghavan, Practical Physica

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	To Develope an understanding of the breadth and concepts of physical chemistry	PSO1& PSO2
CO 2	An appreciation of the role of physical chemistry in the chemical sciences and engineering	PSO3
CO 3	An understanding of methods employed forproblem solving in physical chemistry	PSO5
CO 4	To Develope skills in procedures and instrumental methods applied in analyticaland practical tasks of physical chemistry	PSO5
CO 5	To Develope some understanding of the professional and safety responsibilities residing in working with chemical systems.	PSO3, PSO5

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	**3**	**3**	**2**	**2**	**1**	**2**	**1**	**1**
CO2	**2**	**1**	**3**	**2**	**2**	**1**	**2**	**1**
CO3	**2**	**1**	**2**	**2**	**3**	**2**	**1**	**2**
CO4	**3**	**2**	**1**	**1**	**3**	**1**	**2**	**1**
CO5	**1**	**2**	**3**	**2**	**3**	**2**	**3**	**1**

Mapping of C0s with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	3	1
CO2	2	3	2	1
CO3	3	3	1	2
CO4	2	3	2	1
CO5	3	3	3	3

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr.A.Rajeswari

2.Dr.B.Vinosha

Forwarded By

B-Medona.

(Dr. B. Medona)

HOD'S Signature

Self-Learning Inter-Disciplinary Courses in UG

SEMESTER-I

(For those who join from June- 2021 onwards)

DEPARTMENT OF CHEMISTRY AND COMMERCE

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDI S
------	21UG2SLCA	HOUSE HOLD PRODCUTS AND MARKETING	SELF LEARNING	2	2

COURSE DESCRIPTION

To enable students to have basic understanding & knowledge about the House hold chemicals and marketing

COURSE OBJECTIVE:

This course is designed for the students to learn about

- To study the basic concepts involved in the preparation of house hold chemicals
- To study the procedure involved in marketing of house hold prepared articles

Course out –comes

- To cultivate the entrepreneur skills of students.
- To inculcate the synthetic importance of house hold chemicals

- To synthesize the profitable house hold chemicals at home.
- To get hands on experience in field of synthesis cum marketing
- To learn the economic importance of house hold chemicals in marketing fields

UNITS

UNIT – 1 – BASIC CONCEPTS INVOLVED IN THE PREPARATION OF HOUSE HOLD LIQUID CHEMICAL PRODUCTS (6 HRS.)

Preparation of Phenoyl – Black phenoyl – white phenoyl – synthetic importance – Preparation of Ink – synthetic importance – Preparation of shampoos – Synthetic importance – Preparation of sanitizers – synthetic importance – Preparation of Antiseptics and disinfectants – uses.

UNIT – 2 – BASIC CONCEPTS INVOLVED IN THE PREPARATION OF HOUSE HOLD SOLID CHEMICAL PRODUCTS (6 hrs)

Preparation of Talcum powder – Lipstick – varnishing creams – synthetic importance – Preparation of detergent powder – cleaning powder -– Synthetic importance – Preparation of candles – Chalk crayons – Computer sambrani -synthetic importance .

UNIT – 3 –Practicals - Hands On training in the preparation of HOUSE HOLD SOLID CUM LIQUIDCHEMICAL PRODUCTS (6 hrs)

- Candles
- Black phenoyl
- White phenoyl
- Sanitizers
- Computer sambrani

- Detergent powder

UNIT – 4 –Product and Pricing (6 hrs)

Definition – Product life cycle – New product development – Pricing – methods of pricing – Psychological pricing – Dual pricing –Monopoly Pricing – Skimming Pricing – Penetration pricing

UNIT – 5 –Physical Distribution and promotion (6 hrs)

Advertising ––Procedure – wholesaler- retailer- ultimate consumer -sales promoter at consumers level – coupons, price – off – offer (discount), samples –Advertising -Advantages and disadvantages

REFERENCES:

1.Jayashree Gosh, Textbook of Pharmaceutical Chemistry, S.Chand&Chand publications New Delhi (1997).

2. Marketing – Dr. Rajam Nair and Sanjith .R. Nair – sultan chand and sons – 7th edition – 2018 (print)

3. Marketing – R.S.N., Pillai., chand and company ltd ., 2010

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% As	of ssm t
	Session - wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID - SEM TES T 15 Mks	35 Mks.	5 Mks.	40Mks.		
K1	5	-	-	2 ½	7.5	-	7.5	18	5 %

K2	-	5	4	2 ½	11.5	-	11.5	28	5 %
K3	-	-	3	5	8	-	8	2	%
K4	-	-	3	5	8	-	8	2	%
Non Scholastic	-	-	-	-		5	5	12	%
Total	5	5	10	15	35	5	40	1(	%

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

UG CIA Components					
			Nos		

C1	-	Test (CIA 1) - Theory	1	-	10 Mks
C2	-	Test (CIA 2) - practical	1	-	10 Mks
C3	-	Assignment	1	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Quiz	2 *	-	5 Mks
C6	-	Attendance		-	5 Mks

**** The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDINGTO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To cultivate the entrepreneur skills of students.	K1	PSO 5
CO 2	To inculcate the synthetic importance of house hold chemicals	K1, K2,	PSO 2
CO 3	To synthesize the profitable household chemicals at home.	K1 & K3	PSO 6
CO 4	To get hands on experience in field ofsynthesis cum marketing	K1, K2, K3 &	PSO 7

CO 5	To learn the economic importance ofhouse hold chemicals in marketing fields	K2 & K4	PSO 7

Mapping of C0s with PSOs

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	1	1	1	1	3	1	1	1
CO2	1	2	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1
CO4	1	1	1	1	1	1	3	1
CO5	1	1	1	1	1	1	2	1

Mapping of C0s with Pos

CO / PSO	PO1	PO2	PO3	PO4	PO5
CO 1	1	1	3	1	1
CO 2	1	3	1	1	1
CO 3	1	1	1	2	1
CO 4	1	1	1	1	3
CO 5	1	3	1	1	1

Note: Strongly Correlated – **3** Moderately Correlated – **2**

♦ Weakly Correlated **-1**

COURSE DESIGNER:

1.Dr. B.SUGANTHANA

2.Dr. SAHAYARANI

B-Medona.

(Dr. B. Medona)

HOD'S Signature

SELF LEARNING INTERDISCIPLINARY COURSE

SEMESTER –IV

Offered by The Research Centre of Home Science and Department of Chemistry

(For those who joined in 2021 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAHS	22UG4SLNC	Textile Coloration	Self Learning	-	2

COURSE DESCRIPTION

This course enlightens the students on the textile fibres, dyes and the coloration process. It also deals with the application process of mordant and disperse dyes.

COURSE OBJECTIVES

CO1: To gain knowledge about textile fibres and dyes

CO2: To understand the textile coloration process

CO3: To develop familiarity with the machinery used for dyeing and the application process

CO4: To study the concept of mordant dyes and properties

CO5: To learn about disperse dyes and the process of dispersion

UNITS

UNIT –I FIBRES AND DYES

Classification of textile fibres, types of dyes, suitability to textile fibres.

UNIT –II COLORATION PROCESS

Stages of dyeing. Methods of dyeing fabrics: jet dyeing, jig dyeing, pad dyeing and beam dyeing.

UNIT –III MACHINERY AND APPLICATION

Machinery: Conical-pan-loose-stock machine, The Hussong machine, Package dyeing machine, The Winch dyeing machine.

Application process: Forces by which dye molecules are bound to fibre (i) ionic force (ii) hydrogen bonding(iii) van der Waals forces (iv) covalent chemical linkages

UNIT –IV MORDANT DYES

Introduction -Natural mordant dyes - Synthetic mordant dyes- structure and properties of Eriochrome Black A and Alizarin.

UNIT –V DISPERSE DYES

Introduction – Ion amines, disperse acetate dyes and solacet dyes - Chemical structure of disperse dyes- Dispersion process -Function of dispersing agents

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

REFERENCES:

1. Shailaja D.Naik, Jacquie A Wilson, 'Surface Designing of Textile Fabrics', New Age International(P) Ltd; Publishers, New Delhi (2006)

2.P.V.Vidyasagar, 'Handbook of Textiles', Mittal Publications, New Delhi (1998)

3. SusheelaDhantyagi, 'Fundamentals of Textiles and their care', Orient Longman, New Delhi. (1991)

4. B.K.Sharma-—Industrial Chemistry , Goel Publishing co,1997
5. R.Chatwal —Synthetic Dyes‖-Himalayan Publishing House,1995
6. V.A.Shenai, Chemistry of Dyes and Principles of Dyeing.

WEB REFERENCES:

link.springer.com
www.keycolour.net
www.slideshare.net
textileinsight.blogspot.com
Britannica.com/topic/textile/dyeing-and-printing

III B.Sc. ZOOLOGY & Chemistry

SEMESTER –VI

For those who joined in 2021 onwards

Interdisciplinary course offered by Department of Zoology & Chemistry

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USZO	23UG6SLZC	HERBAL COSMETICS	SELF LEARNING	2	2

COURSE DESCRIPTION

To enable students to have basic understanding & knowledge about the Herbs used in cosmetics

COURSE OBJECTIVE:

This course is designed for the students to learn about

- Commonly available skin and hair care herbs
- The raw materials used in herbal cosmetics
- Standardization of the phytocomponents in cosmetic preparation
- Various formulations of herbal cosmetics.

UNITS

UNIT –I INTRODUCTION TO HERBAL COSMETICS (6 HRS.)

Introduction - Historical background and present status of Herbal cosmetics- Quality, safety and efficacy of Herbal cosmetics- Classification of Herbal cosmetics, Drugs and cosmetics act ,1940

UNIT –II COSMECEUTICAL HERBS (6 HRS.)

Morphological characteristics & Chemical properties - Skin care herbs: Aloe, Khus, Saffron; Hair care herbs: Bhringaraj, Henna, Hibiscus; Fruits & vegetables in hair & skin care: Papaya, Lemon, Neem, Tulsi - Various Oils used in hair & skin care: Coconut oil, Sandalwood oil, Almond oil

UNIT –III USES OF BOTANICAL COMPOUNDS (6 HRS.)

Secondary metabolites - physical and chemical properties - Lipids: Olive Oil, Sesame

Oil – Carbohydrates: Agar, Pectin Sland- Phenols: Cassia, Rosemary – Flavonoids: Tea, Apple – Glycosides: Almond, Mustards Alkaloids: Black Pepper, Vinca, Volatile Oils - Cinnamon, Saffron

UNIT –IV STANDARDIZATION OF HERBS (6 HRS.)

General methods of extraction of compounds – Solvents and distillation. Chromatographic techniques: Principles of separation and application of Column, Paper, Thin layer and Gas chromatography, HPLC, HPTLC

UNIT –V PREPARATION OF HERBAL COSMETICS (6 HRS.)

Herbal Cosmetics preparations: Herbal body bath & Massage oils, Butter soap bars, Body powder, Bath salts,Herbal Tooth powder,Lip balm,Herbal shampoo & Hair oils

REFERENCES:

1. Rosemary Gladstar(2014). *Herbs for Natural Beauty,* Storey Publishing, North Adams.
2. McKenna D.J., Jones K., and Hughes K., (2004). *Botanical Medicines, The Desk Reference for Major Herbal Supplements,* The Haworth Herbal Press, New York.
3. Amrita singh, (2006). *Medicinal plants the world.* Oxford & IBH Co. Pvt. Ltd, New Delhi.
4. Jain S. K., (1999). *Medicinal plants*, National book Trust, India.
5. Burlando B., Verotta L., Cornara L., and Bottini-Mass E., (2010). *Herbal Principles in Cosmetics - Properties and Mechanisms of Action,* CRC Press, London, New York.
6. Roland Hardman (2010). *Traditional Herbal Medicines for Modern Times Herbal Principles in Cosmetics Properties and Mechanisms of Action*- Taylor and Francis Group, LLC, New York

1. **Digital Open Educational Resources (DOER) :**

http://www.phdmsme.in/uploaded_files/project_report/1536151263_616.pdf

2. https://www.scholarsresearchlibrary.com/articles/herbal-plants-used-as-a-cosmetics.pdf
3. https://www.botanylibrary.com/herbal-cosmetics/list-of-herbal-cosmetics-herbal-drugs/16060
4. https://www.botanylibrary.com/herbal-cosmetics/list-of-raw-materials-used-for-preparing-herbal-cosmetics-botany/16058

INTERNAL - UG

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session - wise Average	Better of W1, W2	M1+M2	MID-SEM TEST				
	5 Mks.	5 Mks	5+5=10 Mks.	15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

Scholastic	**35**

Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

UG CIA Components					
			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	1	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Quiz	2 *	-	5 Mks
C6	-	Attendance		-	5 Mks

**** The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED	PSOs ADDRESSED

		BLOOM'S TAXONOMY)	
CO 1	Describe the history of herbal cosmetics & current regulation in herbal cosmetic preparation	K1	PSO1, PSO3, PSO4, PSO6 PSO9 ,PSO10 & PSO11
CO 2	Outline the raw materials used in Formulation cosmetics for skin & hair care	K2	PSO1, PSO3, PSO4, PSO6 PSO9 ,PSO10 & PSO11
CO 3	Identify the various chemical diverse constituents of the biological compounds present in cosmetics	K3	PSO1, PSO3, PSO4, PSO6 PSO9 ,PSO10 & PSO11
CO 4	Analyze the extraction techniques applied to natural products	K4	PSO1, PSO3, PSO4, PSO6 PSO9 ,PSO10 & PSO11
CO 5	Summarize the preparations of various herbal cosmetic products	K2	PSO1, PSO3, PSO4, PSO6 PSO9 ,PSO10 & PSO11

Mapping COs Consistency with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO10	PSO1 1	PSO1 2

CO1	3	2	3	3	2	2	2	2	3	3	3	2
CO2	3	2	3	3	2	2	2	2	3	3	3	2
CO3	3	2	3	3	2	2	2	2	3	3	3	2
CO4	3	2	3	3	2	2	2	2	3	3	3	2
CO5	3	2	3	3	2	2	2	2	3	3	3	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3
CO2	3	2	2	2	3
CO3	3	2	2	2	3
CO4	3	2	2	2	3
CO5	3	2	2	2	3

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**
♦ Weakly Correlated -**1**

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