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

Fatima College (Autonomous) Madurai – 18

The Minutes of the Board of Studies
Department of Chemistry
(To be implemented from 2023-2024 onwards)
Convened on 3.4.2023 Convened at 2p.m.
Venue : R3

Members Present

S.NO.	Name	Designation
1.	Dr B. Medona, Head & Associate Professor, Dept of Chemistry B. Medona 3/4/23.	Head of the Department
2.	Dr. P. Suresh, Assistant Professor Department of Natural Products Chemistry School of Chemistry, Madurai Kamaraj University, Madurai U. Suresh 3/4/23	University Nominee.
3.	Dr. N. Manimaran, Associate Professor, Department of Chemistry, Bharathidhasan University, Trichy N. Manimaran 3/4/23	Subject Expert (Other than Parent University)
4.	Dr. A. Mary Imelda Jayaseeli, Head & Associate Professor, Jayaraj Annapackiam College for Women, Periyakulam. 3/4/2023	Subject Expert

5	S. Manikandan, Senior Research Associate, Par Pharma, R&D Department. Chengalpattu.	Industrialist
6	Ms. B. Shobana, Research Scholar, Research department, Thiagarajar College. B. Shobana (03/04/2023)	Alumna.
7.	Dr. A. Rajeswari, Assistant Professor, Dept. of Chemistry, Fatima College	3/4/2023 Dean of Academic Affairs.
	Staff Members	
	Dr. S. Sukumari	S. Sukumari
	Dr. B. Vinosha	B. Vinosha
	Dr. B. Suganthana	B. Suganthana
	Dr. J. Arulmary	Dr. J. Arulmary
	Dr. V. Arul Deepa	V. Arul Deepa
	Dr. M. Priyadharsani	M. Priyadharsani
	Dr. K.R. Subimol	K.R. Subimol
	Dr. J. Belinda Asha	J. Belinda Asha
	Dr. J. Jone Celestina	For N. Vimala Sundari

Minutes of the Board of Studies: UG

1. Presentation of the Action Taken Report

Action Taken Report for 2022-2023

S.No	Common Suggestions offered in the previous Board	Action Taken for the Academic year 2022-2023
1.	No need to have External Exam for Self Learning Courses	As per the suggestion Question Paper Setting is done Internally.

Change of Course Title

S.No	old Course Code	New Course Code	old Course Title	New Course Title	Need for Change
1.	19C4SB2	19C4SB2	Natural and Synthetic Dyes	Dyes and Pigments	As per Recommendation of Course Teacher
2.	19C5CC16	19C5CC16	Green Chemistry Practicals	Conventional and Green Synthesis	To include experiments of removed Lab course

New Courses Introduced

S.No	Course Code	Course Title	Relevance to				Scope for			Need for Introduction
			L	R	N	G	EMP	ENTRE	SD	
1	21N4SLC4	Textile Colouration			N		Emp	Entre		To make learners Entrepreneurs.

Revised Courses

S.No	Course code	Course Title	No. & Title of units Revised with Content	% of Revision	Need for Revision	Relevance to				Scope for		
						L	R	N	G	EMP	ENTRE	SD
1.	19C4SB2	Dyes & Pigments	Unit-IV Title can be changed as Pigments.	20	Course Teacher Recommendation			N		Emp		
2	19C5CC16	Conventional and Green Synthesis	3 New Conventional Expts. were Included & Greener methods & Reagents were Increased.	50	To include removed Experiments				G	Emp		

2. updation of Open Educational Resources — Nil.

3. Revision of Courses.

S.No	Course Code	Course Title	No. & Title of units Revised with the Revised content Specified if it is not the whole unit.	% of Revision	Need for Revision	Relevance to				Scope for		
						L	R	N	G	EMP	ENTRE	SD
1.	19C4CC10	Inorganic	Unit I - Inclusion of Structural	10					G	Emp		

		Chemistry – III	Isomerism (Ionisation, linkage, ligand, hydrate & Co-ordinate Position Isomerism) & in Unit – III – Reaction Mechanism in 6 coordinate complexes – SN^1 & SN^2, Acid hydrolysis Base Hydrolysis SN^1CB can be included.							
2	19C5ME1	Spectroscopy	Unit-I – Basic Problems. Unit-II & III – Problems involving Small molecule. Unit-V. Problems involving Simple fragmentation (150-200) with Nitrogen & Halogen Functional Groups	5				G	E M P	S	
3	19C6CC17	Organic Chemistry – IV	Deletion of the following Unit I – Preparation & Properties of 1,2-; 1,4-& 2,6-Naphthaquinones, Naphthoic acids, 9,10-anthraquinone & Phenanthraquinone Unit-III. Stereochemistry of amino acids, Primary Structure and denaturation of Proteins – Fibrous & Globular Proteins. Unit-IV – Structure and Synthesis of Camphor & Zingiberene & in Unit-V – Structure & Synthesis of Quinine	20%	Since the Course is found to be too heavy for Students			G	E M P		
4	19C6ME3	Advanced Organic Chemistry	Unit-III – Contents in organic Photochemistry – Elaborated Unit-IV – In Contents, only Name of the Rearrangements can be specified Unit-V – Title can be changed as Reagents & Rearrangements can be deleted in Title & Contents	15%	As per the suggestions Given by subject Experts & Course Teachers			G	E M P		

4. New Courses Introduced

III UG (CBE)

S.No	Course Code	Course Title	Relevance to				Scope for			Need for Introduction
			L	R	N	G	EMP	ENTRE	SD	
1	23U6SL ZC	Herbal Cosmetics			N		EMP	ENTRE	SD	To develope Entrepreneurial Skill of Learners [Beautician course]

I UG (TANSCHE SYLLABUS)
CORE COURSES INTRODUCED (PART-III)

S.No	Course Code	Course Title & Semester	Relevance To				Scope for			Need for Introduction
			L	R	N	G	EMP	ENTRE	SD	
1	CC1	Inorganic Chemistry-I & I Semester				G	EMP			
2	CC2	Organic Chemistry-I & I Semester				G	EMP			
3	CC3	Volumetric Analysis-I & I Semester				G	EMP		SD	
4	CC4	Inorganic Chemistry-II & II Semester				G	EMP			
5	CC5	Organic Chemistry-II & II Semester				G	EMP			
6	CC6	Volumetric Analysis-II & II Semester				G	EMP		SD	

Elective courses Introduced (Part-III)

S.NO	Generic/ Discipline specific & Semester	Course code	Course Title	Relevance to				Scope for		
				L	R	N	G	EMP	ENTRE	SD
1.	Generic & I Semester	EC1	Basic concepts of Chemistry for Biological Sciences			N		EMP		
2	Generic & I Semester	EC2	Organic Qualitative & volumetric Analysis			N		EMP		SD

Skill Enhancement/ Fourdation/ Ability Enhancement Course (Part-IV)

S No	SEC/FC/AECC & Semester	Course Code	Course Title	Relevance to L	R	N	G	Scope for Emp	ENTRE	SD	Need for Introd.
1.	SEC(NME) & I Semester	SEC-1	Profitable Home Industries			N		Emp	ENTRE		
2.	FC & I Semester	FC	Concepts of Chemistry to Beginners				G	Emp		SD	
3	SEC(NME) & II Semester	SEC-2	Profitable Home Industries			N		Emp	ENTRE		
4	SEC (Discipline specific) & II Semester	SEC-3	Dyes & Pigments			N		Emp			

5. Introduction of Purely Skill Embedded Certificate/Diploma Advanced Diploma Value added Course other than that already offered : NIL
6. Approval of Ph.D Course work Syllabus : NIL
7. Rubrics for Internship/Project : NIL

*The Syllabus for all the above I UG courses are framed & passed in the Board

Other Suggestions

1. In FC, Problems can be included in contents, Teaching and Testing can be focused on Problem Solving method
2. The title Volumetric Analysis-I can be renamed as Green Volumetric Analysis.
3. For Organic chemistry I & II - Morrison R.T. & Boyd R.N - organic chemistry Book can be included as one of the Text Books

Commendations:

Our UG Syllabus is Good & too heavy

Minutes of the Board of Studies: PG

1. Presentation of the Action Taken Report for 2022-2023

S.No	Common Suggestions offered in the Previous Board	Action taken for the Academic year 2022-23
1	19PG4C17 - Unit-I - Absorption, Emission, LASER, EMR Interaction and Einsteins Coefficient can be deleted	The given suggestion is incorporated in 19PG4C17

Change of Course Title:

S.No	Old Course Code	New Course Code	old course Title	New course Title	Need for change
1	19PG1C5	19PG1C5	Organic Qualitative Analysis	Organic Qualitative Analysis & Preparation - I	Recommendation of course Teacher & subject Experts
2	19PG2C10	19PG2C10	Organic Quantitative Analysis and Preparations	Organic Estimation & Preparation - II	Recommendation of Course Teachers & subject Experts

New Courses Introduced

S.No	Course Code	Course Title	Relevance To				Scope for			Need for Introduction
			L	R	N	G	EMP	ENTRE	SD	
1	22PGC4 SLCP	Batteries and its applications			N		EMP	Entre		To increase Employability & Entrepreneurship

Revised Courses

S. NO	Course Code	Course Title	NO. & Title of units Revised with the Revised content	% of Revision	Need for Revision	Relevance to				Scope for		
						L	R	N	G	EMP	ENTRE	SD
1.	19PG1C5	Organic Qualitative Analysis & Preparation-I	Spectral Analysis of Compounds using IR and UV can be included	10%				N		EMP		SD
2	19PG2C10	Organic Estimation & Preparation-II	Inclusion of Estimation of Aniline & Phenol									

			instead of Glucose by Eynon & Lane Method, Spectral Analysis of Compounds using IR & UV can be included	20%					N		Emp				
3	19PG4 CI7	Physical Chemistry -IV	Title of Units I, II & III changed as Rotational & Vibrational, Electronic & Resonance and Mossbauer Spectroscopy. In Unit-I-Inclusion of NMR Instrumentation Frequency & comparison with ESR frequency can be included.	15%					G	Emp	EN TRE				
4	19PG4 CE4	Analytical Chemistry	Title of unit I, II & V are changed as Error Analysis Chromatography & Computers in Chemistry with minor changes in content and in unit-III - DTA can be Included.	10%					G	Emp	EN TRE				

2. Updation of Open Educational Resources in the list of references of each courses : NIL
3. Revision of Courses : NIL (for II PG-OBE Syllabus)
4. New Courses Introduced : NIL (for II PG-OBE Syllabus)

I PG (TANSCHE SYLLABUS)

Core Courses Introduced (Part A)

S. No.	Course code	Course Title & Semester	Relevance to L	R	N	G	Scope for Emp	EN TRE	SD	Need for Introduc
1.	PG-CC1	Inorganic Chemistry -I & I Semester				G	Emp			
2	PG-CC2	Organic Chemistry-I & I Semester				G	Emp			
3.	PG-CC3	Physical Chemistry-I & I Semester				G	Emp			

4	PG-CC4	Inorganic chemistry-II & II Semester				G	EMP				
5	PG-CC5	Organic Chemistry - II & II Semester				G	EMP				
6	PG-CC6	Physical Chemistry - II & II Semester				G	EMP				

Elective courses Introduced (Part-A)

S.No	Generic/ Discipline Specific & Semester	Course Code	Course Title	Relevance to				Scope for			Need for
				L	R	N	G	EMP	ENTRE	SD	Introduction
1.	Discipline Specific I Semester	PG-EC1 Lab	Inorganic Qualitative Analysis				G	EMP		SD	
2.	Discipline Specific I Semester	PG-EC2 Lab	Organic chemistry Practical				G	EMP		SD	
3	Generic & II Semester	PG-EC3	Analysis of Soil, Water, Food, Cosmetic and Fertilizer			N		EMP	ENTRE		
4	Discipline Specific & II Semester	PG-EC4	Inorganic Quantitative Analysis				G	EMP		SD	

Skill Enhancement/Ability Enhancement Course (Part-B)

S.No	SEC/AEC & Semester	Course Code	Course Title	Relevance to				Scope for				Need for Introduction
				L	R	N	G	Emp	ENTRE	SD		
1.	SEC & I Semester	PG-SEC-1	Computational Chemistry			N		Emp		SD		
2	SEC & II Semester	PG-SEC-2	Preparation of Consumer Products.			N		Emp	ENTRE			

5. Introduction of Purely Skill-Embedded Certificate/Diploma, Advanced Diploma, value added course Other than that is already being offered : NIL

6. Approval of Ph.D. Course work Syllabus : NIL

7. Rubrics for Internship/Project : NIL

8. Details of Proposed/Signed MoU :

Signed MoU with Material Research Centre, Coimbatore on 20.04.2022 for Three years.

The Syllabus for all the above I year PG Courses are reviewed and passed in the Board. The front page for II year courses are framed and reviewed.

Other Suggestions

1. Jerry March. A. - Advanced organic Chemistry - Book can be removed from Reference for organic chemistry I & II Courses.
2. NPTEL Study Material can be included under references.

Commendations.

1. The syllabus for all the courses are very Good

3. Puri, Sharma & Pathania - Principles of Physical Chemistry Book can be included in PG-CC3.

			Signature
1.	Head of the Department	Dr. B. Nedona	B. Nedona.
2.	University Nominee.	Dr. P. Suresh	3/04/23
3.	Subject Expert.	Dr. N. Manimaran	3/4/23
4.	Subject Expert	Dr. A. Mary Imelda Jeyaseeli	3/4/2023
5	Industrialist.	S. Manikandan	
6.	Alumna	Ms. B Shobana	3/4/2023
7.	Dean of Academic affairs	Dr. A Rajeswari.	3/4/2023
8.	Staff Members.		
	Dr. S. Sukumari		
	Dr. B. Vinosha		
	Dr. B. Sugantham		
	Dr. J. Arul Mary		
	Dr. V. Arul Deepa		
	Dr. M. Priyadharsani		
	Dr. K. R. Subimol		
	Dr. J. Berlinda Asha		
	Dr. J. Jona Celestina		For N. Vimala Sundari

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/ 23C1GEN4	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	4	2	40	60	100

		Green synthesis					
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 $\Psi 2$.

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

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.8	Pauli'exclusion principle and Aufbau principle	2	Discussion	Black Board
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 $\Psi 2$.	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	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	compounds			
3.2	Born Haber cycle – lattice energies, Madelung constant; relative effect of lattice energy and solvation energy	1	Lecture	Black Board
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	2	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	dipole interactions. Repulsive forces; Hydrogen bonding – Types.			
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

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -5ALKANES				
5.1	Introduction-IUPAC Nomenclature-Isomerism-Free rotation about carbon – carbon single bond	2	Lecture	Black Board
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,periodic propertiesbonding,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,percentageionicharacterandbondorder.	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

I B.Sc.

SEMESTER –I

For those who joined from 2023 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1GEZ1/ 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 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				

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 coordinati compounds- Werner's theory a Sidgwick theory- EAN rule	2	Chalk & Talk	Black Board
1.5	Biologically important compoun Lingands and their type 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 &	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
			Talk	
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, Chloramphenicol –	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	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
5.3	**purification techniques** –	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Methods for purification of Solids and liquids			
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 and artificial sugars.	K1, K2 & K4	PSO1
CO 5	Analyse various methods to identify	K1,K2&K3	PSO4 & PSO5

	an appropriate method for the separation of chemical components.		

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)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1GEZ2 /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

I B.Sc Chemistry

SEMESTER-I

(For those who joined in June2023 onwards)

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	23C1GEZ2 /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

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& Whiteboard
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	BlackBo

				ard
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-IN 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,periodicityinpropertiesanditsapplicationinexplainingthechemicalbehavior natureofchemicalbonding,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.ofLectures	Teaching Pedagogy	TeachingAids

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	TeachingAids
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

ModuleNo.	Topic	No.ofLectures	Teaching Pedagogy	TeachingAids
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	Gainabasicknowledgeaboutthebasic 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 ($HClO_4$). 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 strengths of acids, bases and dissociation constant.	2	Chalk &Talk	Black Board
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: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates.	2	Chalk &Talk	BlackBoard
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.)**	

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 conjugated dienes, Diels–Alder reactions, polymerisation, polybutadiene, polyisoprene (natural rubber), vulcanisation, polychloroprene	2	Chalk &Talk	Black Board
4.5	**Alkynes**- Nomenclature; **Hybridization** general methods of	2	Chalk &Talk	Black Board

3.1	General characteristics of elementsof Group [illegible]	2	Chalk [illegible]	Black Board
[illegible]	General properties of elements of group 16 - Structure			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 periodic table.	**2**	Chalk &Talk	Black Board
3.7	Preparation, properties and structure of XeF_2, XeF_4, XeF_6 and $XeOF_4$; uses of noble gases- clathrate compounds	**3**	Chalk &Talk	Black Board

	preparation, properties and reactions; acidic nature of terminal alkynes and acetylene, polymerisation and isomerisation.			
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 C-10; uses.	**3**	Chalk &Talk	BlackBoard
	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 pblock 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 andaromatic 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 aromatic hydrocarbons	K1,K2,K3&K4	PSO5
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

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 an unknown organic compound performing a systematic analysis.	K1 & K2	PSO2 &PSO7
CO 3	Compare mono and dicarboxylic acids, primary, secondary and tertiary	K1, K2 , K3& K4	PSO6

	amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non- reducing sugars and explain the reactions behind it.		
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 I (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 EDTA method	2	Chalk & Talk	Black Board
1.3	Purification techniques –BOD and COD-	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
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**			
4.1	Galvanic cells - Standard hydrogen electrode	1	Chalk & Talk	Black Board

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

OURSE 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	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

COURSE DESIGNER:

Staff Name

1.Dr. B.SUGANTHANA

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 I (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 EDTA method	2	Chalk & Talk	Black Board
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**			

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
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**			
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 a its biological applications	2	Chalk & Talk	Black Board

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

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	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
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	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
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,IndianCouncilofAgriculturalResearch,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& Whiteboard

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.ofLectures**	**TeachingPedagogy**	**TeachingAids**
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& Whiteboard
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& Whiteboard
3.3	Estimation of cream	1	Chalk &Talk	Black Board

3.4	Butter	1	Chalk &Talk	PPT& Whiteboard
3.5	Ghee	1	Chalk &Talk	Black Board
3.6	Rancidity	1	Chalk &Talk	Black Board

Module No.	Topic	No.ofLectures	TeachingPedagogy	TeachingAids
UNIT-4	**SPECIAL MILK**			
4.1	Standardised milk	1	Chalk &Talk	PPT& Whiteboard
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	KNOWLEDGE LEVEL(ACCORDINGTOREVISEDBLOOM'STAXONOMY)	PSOsADDRESSED

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	tounderstandthemethodsofbeautytreatmentstheiradvantages	K1,K2,K3&K4	PSO7

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

COURSECONTENTS&LECTURESCHEDULE

Module No.	Topic	No.ofLectures	Teaching Pedagogy	Teaching 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	Blackl ard
1.3	shaving and sunscreen (formulation only); Gels	2	Chalk &Talk	Blackl ard
1.4	formulation and advantages; astringent and skin tonics	2	Lecture	Blackl ard
1.5	key ingredients, skin lightness, depilatories.	2	Lecture	Blackl ard

Module No.	Topic	No.ofLectures	Teaching Pedagogy	TeachingAids
UNIT-2 Hair Care				
2.1	Shampoos – types –	2	Lecture	BlackBoard
2.2	powder, cream, liquid, gel – ingredients;	2	Chalk &Talk	Green Board
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.ofLectures	Teaching Pedagogy	TeachingAids
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	Green Board

Module No.	Topic	No.ofLectures	Teaching Pedagogy	TeachingAids
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	Green Board
5.3	shaping the brows; eyelash tinting; perming types;	2	Chalk &Talk	BlackBoard

Module No.	Topic	No.ofLectures	Teaching Pedagogy	TeachingAids
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,Washing and Filtration, DryingorIgnition	2	Lecture	PPT& White board
5.8	ErrorsinGravimetryandscopeofthetechnique,Inorganicand Organicprecipitatingagents.	2	Lecture	BlackBoard

Levels	C1	C2	C3	C4	TotalScholastic Marks	NonScholastic MarksC5	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)

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
WeightedpercentageofCourse ContributiontoPos	3.0	3.0	3.0	3.0	3.0

LevelofCorrelationbetweenPSO’sandCO’s

HOD’S Signature

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 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

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 BLOOM'S	PSOs ADDRESSED

		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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
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**

COURSE DESIGNER:

1. **Dr. V. Bharathy**

2. **Dr. R. Sarika** 

Forwarded By

1. Dr. A. Tamil Selvi 

2. Dr. B. Medona 

HOD's Name & signature