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 : 2022 - 2023

Fatima College (Autonomous) Madurai-18

The Minutes of the Board of Studies
Department of Chemistry
To be implemented from 2022-2023 onwards
Convened on 21.3.2022. Convened at 2 p.m
Venue : R3

External Members

S.No.	Name	Designation
1	Dr.S. Murugesan Professor, Dept. of Inorg. Chem. SOC, MKU, Madurai-21	University Nominee 21/3/22
2.	Dr. S. Abraham John Prof. of Chemistry GRI (Deemed to be University) Gandhigram Dindigul	Subject Expert 21/3/22
3.	Dr. A. Mary Imelda Jayaseeli Associate Professor & Head Jeyaraj Annapackiam College for Women Periyakulam	Subject Expert 21/3/2022
4.	Mr. S. Manikandan Senior Research Associate Par Pharma, R&D. Dept. Chengalpattu	Industrialist (Absent)
5.	Miss. B. Shobana Research Scholar, Research Dept. of Chemistry, Thiagarajar college, Madurai	Alumna. 21/03/22

6	Dr. N. Malathi	Dean of Academic Affairs
7.	Dr. S. Sukumari	Staff Member
8.	Dr. A. Rajeswari	Staff Member
9.	Dr. B. Vinosha	Staff Member
10	Dr. B. Suganthana	Staff Member
11	Dr. Sr. Arul Mary	Staff Member
12.	Dr. V. Arul Deepa	Staff Member
13	Mrs. R.M. Nagalakshmi	Staff Member
14.	Dr. M. Priyadharsani	Staff Member
15	Dr. K.M. Subimol	Staff Member
16	Dr. P. Sylvia Reeta	Staff Member

1. Action Taken Report For 2021-2022 - For M.Sc Chemistry

S.No	Common suggestion offered in the Previous Board	Action Taken for the Academic Year 2021-22
1.	21PGC2SL1 - Research methodology - Plagiarism can be added in unit V	Included in unit V
2.	In EDC paper - Instead of fertilizer Oil Analysis can be included	Fertilizers is removed & Oil unit is included as unit V

Change of Course Title

S.No	Old Course Code	New Course Code	Old Course Title	New Course Title	Need for Change
-	-	-	-	NIL	-

New Courses Introduced

For B.Sc.

S.No	Course Code	Course Title	Relevance to				Scope for			Need for
			L	R	N	G	EMP	ENTRE	SD	Introduction
1.	21C2SL A1	Household Products Marketing		R			EMP	ENTRE		To make Learners Entrepreneurs

Internal Members.

1. Dr. N. Malathi Dean of Academic Affairs. Staff Member - Dept of Chemistry

N. Malathi
24/03/2022

S.NO.	Name	
1.	Dr. B. Medona [Head of the Dept.]	B. Medona.
2	Dr. S. Sukumari	S.
3.	Dr. A. Rajeswari	
4	Dr. B. Vinosha	
5.	Dr. B. Sugantharaj	
6	Dr. Sr. Arul Mary	
7	Dr. V. Arul Deepa	
8.	Mrs. R.M. Nagalakshmi	
9.	Dr. M. Priyadharsini	
10.	Dr. K.M. Subimol	
11.	Dr. P. Silviya Reeka.	

Members Present.

1.	Dr. B. Medona	Head of the Department
2.	Dr. S. Murugesan, Professor, Dept of Inorganic Chemistry, SOC, MKU	University Nominee
3	Dr. S. Abraham John, Professor, Dept of Chemistry, GRI, Dindigul	Subject Expert
4	Dr. A. Mary Imelda Jayaseeli, Head & Associate Prof. of Chemistry JAC, Periyakulam	Subject Expert
5	Miss. B Shobana Research Scholar, Research Dept of Chemistry Thiagarajar College, Madurai	Alumna.

For M. Sc.

S.No	Course Code	Course Title	Relevance to				Scope for			Need for Introduction
			L	R	N	G	EMP	EMRE	SD	
1.	21PGC2 SL1	Research Methodology				G	EMP		SD	offered to the advanced Learners
2.	21C1EDC / 21C2EDC	Analysis of Soil, Water Food, Cosmetics And oil.			N		EMP		SD	As per the Recommendation of course Teachers

Revised Courses -

S.No	Course code	Course Title	No. & Title of units Revised	% of Revision	Need for Revision	Relevance to				Scope for		
						L	R	N	G	EMP	ENTRE	SD
-	-	-	NIL	-	-	-	-	-	-	-	-	-

2. updation of Open Educational Resources in the list of references of each course.

S.No	Course Code	Course Title	Details of updation
-	-	-	NIL

3 Revision of Courses.

FOR B.SC.

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.	19C4 SB2	NEW TITLE "Dyes and Pigments" Old Title Natural & Synthetic Dyes	Unit-IV g-Pigments Title Instead of Structure of Dyes. Revised content - Anthocyanin, Flavones Phthalocyanin, Carotenoids & Chlorophyll	20%	As per the Recommendation of Course Teacher			N		EMP		
2.	19C5CC 16	NEW TITLE "Conventional & Green Synthesis OLD TITLE Green chemistry Practicals [Lab Course]	Under Greener methods of Preparation of organic compounds - Preparation of Aspirin using MW, use of greener Nitrating & Brominating Mixture are used for Nitration & Bromination - Included. Under Conventional methods - Three New Experiments to be included.	50%	To include Experiments in the revised Lab course, To increase the use of Microwave radiation & Greener Reagents				G	EMP		SD

For M.Sc.

S.No	Course Code	Course Title	No. & Title of units revised with the Revised content	% of Revision	Relevance to L	R	N	G	Scope for Emp	Entre	SD
1.	19PG4 CI7	Physical Chemistry - IV	Unit I, II & III Title - to be changed as Rotational & Vibrational Spectroscopy, Electronic Spectroscopy & Spin Resonance & Mossbauer spectroscopy with minor Revisions in unit I, II & V In unit III - NMR Spectroscopy - Frequency, Instrumentation & Comparison of NMR with ESR are Included.	15%				G	Emp	Entre	
2.	19PG4 CE3	Analytical Chemistry	Unit I Title for - Error Analysis Unit II - Chromatography Unit V - Computers in Chemistry with minor Changes in Content. Unit III - DTA to be Included.	10%				G	Emp	Entre	SD
3.	19PG1C5	New Title Organic Qualitative Analysis & Preparation - I Old Title Organic Qualitative Analysis	Spectral Analysis of the Synthesized Compounds Using IR and UV are included.	10%			N		Emp		SD
4.	19PG2C10	New Title Organic Estimation & Preparation - II Old Title. Organic * Estimation & Preparation - II *Quantitative Analysis	Under Estimation - Estimation of Phenol & Aniline are Included instead of Estmn. Of Glucose by Eynon-Lane Method. Under preparation - Spectral Analysis of the Synthesized Compounds using UV & IR are included.	20%			N		Emp		SD

4 New Courses Introduced - For B.Sc.

S.No	Course code	Course Title	Relevance to L	R	N	G	Scope for Emp	Entre	SD	Need for Introduction
1.	22N4SLC4	Textile Colouration			N		Emp	Entre		To make Learners Entrepreneur

For M.Sc

S.No	Course code	Course Title	Relevance to				Scope for			Need for Introduction
			L	R	N	G	EMP	ENTRE	SD	
1.	22PGC4SL3	Batteries and its Application			N		EMP	ENTRE		To increase Employability & Entrepreneurship.

5 Introduction of Purely Skill Embedded Certificate Value added Course

S.No	Course Code	Course Title	MOU with Industry/ Organisation	Skills Sharpened	Course outcome
1.	22PGVACC1	Certificate course on Instrumentation in IR	-	Analytical Skill & Employability	To produce Analytical chemist.
2.	22PGVACC2	Certificate Course on Instrumentation in UV	-		
3.	22PGVACC3	Certificate Course on Electrochemical Techniques	-		

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

7 Rubrics for Internship/Project - NA

Details of Proposed MOU - Planned to have MOU with Materials Research Centre (MRC) Coimbatore.

Other Suggestions	Commendations
1. No need to have External Exam for Self Learning courses.	1. OUR UG & PG Syllabus is Very Good but too heavy.
2. In 19PG4CM - Unit I - Absorption & Emission LASER, EMR Interaction, Einstein Coefficient Can be deleted.	

Dr. B. Medona Head of the Department

21/3/22 Dr. S. Murugesan University Nominee

21/3/22 Dr. S. Abraham John. Subject Expert

21/3/2022 Dr. A. Mary Imelda Jayaseeli Subject Expert

21/03/2022 Ms. B. Shobana Alumna

Name of	Signature
Dean of Academic affairs Dr. N. Malathi	21/03/2
Staff Members	
Dr. S. Sukumari	S.
Dr. A. Rajeswari	
Dr. B. Vinosha	
Dr. B. Sugarthana	
Dr. Sr. Arul Mary	
Dr. V. Arul Deepa	
Mrs. R.M. Nagalakshmi	
Dr. M. Priyadharsani	
Dr. K.M. Subimol	
Dr. P. Sylvia Reeta	

VISION of the department

To transform the students entrusted in our hands into competent chemists.

MISSION OF THE DEPARTMENT

To Transfer the knowledge of chemistry with values to create globally 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 chemistry methodologies.

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 aspire excellence
GA 3	Enthusiasm towards emancipation and empowerment of 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 to be employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professional and 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 solve social and environmental issues in diverse environments
GA 10	Self awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building on their strengths and improving their weaknesses
GA 11	Finesse to co-operate exhibiting team-spirit while working 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 and social responsibilities in local, national and global scenario
II. PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would make them 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 tap Potentials
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 from the 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 be able to

PO 1	Apply acquired scientific knowledge to solve complex issues.
PO 2	Attain Analytical skills to solve complex cultural, societal and 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 be able to

PSO 1	Thorough understanding of all basic concepts and theories pertaining to Chemistry
PSO 2	A comprehensive view of bonding, structure, reactivity andstability 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 to enter varied fields
PSO 8	Additional in-puts of using appropriate software related to Chemistry and chemical calculations

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

DEPARTMENT OF CHEMISTRY - CBCS 2022-23

PROGRAMME CODE : UACH

Semester	Subject Code	Subject Title	Hours	Credits	Maximum Marks		
					Internal	External	Total
I	19C1CC1	Inorganic Chemistry –I	4	3	40	60	100
	19C1CC2	Organic Chemistry - I	5	4	40	60	100
	19C1CC3	Volumetric analysis-I	3	2	40	60	100
	21C1ACN1	Allied Chemistry -I	3	3	40	60	100
	21C1ACZ1	Allied Chemistry -I	3	3	40	60	100
	21C1ACN2	Allied Chemistry Practicals -I	2	2	40	60	100
	21C1ACZ2	Allied Chemistry Practicals -I	2	2	40	60	100
	19C1NME	Profitable Home Industries	2	2	40	60	100
II	19C2CC4	Inorganic Chemistry –II	4	3	40	60	100
	19C2CC5	Organic Chemistry –II	5	4	40	60	100
	19C2CC6	Volumetric analysis-II	3	2	40	60	100
	21C2ACN3	Allied Chemistry -II	3	3	40	60	100
	21C2ACZ3	Allied Chemistry -II	3	3	40	60	100

	21C2ACN4	Allied chemistry Practicals-II	2	2	40	60	100
	21C2ACZ4	Allied chemistry Practicals-II	2	2	40	60	100
	19C2NME	Profitable home Industries	2	2	40	60	100
III	19C3CC7	Organic and inorganic chemistry	5	4	40	60	100
	19C3CC8	Physical chemistry-I	4	3	40	60	100
	19C3SB1	Agricultural chemistry	2	2	40	60	100
	19C3SB1(A)	Diary chemistry	2	2	40	60	100
	19P3ACC1	Allied Chemistry –I	3	3	40	60	100
	19C3CC9	Inorganic Qualitative Analysis	3	2	40	60	100
	19P3ACC2	Allied Chemistry Practicals-I	2	2	40	60	100
IV	19C4CC10	Inorganic Chemistry-III	5	3	40	60	100
	19C4CC11	Physical chemistry-II	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	3	40	60	100
	19P4ACC3	Allied Chemistry –II	3	3	40	60	100

	19P4ACC4	Allied Chemistry practicals-II	3	3	40	60	100
V	19C5CC13	Organic chemistry -III	6	4	25	75	100
	19C5CC14	Physical chemistry -III	6	4	25	75	100
	19C5CC15	Inorganic practicals	4	2	40	60	100
	22C5CC16	Conventional and Green synthesis	4	2	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
VI	19C6CC17	Organic chemistry –IV	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	3	40	60	100

CHEMISTRY- SELF LEARNING NEW COURSES

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

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc. CHEMISTRY

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C1CC1	INORGANIC CHEMISTRY -I (ATOMIC STRUCTURE, PERIODIC TABLE, ACID AND BASES, NON-AQUEOUS SOLVENTS AND S-BLOCK ELEMENTS)	UG Core	4	3

COURSE DESCRIPTION

This course deals with the basics of chemistry required for UG programme

COURSE OBJECTIVES

To comprehend the fundamental properties of atoms, molecules, and the various states of matter and to understand the periodic table and their trends in physical and chemical properties. It also deals with study to acquire the knowledge of properties, characteristics and application of non-aqueous solvents.

COURSE OUTCOMES

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

CO 1 To comprehend the fundamental properties of atoms, molecules, and energy , radius relationship for atom

CO 2 To describe the periodic table as a list of elements arranged so as to demonstrate trends in their physical and chemical properties.

CO 3 To acquire the knowledge of properties, characteristics and application of non-aqueous solvents

CO 4 To recognize the anomalous properties of Li and compares the properties

Li with those other alkali metals

CO 5 To illustrate the factors affecting the strength of acid and bases

UNIT -I ATOMIC STRUCTURE (12 HRS.)

Planck's quantum theory of radiation-Bohr's theory- origin of Hydrogen spectrum-sommerfelds extension of Bohr's theory-The dual nature of electrons-Heisenberg's uncertainity principle- Pauli's exclusion principle- Quantum numbers- Zeeman effect - Sequence of energy levels- Slater's rule- problems related to slater's rule.

UNIT -II PERIODIC TABLE (12HRS.)

The long form of periodic table- periodic law and electronic configuration of elements - causes of periodicity-division of s, p,d and f block elements-Horizontal and vertical relationship. Atomic properties- Size of atom- Atomic volumes-Vander waals radius-Ionic radius-Ionisation energy- electron affinity-Electronegativity-Different stakes- Diagonal relationship-factors influencing electronegativity- applications of elcetronegativities.

UNIT -III ACIDS AND BASES (12 HRS.)

Arrhenius concept-Lowry Bronsted –Lewis concepts-Lux Flood -solvent system concepts-Usonowich concept. Effect of solvents on the relative strength of acids and bases-leveling effect-Factors influencing the acidic and basis properties(steric effect and solvation effect, electron releasing or electron withdrawing nature of substituents-charge on the species-hydration and other energy factors-resonance effect and electronegativity effect) . Oxo acids and strength of oxo acids.

UNIT -IV NON AQUEOUS SOLVENTS (12 HRS.)

General properties-liquid ammonia, liquid sulphur dioxide, liquid hydrogen fluoride, anhydrous sulphuric acid and liquid Dinitrogen tetraoxide. Chemistry of the above mentioned solvents-advantages and disadvantages.

UNIT -V s-BLOCK ELEMENTS (12HRS.)

General discussion – electronic configuration – flame colour & spectra lattice energy and solubility in liquid ammonia-ionic conductance – diagonal and anomalous behaviour – Chemistry of $LiAlH_4$, comparative study of oxides, super oxides and hydroxides-wrap around complexes (crowns and crypts) –

compounds of Be(Beryllium oxide, beryllium chloride, Basic Beryllium acetatestructure, basic Beryllium Nitrate)– Biological importance of I & II elements.

REFERENCES:

1. J.D.Lee, Concise Inorganic Chemistry, Wiley India, 9th Edition, 2009.
2. James.E.Huheey, Inorganic Chemistry, pearson publications, 4th edition, 2008.
3. R.D.Madan, Modern Inorganic Chemistry, S.Chand and company, Reprint,1994.
4. Satya Prakash, Tuli, Basu, Madan, Advanced Inorganic Chemistry, S.Chandand company, Reprint, 1992.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**TITLE**			
1.1	Atomic Structure – Basics	1	Chalk & Talk	Black Board
1.2	Planck's Quantum Theory Of Radiation	2	Chalk & Talk	Black Board
1.3	Bohr's Theory- Origin Of Hydrogen Spectrum-Sommerfelds Extension Of Bohr's Theory	3	Lecture	PPT & White board
1.4	The Dual Nature Of Electrons-Heisenberg's Uncertainity Principle-	1	Lecture	Smart Board
1.5	Pauli's Exclusion Principle-Quantum Numbers-	2	Chalk & Talk	Black Board
1.6	Sequence Of Energy Levels-	1	Chalk & Talk	Black Board

1.7	Slater's Rule-Problems Related To Slater's Rule.	2	Chalk & Talk	Black Board
Unit -2 Periodic Table				
2.1	The Long Form Of Periodic Table-Periodic Law And Electronic Configuration Of Elements	2	Lecture	Periodic Table

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	Causes Of Periodicity	1	Chalk & Talk	Black Board
2.3	Division Of S, P,D And F Block Elements	1	Lecture	Periodic Table
2.4	Horizontal And Vertical Relationship. Atomic Properties- Size Of Atom- Atomic Volumes- Vander Waals Radius-Ionic Radius	3	Chalk & Talk	Black Board
2.5	Ionisation Energy- Electron Affinity	2	Chalk & Talk	Black Board
2.6	Electronegativity-Different Stakes- Diagonal Relationship-	1	Chalk & Talk	Black Board
2.7	Factors Influencing Electronegativity- Applications Of Elcetronegativities.	2	Chalk & Talk	Black Board
UNIT -3 ACIDS AND BASES				
3.1	Arrhenius Concept-Lowry Bronsted	2	Chalk & Talk	Black Board
3.2	Lewis Concepts-Lux Flood	1	Chalk & Talk	Black Board
3.3	Solvent System Concepts- Usonowich Concept	2	Chalk & Talk	Black Board
3.4	Effect Of Solvents On The Relative Strength Of Acids And Bases- Leveling Effect	2	Chalk & Talk	Black Board
3.5	Steric Effect And Solvation Effect	1	Chalk & Talk	Black Board
3.6	Electron Releasing Or Electron Withdrawing Nature Of Substituents-Charge On The	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Species			
3.7	Hydration And Other Energy Factors-Resonance Effect And Electronegativity Effect	2	Chalk & Talk	Black Board
3.8	Oxo Acids And Strength Of Oxo Acids.	1	Chalk & Talk	Black Board
UNIT -4 NON AQUEOUS SOLVENTS				
4.1	General Properties	2	Chalk & Talk	Black Board
4.2	Liquid Ammonia	4	Chalk & Talk	Black Board
4.3	Liquid Sulphur Dioxide	2	Chalk & Talk	Black Board
4.4	Liquid Hydrogen Fluoride	1	Chalk & Talk	Black Board
4.5	Anhydrous Sulphuric Acid	1	Chalk & Talk	Black Board
4.6	Liquid Dinitrogen Tetraoxide	2	Chalk & Talk	Black Board
UNIT -5 s-BLOCK ELEMENTS				
5.1	General discussion – electronic configuration	2	Chalk & Talk	Periodic table
5.2	Flame colour & spectra lattice energy	1	Chalk & Talk	Black Board
5.3	solubility in liquid ammonia-ionic conductance – diagonal and anomalous behavior	3	Chalk & Talk	Black Board
5.4	Chemistry of $LiAlH_4$, comparative study of oxides, super oxides and hydroxides	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.5	Wrap around complexes (crowns and crypts) – compounds of Be	3	Chalk & Talk	PPT
5.6	Biological importance of I & II elements	1	Chalk & Talk	Black Board

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non – Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To comprehend the fundamental properties of atoms, molecules, and energy , radius relationship for atom	K1, K2, K3 &K4	PSO1& PSO2
CO 2	To describe the periodic table as a list of elements arranged so as to demonstrate trends in their physical and chemical properties.	K1, K2, K3 &K4	PSO1& PSO3
CO 3	To illustrate the factors affecting the strength of acid and bases	K1, K2, K3 &K4	PSO1&PSO6
CO 4	To acquire the knowledge of properties, characteristics and application of non-aqueous solvents	K1, K2, K3 &K4	PSO1& PSO3
CO 5	To recognize the anomalous properties of Li and compares the properties Li with those other alkali metals	K1, K2, K3 &K4	PSO3 & PSO6

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:

1. **Staff Name : DR.B.VINOSHA**

Forwarded By

HOD'S Signature&

Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc. CHEMISTRY

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C1CC2	ORGANIC CHEMISTRY - I (REACTION MECHANISM, ALKANES, CYCLOALKANES AND ALKYL HALIDES)	UG Core	5	4

COURSE DESCRIPTION

This course helps the students to acquire a thorough knowledge of the basics of organic chemistry related to reaction mechanism and alkanes and their derivatives.

COURSE OBJECTIVES

This paper deals with electron displacement effects, Fundamentals of reaction mechanism, Conformation and free radical substitution reactions in alkane and chemistry of alkyl halides with special emphasis to aliphatic nucleophilic substitution.

COURSE OUTCOMES

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

CO 1 Gain a thorough knowledge about the chemistry of aliphatic saturated compounds

CO 2 Analyze the behaviour of an organic compound through electron displacement effects

CO 3 Describe the structure and stability of different types of intermediates involved in reaction mechanism.

CO 4 Know the nomenclature, classification of alkanes, alkyl halides.

CO 5 To derive and familiarise the mechanisms of nucleophilic substitution reactions of organic compounds.

UNIT –I ELECTRON DISPLACEMENT EFFECTS (15 HRS.)

Inductive effect and its applications– Delocalized bonds –Delocalisation of pi electrons through p-π and π-π overlap - Resonance effect – rules of resonance structures – resonance energy – steric inhibition of resonance – hyper conjugation – Electromeric effect – Effect of substituents on the dissociation constant of acids – hydrogen bonding – Effects of hydrogen bonds on physical properties-Effect on melting and boiling points , Effect on solubility , Effect on strength carboxylic**Self study** -Effect of substituents on the dissociation constant of bases.

UNIT -II REACTION MECHANISM: (FUNDAMENTAL ASPECTS) (15 HRS.)

Homolytic and heterolytic cleavage of bonds – Attacking reagents – nucleophiles, electrophiles, free radicals – Reactive intermediates – carbocations, free radicals and carbenes – their formation, stability and structure – activation energy – Exergonic and endergonic reactions – Energy profile diagrams for concerted and two step reactions – transition state – intermediates – Hammonds postulate – Principle of microscopic reversibility – Kinetic and thermodynamic control of reactions.

Self study – carbanions- their formation, stability and structure.

UNIT -III ALKANES (15 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).

Self study-combustion – pyrolysis.

UNIT -IV CYCLOALKANES (15 HRS.)

Introduction**,** IUPAC nomenclature, General methods of preparation – Freund's method, Dieck mann's method, Simmon – Smith reaction, Thorpe – Ziegler reaction, Preparation from Cyclopentanone, Aromatic hydrocarbons, Salts of dicarboxylic acids, Active methylene groups, Alicyclic compounds, Alkenes, Grignard reagents. Chemical properties- oxidation, reaction with halogens, halogen acids and hydrogen. Relative stabilities of cycloalkanes- Baeyer's strain theory and its limitations, Sachse - Mohr theory, Relative

stabilities of cyclopropane, cyclobutane, cyclopentane and cyclohexane.

Self study-Physical properties of cycloalkanes.

UNIT -V ALKYL HALIDES (15 HRS.)

Introduction-Classification-Preparation from alcohols, alkenes, alkynes and alkanes- Physical properties-Chemical Reactions- Nucleophilic aliphatic substitution – Reduction reactions. Detailed Mechanism of nucleophilic substitution-Alkaline hydrolysis of methyl bromide (S_N2)-Factors influencing rates of nucleophilic substitution reactions and their stereochemistry. S_N2 vs. S_N1. Relative stability of the carbocations, rearrangement of carbocations – neighbouring group participation .

Self study- IUPAC Nomenclature, Alkaline hydrolysis of tert-butylbromide (S_N1).

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 & Company Ltd., 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 ofIndia Pvt, Ltd., New Delhi, 2005.
5. Jerry March, A, Advanced Organic Chemistry, 6th Edition, John Wileyand sons reprint, 2008.
6. Bhupinder Mehta & Manju Mehta, Organic Chemistry, 6th Edition, PHILearning Pvt Ltd., New Delhi, 2011.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 ELECTRON DISPLACEMENT EFFECTS				
1.1	Inductive effect and its applications– Delocalized bonds	2	Chalk & Talk	Black Board
1.2	Delocalisation of pi electrons through p-π and π-π overlap	1	Chalk & Talk	LCD
1.3	Resonance effect – rules of resonance structures	1	Lecture	Ball & Stick Models
1.4	Resonance energy – steric inhibition of resonance	3	Lecture	Black Board
1.5	Hyper conjugation – Electromeric effect	3	Lecture	Ball & Stick Models
1.6	Effect of substituents on the dissociation constant of acids – hydrogen bonding – Effects of hydrogen bonds on physical properties	2	Lecture	Ball & Stick Models
1.7	Effect on melting and boiling points , Effect on solubility	1	Lecture	PPT & White board
1.8	Effect on strength of carboxylic acids	2	Discussion	Black Board
UNIT -2 REACTION MECHANISM: (FUNDAMENTAL ASPECTS)				
2.1	Homolytic and heterolytic cleavage of bonds – Attacking reagents – nucleophiles, electrophiles	1	Lecture	Black Board
2.2	Free radicals – Reactive intermediates	2	Chalk & Talk	Green Board
2.3	Carbocations, free radicals and carbenes – their formation, stability and structure	2	Chalk & Talk	Black Board

2.4	Activation energy – Exergonic and endergonic reactions	3	Lecture	PPT & White

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
				Board
2.5	Energy profile diagrams for concerted and two step reactions – transition state – intermediates	2	Discussion	LCD
2.6	Hammonds postulate	1	Lecture	Black Board
2.7	Principle of microscopic reversibility	2	Lecture	PPT & White board
2.8	Kinetic and thermodynamic control of reactions	2	Lecture	Black Board
UNIT -3 ALKANES				
3.1	Introduction-IUPAC Nomenclature-Isomerism-Free rotation about carbon – carbon single bond	2	Lecture	Black Board
3.2	Conformations – Ethane	3	Discussion	LCD
3.3	Conformations – n-Butane	3	Lecture	PPT & White Board
3.4	Definition and distinction between configurational and conformational isomers	2	Lecture	Black Board
3.5	Classes of carbon atoms and hydrogen atoms. Industrial source – preparation	1	Discussion	LCD
3.6	Hydrogenation of alkenes, Reduction of RX	2	Lecture	Black Board
3.7	Coupling of RX with Lithium dialkyl copper (R2CuLi).	1	Lecture	Black Board
3.8	Reactions – halogenation (mechanism, orientation, relative reactivity of alkanes, reactivity and selectivity).	1	Lecture	Black Board
UNIT -4 CYCLOALKANES				
4.1	Introduction, IUPAC nomenclature, General methods	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	of preparation –Freund's method, Dieck mann's method			
4.2	Simmon – Smith reaction, Thorpe – Ziegler reaction, Preparation from Cyclopentanone	3	Chalk & Talk	Green Board
4.3	Aromatic hydrocarbons, Salts of dicarboxylic acids, Active methylene groups	2	Chalk & Talk	Black Board
4.4	Alicyclic compounds, Alkenes, Grignard reagents	3	Lecture	PPT & White board
4.5	Chemical properties- oxidation, reaction with halogens, halogen acids and hydrogen	1	Discussion	LCD
4.6	Relative stabilities of cycloalkanes- Baeyer's strain theory and its limitations	1	Lecture	Black Board
4.7	Sachse - Mohr theory, Relative stabilities of cyclopropane	2	Lecture	PPT & White board
4.8	Cyclobutane, cyclopentane and cyclohexane	2	Lecture	Black Board
UNIT -5 ALKYL HALIDES				
5.1	Introduction-Classification-Preparation from alcohols, alkenes, alkynes and alkanes	2	Lecture	Black Board
5.2	Physical properties-Chemical Reactions	2	Chalk & Talk	Green Board
5.3	Nucleophilic aliphatic substitution – Reduction reactions.	3	Chalk & Talk	Black Board
5.4	Detailed Mechanism of nucleophilic substitution	1	Lecture	PPT & White board
5.5	Alkaline hydrolysis of methyl bromide (S_N2)	2	Discussion	LCD

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.6	Factors influencing rates of nucleophilic substitution reactions and their stereochemistry	1	Lecture	Black Board
5.7	S_N2 vs. S_N1, Relative stability of the carbocations	2	Lecture	PPT & White board
5.8	Rearrangement of carbocations – neighbouring group participation	2	Lecture	Black Board

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non – Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Gain a thorough knowledge about the chemistry of aliphatic saturated compounds	K1,K2,K3 & K4	PSO1& PSO2
CO 2	Analyze the behaviour of an organic compound through electron displacement effects	K1,K2,K3 & K4	PSO3
CO 3	Describe the structure and stability of different types of intermediates involved in reaction mechanism.	K1,K2,K3 & K4	PSO5
CO 4	Know the nomenclature, classification of alkanes, alkyl halides.	K1,K2,K3 & K4	PSO2
CO 5	To derive and familiarise the mechanisms of nucleophilic substitution reactions of organic compounds.	K1,K2,K3 & K4	PSO3

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

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

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

COURSE DESIGNER:
1.Dr.M.Priyadharsani

2. Dr.V.Arul deepa

Forwarded By

HOD'S Signature
& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I UG CHEMISTRY
(SEMESTER - I)
(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C1CC3	VOLUMETRIC ANALYSIS - I	LAB IN	3	2

COURSE DESCRIPTION

This course trains the students to prepare the solutions of different concentrations and to estimate quantitatively by different techniques.

COURSE OBJECTIVE

This practical paper deals with the principles of volumetric analysis, classification of reactions in volumetric estimations, (Neutralisation-acidimetry and alkalimetry , Redox reaction –Permanganometry, Dichrometry-Iodometry and Iodimetry titrations)

COURSE OUTCOMES

After completion of the course, the students should be ableCO1 To prepare solutions of desired concentrations
.
CO2 To apply the principles of volumetric analysis in acid base,permanganometry,and iodometric titrations.
CO3 To compare the principles behind all types of titrationsCO4 To identify suitable indicators for a particular reaction.

List of titrations involved in volumetric analysis

- Estimation of Potassium Permanganate
- Estimation of Ferrous Ammonium Sulphate
- Estimation of Ferrous Sulphate
- Estimation of Oxalic Acid
- Estimation of Sodium Hydroxide
- Estimation of Sodium Carbonate
- Estimation of Potassium Dichromate

Reference Book
V.Venkateswaran,R.veeraswamy&A.R.Kulandaivelu,Basic Principles of

practical chemistry, 3rdEdn, 1992

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	To prepare solutions of desired concentrations	PSO1& PSO2
CO 2	To apply the principles of volumetric analysis in acid base, permanganometry,and iodometric titrations.	PSO3
CO 3	To compare the principles behind alltypes of titrations	PSO5
CO 4	To identify suitable indicators for a particular reaction.	PSO1
CO 5	To calculate acid strength of different acids	PSO2

Mapping of C0s with PSOs

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

CO5	**1**	**2**	**1**	**2**	**2**	**2**	**3**	**1**

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **V.Arul Deepa**
2. **B.Suganthana**
3. **KR.Subimol**

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc.

SEMESTER -I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	21C1ACN1/ 21C1ACZ1	Allied Chemistry-I	Allied	3	3

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 - Substitution, Elimination, Addition and Polymerization reactions. Carbohydrates - preparation, structure, properties and uses of glucose, fructose, sucrose, starch and tests for carbohydrates. Theory behind Volumetric Analysis.

COURSE OUTCOMES

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

To predict the geometry of any molecule with the help of VB and VSEPR theory

To construct M.O diagram for homonuclear diatomic molecule

To categorize the types of organic reactions

To describe the chemistry of carbohydrates.

To classify the chemical reactions involved in volumetric analysis

UNITS

UNIT -I Chemical bonding - VB Theory (9 HRS.)

Chemical bonding - V.B.Theory, Types of overlapping (S-S, S-P and P-P overlapping), Sigma and pi bonds, Hybridisation- SP_3, SP_2, and SP

Hybridisation in acetylene, ethylene & Methane, shapes of covalent molecules using VSPER theory ($BeCl_2$, BF_3, CH_4, H_2O,PCl_5 and SF_6).

UNIT -II Chemical bonding - MO Theory (9 HRS.)

MO theory - Introduction (LCAO Method not required) ,Relative order of energies of molecular orbital's, Bond order, Stability and Bond length of molecules, Paramagnetic & Diamagnetic character of molecules, electronic configuration of Homonuclear diatomic molecules (H_2 , He_2, Li_2, B_2, N_2O_2, F_2& Ne_2 Only).

UNIT -III Types of Organic Reactions (9 HRS.)

Substitution Reactions - Introduction, Free radical, Nucleophilic& Electrophilic Substitution reactions, Elimination reactions, Addition reactions - Electrophilic addition reactions, Nucleophilic addition reactions, Polymerization reactions – Addition Polymerization & Condensation Polymerization reactions {(only examples),(Mechanism not required)}.

UNIT -IV Carbohydrates (9 HRS.)

Classification of Carbohydrates, Preparation, Chemical properties, Haworth structure and uses of glucose, fructose, sucrose & starch. Tests for Carbohydrates - Molish's test, Fehling's solution test, Barfoed's test, Benedict's test, Osazone Formation. Conversion of glucose to fructose & fructose to glucose (Structural elucidation not required).

UNIT -V Theory behind volumetric Analysis (9 HRS.)

Normality, Molarity, Molality, Principles of volumetric analysis, Equivalent mass of

(i) An acid (HCl, H_2SO_4, $(COOH)_2$), (ii) A base(NaOH, KOH, $Ba(OH)_2$), (iii) An oxidizing agent ($KMnO_4$,$K_2Cr_2O_7$), (iv) A reducing agent ($FeSO_4.7H_2O$, FAS) and (v) Acidic salt/Basic salt (Na_2CO_3). Acid-base Titrations, Permanganametric Titrations, Iodometric Titrations and Iodimetric Titrations, Indicators- Phenophthalein, Methyl Orange, $KMnO_4$ (Self), & Starch (Theory of Indicators not required).

REFERENCES:

Text Books:

1. R.D.Madan, Modern Inorganic Chemistry, S.Chand and company,Reprint, 2012.

2. V.Venkateswaran, R.veeraswamy&A.R.Kulandaivelu, Basic Principles of

3. B.R.Puri, L.R.Sharma&S.Pathania, Principles of physical chemistry,47thEdn, 2015-2016.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I	**Chemical bonding - VB Theory**			
1.1	Chemical bonding - V.B.Theory,	1	Chalk & Talk	Black Board
1.2	Types of overlapping (S-S, S-P and P-P overlapping), Sigma and pi bonds	1	Chalk & Talk	Black Board
1.3	Hybridisation- SP_3, SP_2, and SP Hybridisation in acetylene, ethylene & Methane	3	Chalk & Talk	Black Board
1.4	shapes of covalent molecules usi VSPER theory ($BeCl_2$, BF_3, CH_4,)	2	Chalk & Talk	Black Board
1.5	shapes of covalent molecules usi VSPER theory (H_2O,PCl_5 and $SF_{6)}$	2	Chalk & Talk	Black Board
UNIT II	**Chemical bonding - MO Theory**			
2.1	MO theory - Introduction	1	Chalk & Talk	Black Board
2.2	Relative order of energies molecular orbital's, Bond ord Stability and Bond length molecules	2	Chalk & Talk	Black Board
2.3	Paramagnetic & Diamagnetic character of molecules	2	Chalk & Talk	Black Board
2.4	electronic configuration of Homonuclear diatomic molecules (H_2 , He_2, Li_2, B_2).	2	Chalk & Talk	Black Board

2.5	electronic configuration of Homonuclear diatomic molecules (N_2O_2, F_2& Ne_2).	2	Chalk & Talk	Black Board
UNIT III	**Types of Organic Reactions**			

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
3.1	Substitution Reactions - Introduction, Free radical	2	Chalk & Talk	Black Board
3.2	Nucleophilic& Electrophilic Substitution reactions, Elimination reactions,	3	Chalk & Talk	Black Board
3.3	Addition reactions - Electrophilic addition reactions, Nucleophilic addition reactions,	2	Chalk & Talk	Black Board
3.4	Polymerization reactions – Additi Polymerization & Condensati Polymerization reactions wi examples	2	Chalk & Talk	Black Board
UNIT IV	**Carbohydrates**			
4.1	Classification of Carbohydrates,	1	Chalk & Talk	Black Board
4.2	Preparation, Chemical properties,	2	Chalk & Talk	Black Board
4.3	Haworth structure and uses of glucose, fructose, sucrose & starch.	2	Chalk & Talk	Black Board
4.4	Tests for Carbohydrates - Molis test, Fehling's solution te Barfoed's test, Benedict's te Osazone Formation.	2	Chalk & Talk	Black Board
4.5	Conversion of glucose to fructose & fructose to glucose (Structural elucidation not required).	2	Chalk & Talk	Black Board
UNIT V	**Theory behind volumetric Analysis**			

5.1	Normality, Molarity, Molality, Principles of volumetric analysis,	1	Chalk & Talk	Black Board
5.2	Equivalent mass of (i) An acid (HCl, H_2SO_4, $(COOH)_2$), A base(NaOH, KOH, $Ba(OH)_2$),	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.3	An oxidizing agent ($KMnO_4$,$K_2Cr_2O_7$), (iv) A reducing agent ($FeSO_4.7H_2O$, FAS)	2	Chalk & Talk	Black Board
5.4	Acidic salt/Basic salt (Na_2CO_3).	1	Chalk & Talk	Black Board
5.5	Acid-base Titrations, Permanganametric Titrations, Iodometric Titrations and Iodimetric Titrations, Indicators- Phenophthalein, Methyl Orange, $KMnO_4$ (Self), & Starch	3	Chalk & Talk	Black Board

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

Non Scholastic	**-**	**-**	**-**	**-**		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

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

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

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

in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To predict the geometry of any molecule with the help of VB and VSEPR theory	K1,K3 & K4	PSO1& PSO2
CO 2	To construct M.O diagram for homonuclear diatomic molecule	K1 & K2	PSO2 &PSO7
CO 3	To categorize the types of organic reactions	K1, K2 , K3 & K4	PSO6
CO 4	To describe the chemistry of carbohydrates.	K1, K2 & K4	PSO1
CO 5	To classify the chemical reactions involved in volumetric analysis	K1,K2 & K3	PSO4 & PSO5

Mapping COs Consistency with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:
1. Dr. K.R.SUBIMOL

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I-B.Sc Homescience/Zoology

SEMESTER -I

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	21C1ACN2/21C1ACZ2	Allied chemistry practicals-I	LAB IN	2	2

Course Description

This course trains the students to estimate the solutions quantitatively by different techniques.

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

Course outcome

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

- CO1 describe the principles and procedures of various titrimetric methods
- CO2 identify suitable indicators for a particular reaction
- CO3 know the various terms such as standard solution, normality molality,molarity, equivalent weight and molecular weight.
- CO4 select the specific titric method to estimate the amount of analyte present in the given solution.
- CO5 Apply the expressions and equations to calculate the strength of solutions

Permanganonometry

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

Acidimetry-Alkalimetry

5. Estimation of Sodium Hydroxide 6.Estimation of Sodium Carbonate

Iodometry

6. Estimation of Potassium Dichromate
7.Estimation of Copper sulphate
8.Estimation of Potassiumpermanganate

Reference Book

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Describe the principles and procedures of various titrimetric methods	K1	PSO1& PSO5
CO 2	Identify suitable indicators for a particular reaction	K1, K3	PSO5
CO 3	Know the various terms such as standard solution, normality and molality.	K2 & K4	PS05, PSO7
CO 4	Select the specific titric method to estimate the amount of analyte present in the given solution.	K1, K3 & K4	PSO1,PSO5 & PSO7
CO 5	Apply the expressions and equations to calculate the strength of solutions	K1 & K4	PSO1,PSO5

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Mrs. R.M. Nagalakshmi

2. Dr. P. Silviya Reeta

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc.

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C1NME	PROFITABLE HOME INDUSTRIES	NME	2	2

COURSE DESCRIPTION

This course is designed for the students to become self-employed by training them in the preparation of household articles.

COURSE OBJECTIVES

This paper is specially designed for the non chemistry students to give an exposure on topics such as Food chemistry, Dairy Chemistry, Soap & detergents and cosmetics and to understand the basic principles behind them. With an aim to make each student an entrepreneur, we give hands on training to the students for the small scale preparation on the house hold items such as Ink, phenoyl, candle, detergent powder, washing powder, shampoo, liquid soap, incense stick, tooth powder and computer sambirani.

COURSE OUTCOMES

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

CO 1 Recognize the important nutrients present in food

CO 2 Gain knowledge about the fundamental chemistry involved in dairy products

CO 3 Determine the manufacture and functions of various soaps and creams

CO 4 Learn the ingredients required for the preparation of various types of shampoos, skin powder, nail polish

CO 5 Demonstrate the preparation of some home products like candle.detergent powder,soap oil,ink ,phenoyl and computer sambirani

UNITS

UNIT -I FOOD CHEMISTRY (6 HRS.)

History of food chemistry- Water in food systems- Carbohydrates- Lipids- Food proteins-Enzymes- Vitamins- Minerals - Color- Flavors-Foodadditives-Food adulterants and their detection in various food items.

UNIT -II DAIRY CHEMISTRY (6 HRS.)

Definition - composition of milk – Constituent of Milk – factors affecting quality and quantity of milk- Nutritive value of milk – Metals and non- metals used in Dairy Industry

UNIT -III SOAPS AND DETERGENTS (6 HRS.)

Manufacture of soaps, formulation of toilet soaps –different ingradientsused-Soft soaps, shaving soaps and creams.

UNIT -IV COSMETICS (6 HRS.)

Shampoos –different kinds of shampoos –anti dandruff, anti lice, herbal and baby shampoos

hair dye –manufacture of conditioners -skin preparation –skin powder, nailpolish, lipsticks.

UNIT -V PRACTICALS (6 HRS.)

Ink,phenoyl,candle,detergentpowder,washingpowder,and computer sambirani.

Determination of – Fat content – Acidity , pH of different branded milks.

REFERENCES:

1. Jayashree Gosh, Textbook of Pharmaceutical Chemistry, S.Chand&Chand publications New Delhi (1997).

2. Finar I L, Organic Chemistry Volume I and II, Sixth Edition, ELBS withLongmann, Singapore (1997).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I FOOD CHEMISTRY				
1.1	History of food chemistry- Water in food systems	1	Chalk & Talk	Black Board
1.2	Carbohydrates Lipids- Food proteins	1	Chalk & Talk	Black Board
1.3	Enzymes- Vitamins- Minerals – Color	1	Chalk & Talk	Black Board
1.4	Flavors-Food additives-	1	Chalk & Talk	Black Board
1.5	Food adulterants and th detection in various food items.	2	Chalk & Talk	Black Board
UNIT II DAIRY CHEMISTRY				
2.1	Definition - composition of milk	1	Chalk & Talk	Black Board
2.2	Constituent of Milk	2	Chalk & Talk	Black Board
2.3	Factors affecting quality and quantity of milk	1	Chalk & Talk	Black Board
2.4	Nutritive value of milk	1	Chalk & Talk	Black Board
2.5	Metals and non- metals used in Dairy Industry	1	Chalk & Talk	Black Board
UNIT III SOAPS AND DETERGENTS				
3.1	Manufacture of soaps	1	Chalk & Talk	Black Board

3.2	Formulation of toilet soaps	1	Chalk & Talk	Black Board
3.3	Different ingradients used-Soft soaps	2	Chalk & Talk	Black Board
3.4	Different ingradients used in shaving soaps	1	Chalk & Talk	Black Board
3.5	Different ingradients used in Creams	1	Chalk & Talk	Black Board
UNIT IV COSMETICS				
4.1	Shampoos –different kinds of shampoos	1	Chalk & Talk	Black Board
4.2	Anti dandruff, anti lice	1	Chalk & Talk	Black Board
4.3	Herbal and baby shampoos	1	Chalk & Talk	Black Board
4.4	Hair dye –manufacture conditioners	1	Chalk & Talk	Black Board
4.5	Skin preparation –skin powder	1	Chalk & Talk	Black Board
4.6	Nail polish, lipsticks.	1	Chalk & Talk	Black Board
UNIT V PRACTICALS				
5.1	Ink,phenoyl,detergentpowder, Washing powder	1	Chalk & Talk	Black Board
5.2	Candle, computer sambirani.	2	Chalk & Talk	Black Board
5.3	Determination of – Fat content	1	Chalk & Talk	Black Board
5.4	Acidity, pH of different branded milks.	2	Chalk & Talk	Black Board

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Get an exposure on the topics of food chemistry recognize various nutrients in food and awareness on food adulteration.	K1	PSO1& PSO2
CO 2	Know the basic composition of dairy products and their nutritive value.	K1, K2,	PSO3
CO 3	Acquire basic knowledge about the ingredients and manufacture of soaps and detergents.	K1 & K3	PSO1 & 2

CO 4	Learn the basic manufacturing principles of various cosmetic products such as shampoo, nail polish, conditioner etc.,	K1, K2, K3 &	PSO1
CO 5	Get hands on experience on small scale preparation on the house hold items such as Ink, phenoyl, candle, detergent powder, washing powder, shampoo, liquid soap, incense stick, tooth powder and computer sambirani.	K2	PSO5

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr.P. Silviya Reeta**

Forwarded By

S-Tedona.

HOD'S Signature & Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc., Chemistry

SEMESTER -II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WEEK	CREDITS
UGACH	19C2CC4	INORGANIC CHEMISTRY-II (THEORIES OF HARD AND SOFT ACIDS -BASES, CHEMICAL BONDING AND CHEMISTRY OF GROUP III, IV, V & VI elements)	UG Core	4	3

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

COURSE OBJECTIVES :

- To focus on Valence bond theory, molecular orbital theory, VSEPR theory and its' applications.
- To study the general characteristic features of group III, IV, V & VI group elements.

COURSE OUTCOME

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

CO 1 To categorize the soft, hard and border line acids and bases.

CO 2 To compare Valence bond theory and molecular orbital theory

CO 3 To understand the synthetic importance of organo metallic compounds of Al, B and Si

CO 4 To criticize the chemistry of hydrazine and hydroxyl amine

CO 5 To draw the structure of oxo halides and oxo acids of sulphur.

UNITS

UNIT -I Hard and soft acids and Theory of bonding - I: (12Hrs)

Hard and Soft Acids and Bases-HSAB principle – pearson concept of acids and bases – classification – application – Rationalisation of existence of ores, prediction of chemical reactions, coordination behaviour of ambidentate ligands.

Ionic bonding – Radius ratio rule and its Applications- variable electrovalency – lattice energy – Born Haber cycle – Factors affecting Lattice energy – Properties of ionic crystals on the basis of lattice energy – solubility of ionic crystals in various solvents – stability of ionic compounds.

UNIT -II Theory of bonding - II: (12Hrs)

Covalent bonding – VB theory – concept of hybridisation involving d orbitals – VSEPR theory – Merits and demerits of VB and VSEPR theory - Linear combination of atomic orbitals(LCAO) – Molecular orbital theory (M.O) - Comparison of M.O and V.B theory - MO diagrams – homo & hetero nuclear molecules – O_2,O^{2-},O_2^{2-},CO,CN,NO – bond order, magnetic properties, electronic configuration.

Self Study: MO diagrams –,NO

UNIT III : Chemistry of III and IV Group elements (12Hrs)

General characteristics of III group elements. Reactions of the elements with acids alkalies. Compounds of boron- borax and borane. Qualitative analysis of boron compounds. Alumina, qualitative analysis of Aluminium, Amphoteric behavior of Aluminates, Tri halides of Aluminium, Organometallic compounds of Boron and Aluminium – Diagonal relationship of B and Si

General characteristics of IV group elements. Compounds of carbon- Carbides, oxides and Carbonates.Oxides of silicon, silicates – structure of ortho, pyro and chain silicates-silicones and their applications.

Self Study: Silicates

UNIT IV : Chemistry of Vgroup elements (12Hrs)

General characteristics of V group elements – Unique features of Nitrogen – Main differences between N and other family members -Chemistry of hydrazine and hydroxylamine. Oxides, halides and Oxyacids of nitrogen and phosphorus. Nitrogen cycle and Fixation of nitrogen. Phosphazines and cyclophosphazines.

Self Study: Chemistry of hydroxylamine Chemistry of VI group elements (12Hrs) General characteristics of VI group elements. Anamolous behavior of oxygen- Chalcogens. Acid rain, Allotropy of oxygen and sulphur. Chemistry of ozone and and it's depletion. General properties of oxides. (No specific oxides). Oxoacids of sulphur-H_2SO_4, H_2SO_5, $H_2S_2O_8$. Comparison between Caro's acid and Marshall's acid, structure of S_4N_4 and S_2N_2, Oxyhalides - $SOCl_2$ and SO_2Cl_2.

Self Study: Allotropy of oxygen.

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.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**TITLE- Hard and soft acids and Theory of bonding**			
1.1	HSAB Principle	1	Chalk & Talk	Black Board
1.2	Applications of HSAB	2	Chalk & Talk	LCD
1.3	Characteristic features of hard acids, soft acids and hard bases, soft bases	2	Chalk & Talk	Black Board
1.4	Symbiosis	1	Chalk & Talk	Black Board
1.5	Lattice energy	1	Chalk & Talk	Black Board

1.6	Applications of Lattice energy	2	Chalk & Talk	Black Board
1.7	Born- Haeber cycle	2	Lecture	Black Board
1.8	Properties of ionic crystals	1	Chalk & Talk	Black Board
UNIT -2 TITLE - Theory of bonding – II				
2.1	Covalent bonding	1	Lecture	Green Board Charts

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	VB theory	2	Chalk & Talk	Green Board
2.3	concept of hybridisation involving d- orbitals	2	Chalk & Talk	Black Board
2.4	VSEPR theory	2	Chalk & Talk	Black Board
2.5	Merits and demerits of VB and VSEPR theory	1	Chalk & Talk	Black Board
2.6	Linear combination of atomic orbitals(LCAO)	2	Chalk & Talk	Black Board
2.7	Molecular orbital theory (M.O)	2	Chalk & Talk	Black Board
2.8	Comparison of M.O and V.B theory	1	Chalk & Talk	Black Board

UNIT -III TITLE - Chemistry of III and IV Group elements				
3.1	General characteristics of III group elements	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.2	Reactions of the elements with acids alkalies. Compounds of boron- borax and borane.	2	Chalk & Talk	Black Board
3.3	Qualitative analysis of boron compounds. Alumina, qualitative analysis of Aluminium,	2	Chalk & Talk	Black Board
3.4	Amphoteric behaviour of Aluminates,	2	Chalk & Talk	Black Board
3.5	Tri halides of Aluminium,	1	Chalk & Talk	Black Board
3.6	Organometallic compounds of Boron and Aluminium Diagonal relationship of B and Si	2	Chalk & Talk	Black Board
3.7	General characteristics of IV group elements.	1	Chalk & Talk	Black Board
3.8	silicones and their applications.	1	Chalk & Talk	Black Board

UNIT -IV Chemistry of V group elements

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.1	General characteristics of V group elements	1	Chalk & Talk	Black Board
4.2	Unique features of Nitrogen	1	Chalk & Talk	Black Board
4.3	Main differences between N and other family members – Chemistry	2	Chalk & Talk	Black Board
4.4	Chemistry of hydrazine and hydroxylamine.	1	Chalk & Talk	Black Board
4.5	Oxides, halides of nitrogen and phosphorus	2	Chalk & Talk	Black Board
4.6	Oxyacids of nitrogen	1	Chalk & Talk	Black Board
4.7	Nitrogen cycle and Fixation of nitrogen.	2	Chalk & Talk	Black Board

4.8	Phosphazines and cyclophosphazines.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -V TITLE - Chemistry of VI group elements				
5.1	General characteristics of VI group elements	1	Chalk & Talk	Black Board
5.2	Anamolous behavior of oxygen-Chalcogens and Acid rain	1	Chalk & Talk	Black Board
5.3	Allotropy of oxygen and sulphur	2	Chalk & Talk	Black Board
5.4	Chemistry of ozone and and it's Depletion	2	Chalk & Talk	Black Board
5.5	General properties of oxides. Oxoacids of sulphur - H_2SO_4, H_2SO_5	2	Chalk & Talk	Black Board
5.6	Comparison between Caro's acid and Marshall's acid	1	Chalk & Talk	Black Board
5.7	structure of S_4N_4 and S_2N_2	1	Chalk & Talk	Black Board

5.8	Oxyhalides - $SOCl_2$ and SO_2Cl_2.	1	Chalk & Talk	Black Board

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non – Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To categorize the soft, hard and border line acids and bases.	K1, K2, K3 &K4	PSO1& PSO2
CO 2	To compare Valence bond theory and molecular orbital theory	K1, K2, K3 &K4	PSO1& PSO3
CO 3	To understand the synthetic importance of organo metallic compounds of Al, B and Si	K1, K2, K3 &K4	PSO1&PSO6

CO 4	To criticize the chemistry of hydrazine and hydroxyl amine	K1, K2, K3 &K4	PSO1& PSO3
CO 5	To draw the structure of oxo halides and oxo acids of sulphur.	K1, K2, K3 &K4	PSO3 & PSO6

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER: Dr. B.SUGANTHANA

Forwarded By

B-Tedona.

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc., Chemistry

SEMESTER -II

For those who joined in 2019 onwards

UACH	**19C2CC5**	**ORGANIC CHEMISTRY - II (ALKENES,ALKYNES, ALKADIENES, ORGANO METALLIC COMPOUNDS, ALCOHOLS AND ETHERS)**	**UG core**	**5**	**4**

COURSE DESCRIPTION

This paper deals with the chemistry of alkenes, alkadienes, alkynes and organometallics with special emphasis on their synthetic applications,and also provides the study of preparation and properties of alcohols and ether

COURSE OBJECTIVES

To focus on the chemistry of alkenes, alkadienes and alkynes

To study the synthetic applications of organometallic compounds

COURSE OUTCOME

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

CO1 gain a basic knowledge about elimination reactions to prepare alkenesCO 2 describe the chemical reactions and structure of alkenes

CO 3 classify the alkadienes and alkynes

CO 4 choose the specific reagents to prepare various organic compounds from GR

CO 5 Compare the properties of alcohols and ethers

UNIT I- ALKENES-I **(15HRS)**

Alkenes – IUPAC Nomenclature-Isomerism-Structure of Ethylene – Preparation by dehydration of alcohols,dehydro halogenation of alkyl halides, dehalogenation of vicinal dihalides and reduction of alkynes.– Mechanism,evidences and Orientation of E1and E2,Saytzeff rule and

Hoffmann rule -orientaiton, Reactivity with mechanism.E2 Vs E1,

Self Study: Elimination Vs Substitution

UNIT II- ALKENES- II **(15 HRS)**

Reactions of Alkenes – Hydrogenation, determination of stability of alkenesby Heat of hydrogenation.Addition of HX – Markovnikov's rule andmechanism.Addition of HBr – peroxide effect – mechanism.Addition of $H_2SO_4$and H_2O. Electrophilic addition – Orientation,Mechanism andrearrangement.Addition of halogens – Mechanism and Stereochemistry ofaddition.Halohydrin formation, oxymercuration and demercuration, hydroboration, hydroxylation, ozolysis,oxidation,reduction and polymerisation **Self Study:** Test for alkenes.

UNIT III- ALKADIENES & ALKYNES **(15 HRS)**

Classification of dienes,-IUPAC Nomenclature-isomerism-Preparation of conjugated diene by dehydration of alcohols,dehydrohalogenation of dihalides and selective reduction of triple bond.Structure and stereochemistry of conjugated dienes.Determination of Stability of dienes by heat of hydrogenation– – Thieles theory of partial valency. Electrophilic addition – 1,2 and1,4- addition of Br_2 and HBr. 1,2 adduct Vs 1,4 adduct. Rate Vs equilibrium.

Structure,preparationof alkynes by dehydrohalogenation of alkyl dihalides and using metal acetylides. Reactions – Addition of H_2 and hydration
-tautomerism. Acidity of alkynes –Tests for alkynes.

Self Study: Resonance in alkadienes.& ozonolysis in alkynes.

UNIT IV- ORGANOMETALLIC COMPOUNDS **(15 HRS)**

Preparation and synthetic application of Grignard reagent – synthesis of Hydrocarbons, primary, secondary and tertiary alcohols, ethers, aldehydes, ketones, acids, esters, and primary amines-Reformatsky reaction-Gilman reagent- preparation and applications

Self Study:. Tetra ethyl lead- preparation and application

UNIT V- ALCOHOLS AND ETHERS **(15HRS)**

a) Alcohols

Structure and isomerism-Physical properties, industrial source,

preparation of alcohols by reduction of carbonyl compounds, acids and esters. Reactions of alcohols – reactions involving R-OH bond cleavage with HX, PCl_5, $SOCl_2$ and dehydration. – reactions involving O-H bond cleavage with metals,acids $ArSO_2Cl$ and oxidation. Distinction between primary,secondary and tertiary alcohols-Lucas test and Victor Meyer's test

Self Study: Alcohols as acids and bases.

b)Ethers

Structure and isomerism-Preparation of ethers by Williamson's synthesis and alkoxymercuration – demercuration method. Reactions of ethers – with strong inorganic acids, dilute H_2SO_4, HI, Cl_2, O_2, PCl_5. Crown ethers – host – guest relationship. Epoxides – Preparation, Reactions of epoxides – Acid catalysed cleavage.

Self Study: Reactions of epoxides – base catalysed cleavage

Text Books:

1. Jain M.K.& Sharma.S.C,Modern Organic Chemistry,1st Edition,VishalPublishing Co. New Delhi., 2017.
2. Bahl B.S. & Arun Bahl.Organic Chemistry,22nd Edition., S.Chand &Company Ltd New Delhi., 2017.
3. Finar I. L.Organic Chemistry,Volume1; The Fundamental Principles 6th Edition,ELBS &Longman group Pvt., Ltd., 2005.

References:

1. Morrison,R.T & Boyd,Organic Chemistry,6th Edition.,Prentice-hall of India Pvt, Ltd, New Delhi., 2005
2. Jerry March,A, Advanced Organic Chemistry, 6th Edition,John Wiley and sons reprint, 2008.
3. Bhupinder Mehta & Manju Mehta., Organic Chemistry., 6th Edition., PHILearning Pvt Ltd., New Delhi., 2011

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 ALKENES-I				
1.1	IUPAC Nomenclature-Isomerism of alkenes	2	Chalk & Talk	Black Board
1.2	Structure of Ethylene	2	Chalk & Talk	PPT & White board
1.3	Preparation by dehydration of alcohols,dehydro halogenation of alkyl halides, dehalogenation of vicinal dihalides and reduction of alkynes	2	Chalk & Talk	Black Board
1.4	Mechanism,evidences and Orientation of E1and E2	3	Chalk & Talk	Smart Board
1.5	Saytzeff rule and Hoffmann rule -orientaiton,	2	Chalk & Talk	Black Board
1.6	Saytzeff rule and Hoffmann rule Reactivity with mechanism	3	Chalk & Talk	Black Board
1.7	E2 Vs E1	1	Chalk & Talk	Black Board
Unit -2 ALKENES-II				
2.1	Hydrogenation, determination of stability of alkenes by Heat of hydrogenation	2	Chalk & Talk	PPT & White board
2.2	Markovnikov's rule and Mechanism	2	Chalk & Talk	Black Board
2.3	Addition of HX &peroxide effect Addition of H_2SO_4 and H_2O.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.4	Additionof halogens –Mechanism and Stereochemistry of addition&Halohydrin formation	3	Chalk & Talk	Black Board
2.5	oxymercuration and demercuration& hydroboration,	2	Chalk & Talk	PPT & White board
2.6	ozolysis,oxidation&reduction	2	Chalk & Talk	Black Board
2.7	Hydroxylation& polymerisation	2	Chalk & Talk	Black Board
UNIT -3 ALKADIENES AND ALKYNES				
3.1	Classification of dienes,-IUPAC Nomenclature-isomerism	2	Chalk & Talk	PPT & White board
3.2	Preparation of conjugated diene	2	Chalk & Talk	Black Board
3.3	Structure and stereochemistry of conjugated dienes.Determination of Stability of dienes by heat of hydrogenation	2	Chalk & Talk	Black Board
3.4	Thieles theory of partial valency.	1	Chalk & Talk	Black Board
3.5	Electrophilic addition – 1,2 and1,4- addition of Br_2 and HBr. 1,2 adduct Vs 1,4 adduct	2	Chalk & Talk	Black Board
3.6	Structure,preparation of alkynes by dehydrohalogenation of alkyl dihalides and using metal acetylides.	2	Chalk & Talk	Black Board
3.7	Reactions – Addition of H_2 and hydration -tautomerism.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.8	Acidity of alkynes & Tests for alkynes.	2	Chalk & Talk	Black Board
UNIT -4 ORGANOMETALLIC COMPOUNDS				
4.1	Preparation and structure of Grignard reagent	2	Chalk & Talk	Black Board
4.2	Preparation of primary, secondary and tertiary alcohols from GR	3	Chalk & Talk	Black Board
4.3	Preparation of ethers,aldehydes, and ketones from GR	3	Chalk & Talk	Black Board
4.4	Preparation of acids and esters from GR	1	Chalk & Talk	Black Board
4.4	Preparation of hydrocarbons and primary amines from GR	3	Chalk & Talk	Black Board
4.5	Reformatsky reaction	1	Chalk & Talk	Black Board
4.6	Gilman reagent- preparation and applications	2	Chalk & Talk	Black Board
UNIT -5 ALCOHOLS AND ETHERS				
5.1	Structure and isomerism of alcohols	2	Chalk & Talk	PPT & White board
5.2	preparation of alcohols	1	Chalk & Talk	Black Board
5.3	reactions involving R-O bond cleavage	3	Chalk & Talk	Black Board
5.4	reactions involving O-H bond	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.5	Distinction between primary secondary and tertiary alcohols	1	Chalk & Talk	PPT & White board
5.6	Structure and isomerism- Preparation of ethers Reactions of ethers.	2	Chalk & Talk	Black Board
5.7	Crown ethers – host – guest relationship.	2	Chalk & Talk	Black Board
5.8	Preparation and Reactions of epoxides - Acid catalysed cleavage.	2	Chalk & Talk	Black Board

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

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

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

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

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

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

in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Gain a basic knowledge about elimination reactions to prepare alkenes	K1, K2, K3 &K4	PS01,PS02
CO 2	describe the chemical reactions and structure of alkenes	K1, K2, K3 &K4	PS01, PS02
CO 3	classify the alkadienes and alkynes	K1, K2, K3 &K4	PS01, PS02
CO 4	Choose the specific reagents to prepare various organic compounds from GR	K1, K2, K3 &K4	PS01&PS03
CO 5	Compare the properties of alcohols and ethers	K1, K2, K3 &K4	PS01, PSO6 & PS07

Mapping of C0s with PSOs

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

CO3	**3**	**3**	**1**	**1**	**1**	**1**	**1**	**1**
CO4	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**
CO5	**3**	**1**	**1**	**1**	**1**	**3**	**3**	**1**

Mapping of C0s with Pos

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

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

COURSE DESIGNER:
Dr.V.ARULDEEPA

Forwarded By

HOD'S Signature
& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I UG CHEMISTRY
(SEMESTER - II)
(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C2CC6	VOLUMETRIC ANALYSIS - II	LAB IN	3	2

COURSE DESCRIPTIVE

This course trains the students to prepare the solutions of differentconcentrations
and to estimate quantitatively by different techniques.

COURSE OBJECTIVE

This practical paper deals with the principles of volumetric analysis of calcium–precipitation method - Argentimetric titrations, complexometric titrations and
basic principles involved in organic estimations of phenol & aniline.

COURSE OUTCOMES

After completion of the course, the students should be able

- To apply the principles of volumetric analysis in various
- estimations.To estimate the amount of calcium using
- permanganometric method
- To estimate the amount of calcium and magnesium using EDTA
- method.To apply the principle of Argentimetry in the estimation of chloride ions.

To understand the principles behind the estimations of phenol & Aniline iodometrically.

Experiments

1. Estimation of Ferrous Sulphate - External Indicator Method
2. Estimation of Aniline
3. Estimation of Phenol
4. Estimation of Calcium
5. Estimation of Potassium Chloride Using Silver Nitrate (Demonstration)
6. Estimation of Ethylmethyl ketone
7. Estimation of $CuSO_4$
8. Complexometric Titrations- EDTA titration

Reference Book

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To apply the principles of volumetric analysis in various estimations.	K1	PSO1& PSO2
CO 2	To estimate the amount of calcium using permanganometric method	K1, K2	PSO3
CO 3	To estimate the amount of calcium and magnesium using EDTA method.	K1 & K3	PSO5
CO 4	To apply the principle of Argentimetry in the estimation of chloride ions.	K1, K2 & K3	PSO1
CO 5	To understand the principles behind the estimations of phenol & Aniline iodometrically.	K2 & K4	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **V.Arul Deepa**
2. **S.Sukumari**
3. **P.Silviya Reeta**

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc. HOME SCIENCE/ ZOOLOGY

SEMESTER -II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	21C2ACN3/ 21C2ACZ3	ALLIED CHEMISTRY - II (THEORY BEHIND CHEMICAL BONDING, AND ORGANIC QUALITATIVE ANALYSIS, KINETICS OF CHEMICAL REACTIONS AND CATALYSIS)	Allied	3	3

COURSE DESCRIPTION :

This paper deals with the concepts of various theories of coordination chemistry, qualitative analysis of organic compounds, kinetic studies of chemical reactions and general characteristic features of a catalyst.

COURSE OBJECTIVES :

- To study the basic concepts of theories of coordinationchemistry and principles involved in organic analysis.
- To focus on kinetic studies,theories and types of catalysis.

COURSE OUTCOME

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

CO 1 Apply the rules for naming the coordination complexes and to illustrate the applications of metal complexes in biological systems.

CO 2 To analyze the various organic compounds qualitatively

CO 3 To understand the procedure involved in detection ofelements.

CO 4 To explain the kinetics of a chemical reaction and to calculate the order of a particular reaction

CO 5 To evaluate the types of catalysis and theories of catalysis

UNITS

UNIT -I INORGANIC CHEMISTRY-I (9 Hrs)

Coordination Chemistry-I: Introduction, Shapes of d-orbitals, theories of coordination compounds, werner,s theory, Sidgwick's theory, Pauling's theory, Crystal field and Ligand field theories (Introduction idea only) and EAN rule. Coordination Chemistry-II: Nomenclature of complexes, Chelation, metal complexes in biological systems, Chlorophyll, Heme proteins.

UNIT -II: THEORY OF ORGANIC QUALITATIVE ANALYSIS - I:(9 Hrs)

Detection of elements- N,S and Halogens, preparation of Lassiange's extract and the reactions involving the extract. Distinction of Mono and Dicarboxylic acids – solubility, reaction with $NaHCO_3$ and soda lime. Formation of phenolphalein and fluorescein. Reactions of alcohols and phenol -solubility reaction with NaOH and neutral $FeCl_3$.

UNIT III: THEORY OF ORGANIC QUALITATIVE ANALYSIS - II: (9 Hrs)

Reactions of Carbonyl compounds-Solubility –Tollen's reagent test, Borches test, Formation of hydrazone and oxime.Reactions of mono and disaccharides-solubility, reaction with conc.H_2SO_4, Molisch's test, Fehling's solution test, Barfoed's test and Benedict's test. Reaction of 1^0, 2^0 and 3^0 amines- solubility-reaction with HNO_2. Diazotisation -Coupling reaction - Monoamide and Diamides-solubility, action of heat, reaction with NaOH and Biuret test.

UNIT IV : .CHEMICAL KINETICS (9 Hrs)

Chemical Kinetics-Introduction-reaction rate,order and molecularity of a reaction, first order reaction, second order reactions; test for a second order reactions and examples of second order reaction. Zero order reactions-effect of temperature on reaction velocity,energy of activation.

UNIT V : CATALYSIS (9 Hrs)

Introduction, general characteristics of catalysed reactions,types of catalysis,theories of catalysis,catalytic poisoning, auto catalysis.

REFERENCES:

TEXT BOOK

R.D.Madan, Modern Inorganic Chemistry, S.Chand and company, Reprint, 1994.

REFERENCE BOOKS

1. R.D.Madan, Modern Inorganic Chemistry, S.Chand and company,Reprint, 1994.
2. V.Venkateswaran, R.veeraswamy&A.R.Kulandaivelu,Basic Principles ofpractical chemistry, 3rd Edn, 1992.
3. B.R.Puri, L.R.Sharma&S.Pathania, Principles of physical chemistry, 33rdE dn,1992.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 TITLE- INORGANIC CHEMISTRY-I				
1.1	Coordination Chemistry-I: Introduction	1	Chalk & Talk	Black Board
1.2	VB-Theory introduction	1	Chalk & Talk	LCD
1.3	Types of overlapping – s-s, s-p & p-p overlap	1	Chalk & Talk	Black Board
1.4	Sigma & pi bonds	2	Chalk & Talk	Black Board
1.5	Hybridization in Ethane	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.6	Hybridization in Ethylene and acetylene	1	Chalk & Talk	Black Board
1.7	VSEPR Theory	1	Lecture	Black Board
1.8	Applications of VSEPR Theory	1	Chalk & Talk	Black Board
UNIT -2 TITLE - PRINCIPLES OF VOLUMETRIC ANALYSIS				
2.1	Introduction to principles of volumetric analysis	1	Lecture	Green Board Charts
2.2	Normality, Molarity, Molality	2	Chalk & Talk	Green Board
2.3	Acid base titrations	1	Chalk & Talk	Black Board
2.4	permanganometric titration	1	Chalk & Talk	Black Board
2.5	iodo and iodimetric titration	1	Chalk & Talk	Black Board
2.6	Dichrometry	1	Chalk & Talk	Black Board
2.7	Argentimetry	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.8	EDTA titrations	1	Chalk & Talk	Black Board
UNIT -III TITLE -THEORY OF ORGANIC QUALITATIVE ANALYSIS				
3.1	Detection of elements – N.S. and Halogens – preparation of Lassaaigne's extract the reactions involving the extract.,	1	Chalk & Talk	Black Board
3.2	Distinction between aliphatic and aromatic- saturated and unsaturated compounds.			
3.3	Reactions of mono and dicarboxylic acids – Solubility, Reaction with $NaHCO_3$ and soda lime, Formation of phenolphthalein and Resorcinol.	1	Chalk & Talk	Black Board
3.4	Reactions of Carbonyl compounds-Solubility –Tollen's reagent test , Borches test, Formation of hydrazone and oxime. ,	1	Chalk & Talk	Black Board
3.5	Reactions of mono and disaccharides-solubility, reaction with conc.H_2SO_4 Barfoed's test and Benedict's test. Molisch's test, Fehling's solution test	2	Chalk & Talk	Black Board
3.6	Reaction of 1^0, 2^0 and 3^0 amines	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.7	Solubility test, reaction with HNO_2. Diazotisation -Coupling reaction	1	Chalk & Talk	Black Board
3.8	Monoamide and Diamides-	1	Chalk & Talk	Black Board
3.9	Solubility test, action of heat, reaction with NaOH and Biuret test.	1	Chalk & Talk	Black Board
UNIT -IV TITLE - CHEMICAL KINETICS				
4.1	Chemical Kinetics-Introduction	1	Chalk & Talk	Black Board
4.2	Reaction rate,order and molecularity of a reaction.	1	Chalk & Talk	Black Board
4.3	First order reaction	2	Chalk & Talk	Black Board
4.4	Second order reactions	1	Chalk & Talk	Black Board
4.5	Test for a second order reactions, examples of second order reaction.	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
4.6	Zero order reactions	1	Chalk & Talk	Black Board
4.7	Effect of temperature on reaction velocity	1	Chalk & Talk	Black Board
4.8	Energy of activation.	1	Chalk & Talk	Black Board
UNIT -V TITLE - THERMODYNAMICS- I				
5.1	Introduction to thermodynamics	1	Chalk & Talk	Black Board
5.2	Importance, Limitations of thermodynamics	1	Chalk & Talk	Black Board
5.3	terminology of thermodynamic systems, macroscopic properties, state variables, state functions, path functions, ,	2	Chalk & Talk	Black Board
5.4	thermodynamic equilibrium, isothermal, adiabatic, isochoric	1	Chalk & Talk	Black Board
5.5	reversible and irreversible process- nature of work and heat	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.6	law of conservation of energy, first law of thermodynamics	1	Chalk & Talk	Black Board
5.7	Internal energy - enthalpy of a system heat capacity	1	Chalk & Talk	Black Board
5.8	correlation between Cp and Cv.	1	Chalk & Talk	Black Board

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

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

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

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

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

  in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To comprehend the fundamental theories of Valence Bond, types of overlapping and VSEPR.	K1	PSO1& PSO2
CO 2	To categorize the reactions involved in volumetric analysis	K1, K2,	PSO3
CO 3	To analyze the various organic compounds qualitatively	K1 & K3	PSO5
CO 4	To recognize the theories of chemical kinetics.	K1, K2, K3 &	
CO 5	To highlight the importance of thermodynamics and its related functions.	K2 & K4	

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:

Dr.B.SUGANTHANA

Forwarded By

HOD'S Signature
& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc., ZOOLOGY & HOMESCIENCE
(SEMESTER - II)
(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	21C2ACN4/ 21C2ACZ4	ALLIED CHEMISTRY PRACTICALS-II	LAB IN	2	2

Course Description:

This course gives lab experience on organic qualitative analysis.

Course Objective:

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

Course outcome:

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

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

Organic qualitative analysis

The anaysis involving the detection of following characteristics of the given organiccompound

1. Whether given organic compound is aliphatic or aromatic

2. Whether given organic compound is saturated or unsaturated

3. Any one of the following functional groups

1.Carbohydrate
2.Aldehyde
3.Ketone
4.Phenol
5.Amide
6.CarboxylicAcid
7.Amine

Reference Book

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To gain the knowledge of appearance, colour, physical state, and odour of organic substances.	K1	PSO1& PSO5
CO 2	To distinguish whether the given compound is Aliphatic or Aromatic,and Saturated or Unsaturated.	K1, K3	PSO5
CO 3	To perform the confirmatory test for various functional groups present in thegiven organic compound	K2 & K4	PS05, PSO7
CO 4	To recognize the usage of apparatus and laboratory reagents.	K1, K3 & K4	PSO1,PSO5 & PSO7

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

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr. Sr. ARULMARY**
2. **Dr. K.R.SUBIMOL**

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

I B.Sc. CHEMISTRY

SEMESTER -II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C2NME	PROFITABLE HOME INDUSTRIES	NME	2	2

COURSE DESCRIPTION

This course is designed for the students to become self-employed by training them in the preparation of household articles.

COURSE OBJECTIVES

This paper is specially designed for the non chemistry students to give an exposure on topics such as Food chemistry, Dairy Chemistry, Soap & detergents and cosmetics and to understand the basic principles behind them. With an aim to make each student an entrepreneur, we give hands on training to the students for the small scale preparation on the house hold items such as Ink, phenoyl, candle, detergent powder, washing powder, shampoo, liquid soap, incense stick, tooth powder and computer sambirani.

COURSE OUTCOME

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

CO 1 Recognize the important nutrients present in food

CO 2 Gain knowledge about the fundamental chemistry involved in dairyproducts

CO 3 Determine the manufacture and functions of various soaps and creams

CO 4 Learn the ingredients required for the preparation of various types ofshampoo

CO 5 Demonstrate the preparation of some home products

likecandle.detergent powder,soap oil,ink ,phenoyl and computer sambirani

UNITS

UNIT -I FOOD CHEMISTRY (6 HRS.)

History of food chemistry- Water in food systems- Carbohydrates- Lipids- Food proteins-Enzymes- Vitamins- Minerals - Color- Flavors-Foodadditives-Food adulterants and their detection in various food items.

UNIT -II DAIRY CHEMISTRY (6 HRS.)

Definition - composition of milk – Constituent of Milk – factors affecting quality and quantity of milk- Nutritive value of milk – Metals and non- metals used in Dairy Industry

UNIT -III SOAPS AND DETERGENTS (6 HRS.)

Manufacture of soaps, formulation of toilet soaps –different ingradientsused-Soft soaps, shaving soaps and creams.

UNIT -IV COSMETICS (6 HRS.)

Shampoos –different kinds of shampoos –anti dandruff, anti lice, herbal and baby shampoos

hair dye –manufacture of conditioners -skin preparation –skin powder, nailpolish, lipsticks.

UNIT -V PRACTICALS (6 HRS.)

Ink,phenoyl,candle,detergentpowder,washingpowder,and computer sambirani.

Determination of – Fat content – Acidity , pH of different branded milks.

REFERENCES:

1. Jayashree Gosh, Textbook of Pharmaceutical Chemistry, S.Chand&Chand publications New Delhi (1997).

2. Finar I L, Organic Chemistry Volume I and II, Sixth Edition, ELBS withLongmann, Singapore (1997).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I FOOD CHEMISTRY				
1.1	History of food chemistry- Water in food systems	1	Chalk & Talk	Black Board
1.2	Carbohydrates Lipids- Food proteins	1	Chalk & Talk	Black Board
1.3	Enzymes- Vitamins- Minerals – Color	1	Chalk & Talk	Black Board
1.4	Flavors-Food additives-	1	Chalk & Talk	Black Board
1.5	Food adulterants and th detection in various food items.	2	Chalk & Talk	Black Board
UNIT II DAIRY CHEMISTRY				
2.1	Definition - composition of milk	1	Chalk & Talk	Black Board
2.2	Constituent of Milk	2	Chalk & Talk	Black Board
2.3	Factors affecting quality and quantity of milk	1	Chalk & Talk	Black Board
2.4	Nutritive value of milk	1	Chalk & Talk	Black Board
2.5	Metals and non- metals used in Dairy Industry	1	Chalk & Talk	Black Board
UNIT III SOAPS AND DETERGENTS				

3.1	Manufacture of soaps	1	Chalk & Talk	Black Board
3.2	Formulation of toilet soaps	1	Chalk & Talk	Black Board
3.3	Different ingradients used-Soft soaps	2	Chalk & Talk	Black Board
3.4	Different ingradients used in shaving soaps	1	Chalk & Talk	Black Board
3.5	Different ingradients used in Creams	1	Chalk & Talk	Black Board
UNIT IV COSMETICS				
4.1	Shampoos –different kinds of shampoos	1	Chalk & Talk	Black Board
4.2	Anti dandruff, anti lice	1	Chalk & Talk	Black Board
4.3	Herbal and baby shampoos	1	Chalk & Talk	Black Board
4.4	Hair dye –manufacture conditioners	1	Chalk & Talk	Black Board
4.5	Skin preparation –skin powder	1	Chalk & Talk	Black Board
4.6	Nail polish, lipsticks.	1	Chalk & Talk	Black Board
UNIT V PRACTICALS				
5.1	Ink,phenoyl,detergentpowder, Washing powder	1	Chalk & Talk	Black Board
5.2	Candle, computer sambirani.	2	Chalk & Talk	Black Board
5.3	Determination of – Fat content	1	Chalk & Talk	Black Board

5.4	Acidity, pH of different branded milks.	2	Chalk & Talk	Black Board

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Get an exposure on the topics of food chemistry recognize various nutrients in food and awareness on food adulteration.	K1	PSO1& PSO2
CO 2	Know the basic composition of dairy products and their nutritive value.	K1, K2,	PSO3
CO 3	Acquire basic knowledge about the ingredients and manufacture of	K1 & K3	PSO1 & 2

	soaps and detergents.		
CO 4	Learn the basic manufacturing principles of various cosmetic products such as shampoo, nail polish, conditioner etc.,	K1, K2, K3 &	PSO1
CO 5	Get hands on experience on small scale preparation on the house hold items such as Ink, phenoyl, candle, detergent powder, washing powder, shampoo, liquid soap, incense stick, tooth powder and computer sambirani.	K2	PSO5

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. **Dr.P. Silviya Reeta**

Forwarded By

HOD'S Signature & Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. CHEMISTRY

SEMESTER -III

For those who joined in 2019 onwards

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

COURSE OUTCOME:

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

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

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

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

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

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

I. (a) Aromatic hydrocarbon **(6Hrs)**

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

(b). Electrophilic Aromatic Substitution **(9Hrs)**

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

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

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

(b) Phenols **(12Hrs)**

Classification and Nomenclature, Preparation –General Physical properties,.Chemical properties– Acidic character of phenols, Electrophilic aromatic substitution reactions of phenol- Reaction with dilute nitric acid and con. Nitric acid, Sulphuric acid, Bromine, Nitrous acid, Alkyl halides and formaldehyde(LedererManasse Reaction), Coupling reaction, Kolbe reaction, Reimer Tiemann reaction, Reactins of OH group similar to alcohols-reaction with sodium, Esterification-Fries rearrangement, Etherification-Claisenrearrangementand Tests for phenol.

III. Chemistry of VII Group elements **(15Hrs)**

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

Halogen oxides: oxygen difluoride, dioxygendifluoride, dichlorine monoxide, chlorinedioxide, dichlorinehexoxide, dichlorineheptoxide; bromine dioxide, iodine pentoxide.Oxoacids of halogens: hypohalous acid HOX, halous acid HXO_2, halic oxide HXO_3,perhalic acid HXO_4, strength of oxoacids.Interhalogen compounds: ClF, ICl;, IF_3, , BrF_5, - structure-VSEPR Model.

IV Chemistry of d-block elements (15Hrs)

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

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

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

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

Text Books

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

Reference Books

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

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 (a) Aromatic hydrocarbon (b) Electrophilic aromatic substitution				
1.1	The Concept of Aromaticity Aromatic, Antiaromatic and non-aromatic compounds	2	Chalk & Talk	PPT,LCD
1.2	Huckel's rule	1	Chalk & Talk	Black Board
1.3	applications of Huckel's rule	1	Chalk & Talk	Black Board

1.4	Structure of Benzene, Stability of Benzene ring - Heats of Hydrogenation and combustion, C-C Bond lengths, resonance structureof Benzene,Molecular orbital picture of benzene andNomenclature of Benzene derivatives.	3	Lecture	Black Board
1.5	Introduction, General mechanism of Nitration, sulphonationandDesulphonation, Halogenation, Friedal crafts alkylation and acylation.	3	Lecture	Black Board
1.6	Limitations of Friedel-Crafts alkylation, Orientation effect of substituent groups on further electrophilic aromatic substitution, Classification of substituent groups,	2	Lecture	Chalk and Talk
1.7	Effect of Activating groups, Effect of deactivating groups	1	Lecture	White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
1.8	Steric factors in Electrophilic Aromatic Substitution, Introduction of a third substituent into the benzene ring.	2	Lecture	Black Board
UNIT -2 (a) Nucleophilic Aromatic Substitution (b) Phenols				
2.1	Activated Nucleophilic substitution	1	Lecture	Black Board
2.2	Benzyne mechanism and evidences in favour of benzyne mechanism	2	Chalk & Talk	Green Board
2.3	ClassificationandNomenclature, Preparation General Physical properties	2	Chalk & Talk	Black Board
2.4	Chemical properties– Acidic character of phenols, Electrophilic aromatic substitution reactions of phenol	3	Lecture	PPT & White board
2.5	Reaction with dilute nitric acid and con. Nitric acid, Sulphuric acid, Bromine, Nitrous acid, Alkyl halides and formaldehyde	2	Chalk & Talk	LCD
2.6	Coupling reaction, Kolbe reaction, Reimer Tiemann reaction	1	Lecture	Black Board
2.7	Reactins of OH group similar to alcohols-reaction with sodium, Esterification-Fries rearrangement, Etherification-Claisenrearrangementand Tests for phenol.	4	Lecture	PPT & White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -3 Chemistry of VII Group elements				
3.1	Group discussion, anomalous behavior of Flourine.	2	Lecture	Black Board
3.2	Ionic-covalent-,bridging halides, reactivity of halogens - reduction of halogens by thiosulfate	3	Discussion	LCD
3.3	application to iodo/iodimetry, Comparison of Acid strength of HX.	3	Lecture	PPT & White Board
3.4	Halogen oxides oxygen difluoride, dioxygendifluoride, dichlorine monoxide	2	Lecture	Black Board
3.5	chlorinedioxide, dichlorinehexoxide, dichlorineheptoxide	1	Discussion	LCD
3.6	bromine dioxide, iodine pentoxide. Oxoacids of halogens: hypohalous acid HOX	2	Lecture	Black Board
3.7	halous acid HXO_2, halic oxide HXO_3, perhalic acid HXO_4, strength of oxoacids.	1	Lecture	Black Board
3.8	Interhalogen compounds: ClF, ICl; ClF_3, BrF_3, IF_3, ClF_5, BrF_5, IF_5 - structure-VSEPR Model.	1	Lecture	Black Board
UNIT -4 Chemistry of d-block elements				
4.1	First, second and third transition series	1	Lecture	Black Board
4.2	General characteristics – Metallic	3	Chalk & Talk	Green Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	character, atomic and ionic radii			
4.3	oxidation states, colour, complex formation	2	Chalk & Talk	Black Board
4.4	catalytic and magnetic properties-Non-stoichiometric compounds	3	Lecture	PPT & White board
4.5	Preparation, properties and uses of Importantcompounds of transitionmetals:Chromous Acetate	1	Discussion	LCD
4.6	Potassium Ferocyanide,	1	Lecture	Black Board
4.7	Potassium Ferricyanide, Prussian blue,Sodium nitro prusside, Nickel DMG complex, Wilkinson'sCatalyst,	2	Lecture	PPT & White board
4.8	Hg_2Cl_2,$HgCl_2$,Hgl_2,$K_2Cr_2O_7$ and$KMnO_4$.	2	Lecture	Black Board
UNIT -5	**Principles of Inorganic Qualitative and Quantitative Analysis**			
5.1	Qualitative analysis: Basic principles of chemical analysis	2	Lecture	Black Board
5.2	solubility product-definition-application of solubility product	2	Chalk & Talk	Green Board
5.3	Reactions of dilute and concentrated acids-preparation of Na_2CO_3 extract- Tests for interfering and non-interfering acid radicals	3	Chalk & Talk	Black Board

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

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

CIA	
Scholastic	35
Non Scholastic	5
	40

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

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

MappingCOs withPSOs

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

Mapping of COs with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER
Dr.Sr.ArulMary.J

Forwarded By

S-Tedona.

FATIMA COLLEGE (AUTONOMOUS), MADURAI -

18II B.Sc. CHEMISTRY

SEMESTER -IV

For those who joined in 2019 onwards

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

COURSE OUTCOME:

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

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

CO 2 Distinguish between ideal and non-ideal solutions

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

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

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

UNIT-I GASEOUS STATE (12 HRS.)

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

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

Self study : Derivation of Boyle temperature from vanderwaals equation.

UNIT-II SOLUTIONS: (12 HRS.)

Solution of liquids in liquids-Ideal and non-ideal solutions-Raoult's law-Vapour pressure-composition curve of ideal solutions-Vapour pressure-composition curve of non-ideal solutions- Type I, Type II and type III solutions. Vapour pressure-composition and boiling point-composition curves of completelymiscible binary solutions –fractional distillation-Azeotropic distillation-Distillation of immiscible liquids-steam distillation. Solubility of partially miscible liquid pairs-Phenol-water system,Triethylamine-water system,Nicotine-water system.Effect of impurities on Critical solution temperature. Solution of gases in liquids - Absorption co-efficient of gases--Factors affecting the solubility of a gas in liquids-Nature of gas and solvent, andpressure -Henry's law

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

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

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

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

Ebullioscopy:-Derivation of molecular weight of a non-volatile solute using

vapour pressure-boiling point curve-Determination of boiling point elevation byLandsberg's method

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

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

UNIT-IV RADIOACTIVITY AND NUCLEAR TRANSFORMATIONS

(12 HRS.)

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

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

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

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

Self study - Carbon dating

UNIT-V NUCLEAR CHEMISTRY (12 HRS.)

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

Nuclear models: Nuclear shell model-The liquid drop model

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

Nuclear fusion: Stellar energy-Hydrogen bomb.

Self study -Nuclear reactors.

Text Books:

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

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

2005.

Reference Books:

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

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

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 GASEOUS STATE				
1.1	Kinetic theory of gases-gaseous laws-derivation of kinetic gas equation	2	Chalk & Talk	Black Board
1.2	Type of molecular velocities	2	Chalk & Talk	Black Board
1.3	Maxwell's distribution of molecular velocities	2	Chalk & Talk	PPT & White board
1.4	Mean free path-viscosity of gases	2	Chalk & Talk	Black Board
1.5	Effect of temperature on deviation from ideal behaviour -	2	Chalk & Talk	Black Board
1.6	Boyle temperature	1	Chalk & Talk	Black Board
1.7	Dieterici equation-Berthelo equation-clausius equation	1	Chalk & Talk	Black Board
Unit -2 SOLUTIONS				
2.1	Ideal and Non-ideal solutions-Raoult's law	2	Chalk & Talk	Black Board

2.2	Vapour pressure-composition curve of ideal solutions and non-	1	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	ideal solutions			
2.3	Vapour pressure-composition and boiling point-composition curves of completely miscible binary solutions	2	Chalk & Talk	Black Board
2.4	Distillation of immiscible liquids-steam distillation	2	Chalk & Talk	PPT & White board
2.5	Solubility of partially miscible liquid pairs	2	Chalk & Talk	Black Board
2.6	.Solution of gases in liquids	2	Chalk & Talk	Black Board
2.7	Henry's law	1	Chalk & Talk	Black Board
UNIT -3 THEORY OF DILUTE SOLUTIONS				
3.1	Derivation of molecular weight from relative lowering of vapour pressure	2	Chalk & Talk	Black Board
3.2	Ostwald walker's method	1	Chalk & Talk	PPT & White board
3.3	Laws of Osmotic pressure-derivation of molecular weight from osmotic pressure	2	Chalk & Talk	Black Board
3.4	Berkley and Hartley's method	2	Chalk & Talk	PPT & White board
3.5	Derivation of molecular weight using vapour pressure-boiling point curve	1	Chalk & Talk	Black Board

3.6	Landsberg's method	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.7	Derivation of molecular weight using vapour pressure-freezing point curve.	2	Chalk & Talk	Black Board
UNIT -4 RADIOACTIVITY& NUCLEAR TRANSFORMATIONS				
4.1	Properties of α,β and γ—rays-Detection and measurement of radioactivity. G.M counter & Wilson cloud chamber-	2	Chalk & Talk	PPT & White board
4.2	Derivation of decay constant and half life period –Radioactive equilibrium-Soddy-Fajan's group displacement law.	2	Chalk & Talk	Black Board
4.3	n/p ratio for stable and meta stable nuclei-radioactive series-orbital electron capture-Internal Conversion-nuclear isomerism.	2	Chalk & Talk	Black Board
4.4	Different types of nuclear reactio with example-induced radioactivity.	2	Chalk & Talk	Black Board
4.5	Application of radioactivity-Medicine,agriculture and industry	2	Chalk & Talk	Black Board

4.6	As tracer elements in the elucidation of structure and investigation of reaction mechanism,.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT-V NUCLEAR CHEMISTRY				
5.1	**Nuclear Structure:** Size of the nucleus-Nuclear forces-packing fraction	2	Chalk & Talk	PPT
5.2	Mass defect-binding energy of t nucleus-Binding energy a stability of nuclei.	2	Chalk & Talk	Black Board
5.3	Nuclear models- Nuclear shell model-The liquid drop model	3	Chalk & Talk	Black Board
5.4	Nuclear fission- Calculation of energy released	2	Chalk & Talk	Black Board
5.5	The fission chain reaction,atom bomb	1	Chalk & Talk	PPT
5.6	Nuclear fusion-Stellar energy-Hydrogen bomb	2	Chalk & Talk	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %

K2	**2**	**2**	**5**	**-**	**-**	**9**	-	**9**	22.5 %
K3	**3**	**3**	**-**	**-**	**5**	**11**	-	**11**	27.5 %
K4	**3**	**3**	**-**	**5**	**-**	**11**	-	**11**	27.5 %
Non Scholastic	-	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**10**	**10**	**5**	**5**	**5**	**35**	**5**	**40**	**100 %**

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

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

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

EVALUATION PATTERN

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

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Gain a basic knowledge about the kinetic theory of gases, gaseous laws,types of velocities and properties of gases	K1, K2, K3 & K4	PSO1& PSO2
CO 2	Distinguish between ideal and non-ideal solutions	K1, K2, K3 & K4	PSO3
CO 3	Derive the relation betweenmolar mass of a non-volatile solute and colligative properties	K1, K2, K3 & K4	PSO5
CO 4	calculate mass defect,packing fraction and binding energy for any nuclei	K1, K2, K3 & K4	PSO7
CO 5	Predict the growing rate,mechanism and age of plants using radioactive elements	K1, K2, K3 & K4	PSO7

Mapping of COs with PSOs

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

CO5	**2**	**1**	**1**	**1**	**1**	**1**	**3**	**1**

Mapping of COs with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:
Mrs.RM.Nagalakshmi

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc CHMISTRY

SEMESTER -III

For those who joined in 2019 onwards

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

COURSE OUTCOME:

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

CO 1 Define the term soil

CO 2 describe the various types of fertilizers and their uses

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

CO 4 Examine the adverse effect of pesticides

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

UNIT I SOILS (6 HRS.)

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

UNIT -II FERTILIZERS (6 HRS.)

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

UNIT -IIMANURES AND COMPOST

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

UNIT -IV PESTICIDES (6 HRS.)

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

UNIT -V PRACTICALS (6 HRS.)

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

References

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

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 SOILS				

1.1	Soils- Introduction, Composition of soil	1	Chalk & Talk	Black Board
1.2	Organic and inorganic constitutents	1	Chalk & Talk	Black Board
1.3	soil acidity, Alkalinity,	2	Chalk & Talk	PPT & White board
1.4	buffering of soils, Soil fertility	2	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
			Talk	Board
UNIT-2 FERTILIZERS				
2.1	Introduction, Use of fertilizers : urea, DAP, ,	2	Chalk & Talk	Black Board
2.2	Super phosphate, Gypsum, NPK-mixed fertiizers	1	Chalk & Talk	Black Board
2.3	Optimal addition of Fertilizers to obtain estimated yields	2	Chalk & Talk	Black Board
2.4	Adverse effects of fertilizers	1	Chalk & Talk	PPT & White board
UNIT -3 ORGANIC MANURE AND COMPOST				
3.1	Farmyard manure, Compost,	2	Chalk & Talk	Black Board
3.2	Reinforcing manure, green manure crops,	2	Chalk & Talk	PPT & White board
3.3	Biogas production from biogas plant	2	Chalk & Talk	Black Board
UNIT -4PESTICIDES				
4.1	Pesticides –Introduction, classes of pesticides -	2	Chalk & Talk	PPT & White board

4.2	Benefits and Adverse effects of pesticides,.	2	Chalk & Talk	Black Board
4.3	methods of pest control, method of using pest control chemicals.	2	Chalk & Talk	Black Board
UNIT-V PRACTICALS				
5.1	Soil analysis	2	Chalk & Talk	lab

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

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

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

Mapping COs Consistency with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:

1. **Dr. K.R.SUBIMOL**

Forwarded By

HOD'S Signature

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

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

Course Objective:

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

Course Outcomes

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

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

UNIT-I: Introduction (6 hrs)
UNIT-II : Chemistry of carbohydrates (6 hrs)
UNIT-III: Milk Fat (6hrs)
UNIT-IV: Milk and milk powder processing (6 hrs)
UNIT-V : Minerals and vitamins of milk (6hrs)

Unit-I. Introduction

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

Unit -II. Chemistry of carbohydrates

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

III. Milk fat

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

IV. Milk and milk powder processing

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

V. Minerals and vitamins of milk:

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

References:

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

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

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

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

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

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

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
Unit-I. Introduction				
1.1	Milk - definition – composition of milk	1	Chalk & Talk	Black Board
1.2	physical and chemical properties of milk	1	Chalk & Talk	Black Board
1.3	factors affecting yield and composition of milk inter relationship between the milk constituents	2	Chalk & Talk	PPT & White board
1.4	effect of heat, acid and enzymes on milk- nutritive value of milk.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
Unit -II. Chemistry of carbohydrates				
2.1	, Chemistry of carbohydrates – lactose structure	2	Chalk & Talk	Black Board
2.2	physical forms	1	Chalk & Talk	Black Board
2.3	action of bacteria on lactose – browning reaction	2	Chalk & Talk	Black Board
2.4	physiological properties of lactose - uses of lactose.	1	Chalk & Talk	PPT & White board
III. Milk fat				
3.1	Milk fat – structure, chemical nature of milk fat	2	Chalk & Talk	Black Board
3.2	size of fat globules	2	Chalk & Talk	PPT & White board
3.3	fat constants - oxidation and its control – auto oxidation	2	Chalk & Talk	Black Board
IV. Milk and milk powder processing:				
4.1	Introduction – different methods of processing of milk -	2	Chalk & Talk	PPT & White board
4.2	pasteurization – VHT milk- HTST milk – homogenized milk	2	Chalk & Talk	Black Board
4.3	skimmed milk powder – whole dry milk powder – butter milk powder.	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
V. Minerals and vitamins of milk:				
5.1	Distribution of major minerals in milk trace elements in milk- salt composition on milk	2	Chalk & Talk	lab
5.2	significance and factors affecting sa balance - protein and miner interaction	2	Chalk & Talk	lab
5.3	Vitamins in milk: nutrional importance and structure.	2	Chalk & Talk	lab

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

K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non cholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

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

Mapping COs Consistency with PSOs

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

CO3	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**
CO4	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**2**
CO5	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**

Mapping of C0s with POs

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

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

COURSE DESIGNER:

1. **Dr. A.RAJESWARI**

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HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. PHYSICS

SEMESTER -II

For those who joined in 2019 onwards

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

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

COURSE OBJECTIVES :

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

COURSE OUTCOME:

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

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

CO 2 To categorize the reactions involved in volumetric analysis

CO 3 To analyze the various organic compounds qualitatively

CO 4 To recognize the theories of chemical kinetics.

CO 5 To highlight the importance of thermodynamics and its related functions.

UNITS

UNIT -I INTRODUCTION TO BONDING AND SHAPES OF MOLECULES

(9Hrs)

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

UNIT -II PRINCIPLES OF VOLUMETRIC ANALYSIS (9Hrs)

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

UNIT III : PRINCIPLES OF ORGANIC ANALYSIS (9Hrs)

Detection of elements – N.S. and Halogens – preparation of Lassaaigne's extract and the reactions involving the extract. Distinction between aliphatic and aromatic- saturated and unsaturated compounds. Reactions of mono and dicarboxylic acids – Solubility, Reaction with $NaHCO_3$ and soda lime, Formation of phenolphthalein and Resorcinol. Reactions of Carbony1Compounds– Solubility, Tollen's Reagent test, Borsche's test, Formation of hydrazones and Oxime. Reactions of mono and Disaccharides, Solubility, Reaction with conc. H_2SO_4,Molisch'stest, Fehlings solution test, Barfoed's test and Benedict's test. Reactions of primary, secondary and tertiary amines Solubility, Reaction with HNO_2, Diazotisation and coupling reaction, Formation of p-Nitroso tertiary amine. Reactions of monoamide and Diamide – Solubility, action of heat, reaction with NaOH and Biuret test. Reactions of alcohols and phenols – Solubility, Reaction with NaOH and neutral $FeC1_3$

UNIT IV : . CHEMICAL KINETICS (9Hrs)

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

UNIT V : THERMODYNAMICS- I (9Hrs)

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

REFERENCES:

TEXT BOOK

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

REFERENCE BOOKS

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

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. CHEMISTRY

SEMESTER -III

For those who joined in 2019 onwards

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

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

Interfering Acid radicals

- Phosphate
- Borate
- Oxalate

Non interfering acid radicals

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

ateBasic radicals

Group I : Lead

Group II :Bismuth , copper, cadmium,

GroupIII : Manganese, Iron and chromium.

Group IV : Manganese, Cobalt, Nickel and ZincGroup V : Calcium, Strontium and

Barium Group VI : Ammonium and Magnesium

Reference Book

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	Get the knowledge of procedure for group separation and group analysis	PSO1& PSO2
CO 2	Identify various ions present in mixture of salt	PSO3
CO 3	Recognize the role of oxidizing agents, reducing agents, group reagents andcomplexing agents.	PSO3
CO 4	Analyse the experimental observations and inferences with theory behind practicals.	PSO1& PSO2
CO 5	Identification of two acid radicalsand two basic radicals	PSO3

Mapping of C0s with PSOs

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

CO4	**3**	**2**	**1**	**1**	**2**	**3**	**2**	**1**
CO5	**1**	**2**	**1**	**2**	**2**	**2**	**3**	**1**

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.M.Priyadharsani

2.B.Vinosha

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. PHYSICS

SEMESTER -III

For those who joined in 2019 onwards

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

Course Description

This course trains the students to estimate the solutions quantitatively by different techniques.

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

Course outcomes

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

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

Permanganonometry

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

Acidimetry-Alkalimetry

5. Estimation of Sodium Hydroxide
6.Estimation of SodiumCarbonate

Iodometry

6.Estimation of Potassium Dichromate 7.Estimation of Copper sulphate 8.Estimation of Potassiumpermanganate

ReferenceBook

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Describe the principles and procedures of various titrimetric methods	K1	PSO1& PSO5
CO 2	Identify suitable indicators for a particular reaction	K1, K3	PSO5
CO 3	Know the various terms such as standard solution, normality and molality.	K2 & K4	PS05, PSO7
CO 4	Select the specific titric method to estimate the amount of analyte present in the given solution.	K1, K3 & K4	PSO1,PSO5 & PSO7
CO 5	Apply the expressions and equations to calculate the strength of solutions	K1 & K4	PSO1,PSO5

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

3. Mrs. R.M. Nagalakshmi

4. Dr. P. Silviya Reeta

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. Chemistry

SEMESTER -IV

For those who joined in 2019 onwards

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

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

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

COURSE OUTCOMES

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

CO 1 Know the structure and bonding of important coordination compounds

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

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

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

CO 5 Gain knowledge about the chemistry of Lanthanides and Actinides

UNITS

UNIT -I Theories of Coordination – I **(15HRS.)**

a). Introduction – classification of ligands, nomenclature, preparation of complexes and detection of complexes using solubility,colour change,conductance measurements and visible absorption studies. Basis for isomerism in complexes and different types of isomerism.

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

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

UNIT -II Theories of Coordination – II **(15HRS.)**

a).Valence bond theory – Introduction, Hybridisation,sp^3, dsp^2, dsp^3, d^2sp^3, & sp^3d^2, merits & demerits.

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

c).M.O.Theory – M.O. Theory as applied to octahedral complexes, Pi-bonding and M.O. theory, Merits.

Self Study: Structure of Spinels

UNIT -III Mechanism in coordination complexes **(15 HRS.)**

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

b) Mechanism of hydrolysis reactions in octahedral complexes.

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

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

Self Study: Mechanism of trans effect.

UNIT -IV Organometallic Chemistry **(15HRS.)**

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

ferrous sulphate.Ferrocene (structure based on VBT).

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

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

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

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

Self Study: Extraction of thorium from monazite

REFERENCES:

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

COURSE CONTENTS & LECTURE SCHEDULE:

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

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

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Introduction, Hybridisation,sp^3, dsp^2, dsp^3, d^2sp^3, & sp^3d^2, merits & demerits.			Board & Models
2.2	Crystal Field theory – Introduction, crystal field splitting in octahedral, tetrahedral & square planar arrangement of ligands.	2	Chalk & Talk	Black Board
2.3	Spectro chemical series, ligand field effect and colour &crystal field stabilization energy .	3	Problem solving	Black Board
2.4	Factors affecting the magnitude of Δ_0 and its application	2	Chalk & Talk	Black Board
2.4	Tetrahedral Vs Octahed Complexes.Distortion of octahed complexes and John-Tell theorem.Limitations of CFT	2	Chalk & Talk	Black Board
2.5	M.O.Theory – M.O. Theory as applied to octahedral complexes,	2	Chalk & Talk	Black Board
2.6	Pi- bonding and M.O. theo Merits.	1	Discussion	Black Board
UNIT -3 MECHANISM IN COORDINATION COMPLEXES (15Hours)				
3.1	Kinetics of complexes – stability – Kinetic and thermodynamic stability	2	Chalk & Talk	Black Board
3.2	Factors affecting stability and lability	2	Chalk & Talk	Black Board
3.3	Stepwise and over all stability constants (determination not required)	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.4	Mechanism of hydrolysis reactio in octahedral complexes.	2	Chalk & Talk	Black Board
3.5	Mechanism of ligand substitut reaction in square plar complexes, Trans effect, trans effe in synthesis, Mechanism of tra effect.	3	Chalk & Talk	Power point
3.6	Spectroscopic states: L-S coupling & J-J coupling schemes.	2	Chalk & Talk	Black Board
3.7	Derivation of spectroscopicstates for free C-atom	2	Derivation	Black Board
UNIT -4 ORGANOMETALLIC CHEMISTRY (15Hours)				
4.1	Preparation of metal carbonyls	2	Chalk & Talk	Black Board
4.2	$Ni(CO)_4$, $Fe(CO)_5$, $[V(CO)_6]$,	3	Seminar	Black Board
4.3	$Mn_2(CO)_{10}$, $Co_2(CO)_8$and $Fe_2(CO)_9$.	1	Chalk & Talk	Black Board
4.4	EAN calculation	2	Chalk & Talk	Black Board
4.5	Metal nitrosyls – sodium nitroprusside and nitoso ferrous sulphate.	3	Chalk & Talk	Black Board
4.6	Ferrocene (structure based on VBT)	4	Chalk & Talk	Black Board
UNIT-5 'F' BLOCK ELEMENTS (15Hours)				

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

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

CIA	
Scholastic	35
Non Scholastic	5
	40

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

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

CO 4	Import the skills to elucidate the	K1, K2, K3 &	PSO7
	structure and mode of bonding in organometallic compounds	K4	
CO 5	Gain knowledge about the chemistry of Lanthanides and Actinides	K1, K2, K3 & K4	PSO7

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:
1. Dr.A. Rajeswari
2. Ms. RM Nagalakshmi

Forwarded By

S-Tedona.

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc.

SEMESTER -IV

For those who joined in 2019 onwards

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

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

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

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

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

UNITS

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

a) Introduction, Rate of the reaction, the rate equation, Rate constant, order and molecularityof the reaction, methods of determining the rate of the reaction, factors that affect the rate of the reaction. Reactions of I order and pseudo first order reactions-Derivation of rate constant and Half life period – Decomposition of (1) Nitrous Oxide, (2) Hydrogen peroxide, (3) Ammonium nitrite and (4) Dinitrogen, pentoxide, Acid catalysed hydrolysis of ester, Inversion of sucrose and Hydrolysis of benzene diazonium chloride.

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

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

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

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

Self study-Effect of pH and temperature on the rate of the reaction.

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

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

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

c) Diffusion controlled reactions in solution, the influence of ionic strength on the rate of the reactions, influence of solvent on reaction rates. (Derivations not required).

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

UNIT -III SOLID STATE - I (12 HRS.)

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

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

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

Self study- Fermi energy.

UNIT -IV SOLID STATE - II (12 HRS.)

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

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

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

Self study-crystal defects.

UNIT -V DISTRIBUTION LAW (12 HRS.)

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

Self study- Application of distribution law.

REFERENCES:

Text Book:

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

Reference Books:

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

COURSE CONTENTS & LECTURE SCHEDULE:

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

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

	– the Arrhenius equatio measurement of Arrheni parameter.			Board
1.7	Mechanism of enzyme reaction, determination of Michaelis constant,	1	Chalk & Talk	Black Board
1.8	Effect of enzyme and substrate concentration	1	Chalk & Talk	Black Board
UNIT II Chemical Kinetics – II				
2.1	The theories of reaction rates	1	Chalk & Talk	Black Board
2.2	collision theory of bimolecul gaseous reactions	2	Chalk & Talk	Black Board
2.3	Activated complex theory.	2	Chalk & Talk	Black Board
2.4	Lindemann'stheory of unimolecular reactions.	2	Chalk & Talk	Black Board
2.5	Characteristics of complex Reactions – opposing or Reversible reactions, consecutive reaction, competing or parallel reactions and chain reactions	2	Chalk & Talk	Black Board
2.6	Diffusion controlled reactions in solution	2	Chalk & Talk	Black Board
2.7	The influence of ionic strength on the rate of the reactions	1	Chalk & Talk	Black Board
UNIT III Solid State – I				
3.1	Introduction, crystalline and amorphous solids- difference, size and shape of crystals	1	Chalk & Talk	Using models
3.2	symmetry in crystal systems, space lattice and unit cell,	1	Chalk &	LCD

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

3.3	Bravais Lattices, law of Rational indices, Miller indices	2	Chalk &Talk	Black Board
3.4	X-ray diffraction – Bragg's equati and experimental Techniques – ray diffraction on crystals a powder method	2	Chalk & Talk	Black Board
3.5	Lattice energy – Born-Lande' equation, Cohesive energy	2	Chalk & Talk	Black Board
3.6	Close packing in solids-hexagonal close packing, cubic close packing	1	Chalk & Talk	Black Board
3.7	interstitial sites in Close packed lattices, Ionic radius	1	Chalk & Talk	Black Board
3.8	Radius ratio and shape of crystal	2	Chalk & Talk	Black Board
UNIT IV Solid State – II				
4.1	Types of crystals – Molecular, covalent, metallic and ionic crystals	1	Chalk & Talk	Black Board
4.2	structure of water and ammonia (molecular crystals), diamond	1	Chalk & Talk	Black Board
4.3	Graphite (covalent crystals), metallic bonds in metals (metallic crystals) Sodium Chloride	1	Chalk & Talk	Black Board
4.4	Potassium Chloride andCesiu Chloride (Ionic Crystals).	1	Chalk & Talk	Black Board
4.5	Conductors, Insulators and Semi-conductors	3	Chalk & Talk	Black Board
4.6	Liquid Crystals – Classification, Smectic, Nematic and Cholesteric liquid crystals	2	Chalk & Talk	Black Board
4.7	Theories of liquid Crystals – The swarm Theory	2	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
			Talk	Board
4.8	Application of liquid Crystals.	1	Chalk &Talk	BlackBoard

UNIT V Distribution Law				
5.1	The Distribution law	2	Chalk & Talk	Black Board
5.2	conditions for the validity of the distribution law	2	Chalk & Talk	Black Board
5.3	Thermodynamic derivation	2	Chalk & Talk	Black Board
5.4	Association of the solute in one of the solvents	2	Chalk & Talk	Black Board
5.5	Dissociation of the solute in one of the solvents	2	Chalk & Talk	Black Board
5.6	solute enters into chemical combination with one of the solvents	2	Chalk & Talk	Black Board

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To determine integrated rate expression for zero order, first order, second order reactions and their respective half-life period expressions with examples	K1, K2, K3 & K4	PSO1& PSO2
CO 2	To study the various factors which affect the rate of a chemical reaction such as concentration, temperature, and solvent	K1, K2, K3 & K4	PSO3& PSO7
CO 3	To learn the crystal diffraction and experimental techniques used to characterize the solid crystals	K1, K2, K3 & K4	PSO5&PSO6
CO 4	To recognize and give the lattice parameter relationships for the seven crystal systems	K1, K2, K3 & K4	PSO1&PSO2
CO 5	To value the Nernst distribution law - its thermodynamic derivation, modification of law when solute undergoes association, dissociation and chemical combination with one of the solvents	K1, K2, K3 & K4	PSO3&PSO5

Mapping COs
Consistency with PSOs

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

CO4	3	3	2	2	2	2	2	2
CO5	2	2	3	2	3	2	2	2

Mapping of C0s with POs

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

COURSE DESIGNER:
Dr.K R SUBIMOL

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc CHEMISTRY

SEMESTER -IV

For those who joined in 2019 onwards

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

CO 1 know and comprehend the principle and theories of dyes

CO 2 identify the chromophoric groups and auxochromespresent in the dyes

CO 3 classify the of dyes whether natural or synthetic

CO 4 Predict the structure of dyes

CO 5 recognise the applications of dyes in various industries

UNIT I THEORY OF DYES (6 HRS.

Color and dyes: Color sensation, Dyes and dying color and chemical constitution- Witt theory and Modern theory of dyes. Nomenclature of dyes: Valance bond theory of color.

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

reactive dyes, oil and spirit soluble dye

UNIT -III CLASSIFICATION OF DYES-II HRS.)

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

UNIT –IV PIGMENTS (6 HRS.)

Introduction- chemical composition,structure and applications of Anthocyanins,Flavones,Phthalocyanins,Carotenoids and Chlorophyll.

UNIT -V APPLICATIONS OF DYES (6 HRS.)

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

References

1. JeyashreeGhosh, Fundamental concepts of Applied Chemistry, S.Chand,2006
2. B.A. Yagodin ,Agricultural Chemistry, Mir Publishers (Moscow), 1976.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 THEORY OF DYES				
1.1	Soils- Introduction, Composition of soil Color and dyes: Color sensation	1	Chalk & Talk	Black Board
1.2	Dyes and dying color and	1	Chalk &	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	chemical constitution		Talk	Board
1.3	Witt theory and Modern theory of dyes,	2	Chalk & Talk	PPT & White board
1.4	Nomenclature of dyes: Valance bond theory of color.	2	Chalk & Talk	Black Board
UNIT-2 CLASSIFICATION OF DYES-I				
2.1	direct or substantive dyes, mordent dyes, ,	2	Chalk & Talk	Black Board
2.2	mordent dyes, vat dyes, Ingrain or developed dyes	2	Chalk & Talk	PPT & White board
2.3	sulphur dyes, reactive dyes,	1	Chalk & Talk	Black Board
2.4	oil and spirit soluble dye ,	1	Chalk & Talk	Black Board
UNIT -3CLASSIFICATION OF DYES-II				
3.1	Nitro and Nitroso dyesand Tripheyl methane dye- malachite green, pararosaniline, crystal violet	2	Chalk & Talk	Black Board
3.2	Azo dyes – aniline yellow, butter yellow, methyl orange, methyl red, resorcin yellow and congo red	2	Chalk & Talk	PPT & White board
3.3	Phthalein and Xanthen – phenophthalein, fluorescein, eosin and rhodamine-B	2	Chalk & Talk	Black Board
UNIT -4STRUCTURE OF DYES				
4.1	Indigo	2	Chalk &	PPT & White

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

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

									%

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

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

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

EVALUATION PATTERN

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

COURSE OUTCOMES

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

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

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

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	3	3
CO2	2	3	2	2	2	3	3
CO3	2	2	3	2	2	3	3
CO4	3	2	2	2	2	3	3
CO5	3	2	2	2	2	3	3

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:
Mrs.RM.Nagalakshmi

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc CHEMISTRY

SEMESTER -IV

For those who joined in 2021 onwards

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

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

UNIT I -HEALTH AND HYGIENE (6 HRS)

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

Self study:

Disinfectants and antiseptics,

UNIT- II COMMON DRUGS (6 HRS)

Narcotic analgesics (only morphine compds). Antipyretic analgesics (acetyl salicyclic acid, p – amino – phenol derivatives). Anticonvulsant drugs (sodium

valproate, hydantoins). Muscle relaxants.(,glycerylguaiacolate, diazepam) Antibiotics (pencillin, streptomycin, tetracyclin,) Cardiovascular drugs-nitrates, beta blockers(propranalol and atinelol) and calcium channel blockers.

Self study:

Depressants-Sedatives and hypnotics

UNIT- III - BODY FLUIDS (6 HRS)

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

Self study :

Blood sugar and diabetes.

UNIT- IV ENZYMES AND HARMONES (6 HRS)

Classification of enzymes, specificity, and Mechanism of enzyme action

Classsification of harmones,functions of thyroxine ,insulin and progesterone

Self study:

Sex harmones-eastrogen and testosterone

UNIT- V COMMON DISEASES (6 HRS)

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

Self study:

Medicines used for the above diseases

TEXT BOOKS

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

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

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

REFERENCES

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

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

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

New Delhi, 2003.

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

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

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

COURSE CONTENTS & LECTURE SCHEDULE:

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

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

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
				board
5.2	head ache ,stomach ache, night blindnessulcer,	2	Chalk & Talk	PPT & White board
5.3	diarrhea, Jaundice, vomiting and allergies	2	Chalk & Talk	PPT & White board

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

CIA	
Scholastic	**35**

Non Scholastic	**5**
	40

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

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

CO 1	Define the term health and hygiene	K1	PS04
CO 2	Describe the various types of druds and their uses	K2	PSO1
CO 3	Realise theimportance of maintenance of blood pressure	K3	PS03
CO 4	Analyse the adverse effect of hormonal imbalance	K4	PS02
CO 5	Recognise the reason for disease formation	K3	PS03

COURSE DESIGNER:
Mrs.RM.Nagalakshmi

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. CHEMISTRY

SEMESTER -IV

For those who joined in 2019 onwards

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

COURSE DESCRIPTION

This course gives lab experience on organic qualitative analysis.

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

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

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

CO 4 Recognize the usage of apparatus and laboratory reagents.

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

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

1. Whether given organic compound is aliphatic or aromatic

2. Whether given organic compound is saturated or unsaturated

3. Detection of Elements: Nitrogen, Sulphur and halogens

4. Any one of the following functional groups

Carbohydrate

AldehHDE

Ketone

Phenol

Amides

Carboxylic Acids

Amines

Nitro compounds

5. Preparation of derivatives for the above functional groups.

REFERENCES:

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

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	Gain the knowledge of appearance, colour, physical state,and odour of organic substances	PSO1& PSO2
CO 2	Distinguish whether the given compound is Aliphatic or Aromatic,and Saturated or Unsaturated.	PSO3
CO 3	Perform the confirmatory test for various functional groups present in the given organic compound.	PSO5
CO 4	Recognize the usage of apparatus and laboratoryreagents.	PSO1

CO 5	Avoiding hazardous experiments by doing microlevel eco friendly experiments.	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.M.Priyadharsani

2.B.Suganthana

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

II B.Sc. Physics

SEMESTER -IV

For those who joined in 2019 onwards

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

toCO 1 Understand the periodicity in periodic table

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

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

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

CO 5 Derive the rate constants o certain photochemical reactions.

UNITS

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

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

Self-Study: Atomic PropertiesElectron affinity

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

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

Self-Study: Henderson equation

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

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

Self-Study: Glass electrode

UNIT -IV CATALYSIS (9HRS.)

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

Self-Study: Enzyme catalysts

UNIT -V PHOTOCHEMISTRY (9HRS.)

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

Self-Study: Phosphorescence.

REFERENCES:

TEXT BOOK

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

REFERENCE BOOK

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 PERIODIC TABLE AND ATOMIC PROPERTIES				
1.1	Long from periodic table	1	Chalk & Talk	Black Board
1.2	Cause of periodicity	1	Chalk & Talk	LCD
1.3	Division of Elements into s,p,d,&blocks – Atomic Properties – Size of atoms and ions	2	Lecture	PPT & White board
1.4	Covalent radius	1	Lecture	Smart Board
1.5	Ionic radius	1	Lecture	Black Board

1.6	Ionization energy	1	Discussion	
1.7	Electron affinity	1	Lecture	Smart Board
1.8	Electro negativity	1	Discussion	Black Board
UNIT -2 ELECTRO CHEMISTRY – I				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.1	Electrical conductance, specific conductance	1	Chalk & Talk	Black Board
2.2	molar conductance ,Equivalent conductance, determination of conductance conductivity cells	2	Chalk &Talk	LCD
2.3	cell constant variation of molar conductance and equivalent conductance with dilution	1	Lecture	PPT & White board
2.4	Kohlrausch's law and its applications	1	Lecture	Smart Board
2.5	Applications of conductivity measurement	1	Lecture	Black Board
2.6	Conductometric titrations	1	Discussion	
2.7	Acid & Bases – Lowry – Brosted concept, Lewis concept	1	Lecture	Smart Board
2.8	pH – buffer solutions – Henderson equation	1	Discussion	Black Board
UNIT -3ELECTRO CHEMISTRY – II				
3.1	Electochemical cells Galvanic cells	1	Chalk & Talk	Black Board
3.2	Representation of an electrochemical cell, Elecrode potential, EMF of cell and its Measurment standard cell, Reversible and irreversible cell	2	Chalk & Talk	LCD
3.3	Reversible electodes and their types – Metal - metal ion electrode	1	Lecture	PPT & White board
3.4	Gas electrode, Metal – Insoluble metal salt electrodes Oxidation – Reduction Electrodes	1	Lecture	Smart Board
3.5	Relationship between free energy	1	Lecture	Black

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	and electrical energy			Board
3.6	Single electode potential – Hydroganelectode, refrence electrode – Hydrogen and calomel electrode	1	Discussion	
3.7	Electro chemical series. pH determination using EMF measurement	1	Lecture	Smart Board
3.8	Hydrogen electode – Quinehydrone electrode – Glass electrode	1	Discussion	Black Board
UNIT -4CATALYSIS				
4.1	Catalysis types of catalysts	1	Chalk & Talk	Black Board
4.2	Promoters, Negative catalysts	2	Chalk & Talk	LCD
4.3	Auto Catalysts	1	Lecture	PPT & White board
4.4	General Characteristics of catalytic reactions	1	Lecture	Smart Board
4.5	Intermediate compound formation	1	Lecture	Black Board
4.6	Adsorption theory	1	Discussion	
4.7	base catalysts	1	Lecture	Smart Board
4.8	Enzyme catalysts	1	Discussion	Black Board
UNIT -5PHOTOCHEMISTRY				
5.1	Photo chemistry Introduction	1	Chalk & Talk	Black Board

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

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

K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

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

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

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

in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the periodicity in periodic table	K1	PSO1,PSO2,PSO3
CO 2	Understand the different types of condutances and their relations and the effect of dilution.	K2	PSO1,PSO2,PSO3
CO 3	Use Nernst equation to calculatethe electrode potential and emf of electrochemical cells.Study the applications of electrochemical measurements	K3& K4	PSO1,PSO2,PSO3
CO 4	Understand the basics of photochemistry using laws of photochemistry and Jablonsky diagram	K2, K3	PSO1,PSO2,PSO3
CO 5	Derive the rate constants o certain photochemical reactions.	K2 & K4	PSO1,PSO2,PSO3

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER: Dr. B.SUGANTHANA

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -

18II B.Sc.PHYSICS

SEMESTER -IV

For those who joined in 2019 onwards

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

Course Description:

This course gives lab experience on organic qualitative analysis.

Course Objective:

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

Course outcome:

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

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

Organic qualitative analysis

The anaysis involving the detection of following characteristics of the given organiccompound

1. Whether given organic compound is aliphatic or aromatic

2. Whether given organic compound is saturated orunsaturated

3. Any one of the following functional

groups 1.Carbohydrate
2.Aldehyde
3.Ketone

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To gain the knowledge of appearance, colour, physical state, and odour of organic substances.	K1	PSO1& PSO5
CO 2	To distinguish whether the given compound is Aliphatic or Aromatic,and Saturated or Unsaturated.	K1, K3	PSO5
CO 3	To perform the confirmatory test for various functional groups present in thegiven organic compound	K2 & K4	PS05, PSO7
CO 4	To recognize the usage of apparatus and laboratory reagents.	K1, K3 & K4	PSO1,PSO5 & PSO7

CO 5	To relate the experimentalobservations with theory behindpracticals.	K1 & K4	PSO1,PSO5

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

3. Dr. Sr. ARULMARY

4. Dr. K.R.SUBIMOL

Forwarded By

HOD'S Signature

& Name

.Phenol 5.Amide
6.CarboxylicAcid
7.Amine

Reference Book

Venkateswaran, R.veeraswamy&A.R.Kulandaivelu,Basic Principles ofpractical chemistry, 3rdEdn, 1992.

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRY

SEMESTER -V

(For those who joined in 2019 onwards)

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

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

COURSE OBJECTIVES :

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

Unit I - ALDEHYDES AND KETONES (18hrs)

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

Cadmium compounds and Friedel Crafts acylation.

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

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

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

(a) Aliphatic Acids

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

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

(b) Substituted Aromatic Acids

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

(c) Functional Derivatives of Carboxylic Acids

Nomenclature – nucleophilic acyl substitution – role of carbonyl group –nucleophilic substitution alkyl Vs acyl. Preparation and reactions of acid anhydrides, amides and acid chlorides. Reaction of esters – alkaline hydrolysisand acid hydrolysis, ammonolysis of esters, trans esterification, reduction of esters, Claisen condensation and crossed Claisen condensation, Dieckmann condensation.

(d) Reactive methylene compounds –

Preparation and synthetic applications of ethyl acetoacetate and diethylmalonate.

Unit III - STEROISOMERISM **(18 Hrs)**

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

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

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

Unit IV - AMINES AND DIAZO COMPOUNDS **(18 Hrs)**

(a). Amines

Aliphatic Amines: Classification, Basic nature, preparation of Primary,secondary and tertiary aliphatic amines, Separation of amine mixture –
Hofmann's method and Hinsberg method, Physical properties, Chemical properties of amines – Basicity, Reaction with alkyl halides, acid chlorides,nitrous acid,carbon disulphide (Hofmann's mustard oil test), Carbylamine reaction, Quaternary ammonium compounds, Mechanism andstereochemistry of Hofmann elimination, Phase transfer catalyst, Distinctionbetween Primary, secondary and tertiary amines.

Aromatic amine: Preparation, properties and uses of aniline

(b) Diazo Compounds

Preparation and Chemical properties of Diazomethane and Benzene diazonium salts.

Unit V - CARBOHYDRATES **(18 Hrs)**

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

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

Text Book:

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

Reference:

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

   ii) P.Ramesh, Basic principles of Organic Stereochemistry, Meenu Publications. First Edition' 2010,
3. For units IV &V : I.L. Finar, Organic chemistry, Volume – I, ELBS &Longmann group Ltd, 60th Edition'1973

CIA Evalatation Pattern

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

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non – Scholastic

COURSE OUTCOMES

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

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

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr. S.SUKUMARI

2. **Dr. B.SUGANTHANA**

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III

B.Sc.chemistry

SEMESTER -V

(For those who joined in 2019 onwards)

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

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

UNITS

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

Definition and importance, energy and its units. Mechanical work and heat and its relation, Thermodynamic systems and their characteristics, state of a system, state function and its characteristics- thermodynamic function, thermodynamic processes, thermodynamic equilibrium, first law – statement,

different forms, mathematical formulation – work of expansion at constantpressure.

Heat of reaction at constant volume E and constant pressure. H – Relation between H and E and their inter conversion. Heat capacities at constant volume, Cv.and at constant pressure, Cp. Relation between Cp and Cv - Application of first law to ideal gas and real gas obeying van-der waals equation of state - work done, heat absorbed and change in E during adiabatic and isothermal changes. Joule Thomson expansion coefficient, inversion temperature and its significance, Equipartitionenergy.Thermodynamic equilibrium of state.

Thermo chemistry – Definitions and enthalpies of reaction, their determination and application, variation of enthalpies with temperature - Kirchoff equation.

Laws of thermo chemistry – (i) Lavoisier and Laplaces law (ii) Hess's law of constant heat summation – statement- thermodynamic derivation and application (iii) Law of Thermo – neutrality of solutions.

Bond Energies – definitions, calculation from thermo chemistry andapplications

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UNIT -II II law of THERMODYNAMICS (18 Hrs)

II Law of thermodynamics – importance, different ways of stating the II law and its significance.

Conversion of heat into work – Carnot's Theorem and cycle, Thermodynamicefficiency.Efficiency and thermodynamic scale of temperature.

Entropy – definition – dependence of entropy on variables of the system – entropy changes in ideal gases and mixing of gases, physical transformations in chemical reactions and in irreversible processes, Entropy and probability – physical significance.

Free energy functions:

(i) Helmoltz free energy (A) – definition and temperature dependence.

(ii) Gibbs free energy (G) - definition and temperature dependence, properties and significance. Relation between free and total energies –

Gibbs Helmholtz equation and applications.Maxwell equation, derivation of state from Maxwell relation.

(iii) Partial molar quantities and chemical Potential, Physical equilibria involving pure substances.

(iv) Clapeyron equation – derivation and general form – applications to various physical equilibriaviz, melting, vapourisation, sublimation and transition.

(v) Clausius – Clapeyron equation – derivation and its applications.

UNIT - III -APPLICATIONS AND III LAW OF THERMODYNAMICS(18 Hrs)

Applications of thermodynamics to various types of equilibria – equilibrium constant and free energy changes. Reaction isotherm and Van't Hoff isochore – Thermodynamic interpretation of the law of mass action andLe Chatlier's principle -derivation.

Nernst heat theorem and its applications,

III law of thermodynamics. A simple treatment of the law, temperature dependence of the heat capacity and its use in the determination of absolute entropy, comparison between statistical(exception to III law) and III law entropy, Zeroth law of thermodynamics and its significance.

UNIT -IV GROUP THEORY (18 Hrs)

Introduction- symmetry elements and symmetry operations- groups- definitions and rules of a group-group multiplication table-classes, similarity transformation-point group classification.

Matrix representation of symmetry operations, rotation, reflection, reducible and irreducible representation- decomposition of reducible representations- other properties-notation-some theorems-projection operators- general theorems of representation theory problems.

Construction of character table $C_{2V,}$ $C_{3V,}$ - Direct product representation.-Chemical application of Group theory- normal mode analysis- selection rule for IR & Raman spectroscopy.

SELF STUDY: To predict the point groups of Naphthalene, ethylene and cisand trans dichloroethylene

UNIT V -PHASE RULE (18Hrs)

Definition of the terms- phase, component and degrees of freedom, Types of equilibrium and derivation of phase rule.

One component system – (e.g.) water system, Sulphur system, CO_2system, Effect of temperature and pressure on these systems

Two component system- (solid-liquid equilibrium):
Simple eutectic - (e.g.) Lead-Silver

system.Compound formation – General description

.

Solid-solid equilibrium: Salt hydrate- water system, incongruent melting point, Potassium iodide-water system, Ferric chloride – Water system, Sodium- Potassium system, Copper Sulphate – Water system. Transition temperature and its determination.

SELF STUDY: Zinc – Magnesium system

REFERENCES: .

Text Book:

Unit I - III –Puri, Sharma &Pathania.- Physical chemistry by 3rdEdn, Vishalpublishing Company.

Unit IV 1. V. Ramakrishnan& M.S. Gopinathan -Group theory -Vishal publishing House, 2ndEdn, 1991.

2. Barrow -Spectroscopy , Tata Mc-Graw Hall, 5thEdn, 1992.P.No. 104 & 105

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**TITLE**			
1.1	**THERMODYNAMICS – I:** Definition and importance, energy and its units. Mechanical work and heat and its relation, Thermodynamic systems and their characteristics, state of a system, state function and its characteristics- thermodynamic function, thermodynamic processes, thermodynamic equilibrium, - . .	1	Chalk & Talk	Black Board
	first law – statement, different forms, mathematical formulation – work of expansion at constant pressure.			

1.2	Heat of reaction at constant volume E and constant pressure. H – Relation between H and E and their inter conversion.	3	Chalk & Talk	LCD
1.3	Heat capacities at constant volume, Cv.and at constant pressure, Cp. Relation between Cp and Cv - Application of first law to ideal gas and real gas obeying van-der waals equation of state	3	Lecture	PPT & White board

1.4	work done, heat absorbed and change in E during adiabatic and isothermal changes. Joule Thomson expansion coefficient, inversion temperature and its significance, Equipartition energy.Thermodynamic equilibrium of state.	3	Lecture	Smart Board
1.5	Thermo chemistry – Definitions and enthalpies of reaction, their determination and application, variation of enthalpies with temperature - Kirchoff equation	2	Lecture	Black Board
1.6	Laws of thermo chemistry – (i) Lavoisier and Laplaces law (ii) Hess's law of constant heat summation – statement-	2	Discussion	Google classroom
1.7	thermodynamic derivation and application (iii) Law of Thermo – neutrality of solutions.	2	Specimen	Microscope
1.8	Bond Energies – definitions, calculation from thermo chemistry and applications	2	Discussion	Black Board
UNIT -2 THERMODYNAMICS – II:				
2.1	II Law of thermodynamics – importance, different ways of stating the II law and its significance.	1	Lecture	Green Board Charts

2.2	Conversion of heat into work – Carnot's Theorem and cycle, Thermodynamic efficiency.Efficiency and thermodynamic scale of temperature.	2	Chalk & Talk	Green Board
2.3	Entropy – definition – dependence of entropy on variables of the system – entropy changes in ideal gases and mixing of gases, physical transformations in chemical reactions and in irreversible processes, Entropy and probability – physical significance.	2	Chalk & Talk	Black Board
2.4	**Free energy functions:** (i) Helmoltz free energy (A) – definition and temperature dependence. (ii) Gibbs free energy (G) - definition and temperature dependence, properties and significance. Relation between free and total energies – Gibbs Helmholtz equation and applications.Maxwell equation, derivation of state from Maxwell relation.	3	Chalk & Talk	Black Board
2.5	Partial molar quantities and chemical Potential, Physical equilibria involving pure substances.	1	Chalk & Talk	Black Board

2.6	Clapeyron equation – derivation and general form – applications to various physical equilibriaviz, melting, vapourisation, sublimation and transition Clausius – Clapeyron equation – derivation and its applications.	2	Chalk & Talk	Black Board
	APPLICATIONS AND III LAW OF THERMODYNAMICS (18 Hrs)			
3.1	**Applications of thermodynamics** to various types of equilibria – equilibrium constant Thermodynamic interpretation of the law of mass action and Le Chatlier's principle -derivation.	2	Chalk & Talk	Black Board
3.2	and free energy changes. Reaction isotherm and Van't Hoff isochore –	1	Chalk & Talk	Black Board
3.3	Nernst heat theorem and its applications, **III law of thermodynamics**. A simple treatment of the law, temperature dependence of the heat capacity and its use in the determination of absolute entropy,	2	Chalk & Talk	Black Board
3.4	comparison between statistical(exception to III law) and III law entropy, Zeroth law of thermodynamics and its significance.	2	Chalk & Talk	Black Board
	GROUP THEORY			

4.1	**Introduction**- symmetry elements and symmetry operations-	2	Lecture	PPT & White board
4.2	groups-definitions and rules of a group-group multiplication table-classes,	2	Lecture	PPT & White board
4.3	similarity transformation-point group classification.	2	Lecture	PPT & White board
4.4	Matrix representation of symmetry operations, rotation, reflection,	3	Lecture	PPT & White board
4.5	reducible and irreducible representation- decomposition of reducible representations- other properties-notation-	3	Lecture	PPT & White board
4.6	some theorems-projection operators- general theorems of representation theory problems. Construction of character table C_{2v}, C_{3v},	3	Lecture	PPT & White board
4.7	Direct product representation.- Chemical application of Group theory- normal mode analysis- selection rule for IR & Raman spectroscopy.	3	Lecture	PPT & White board
	PHASE RULE			
5.1	Definition of the terms- phase, component and degrees of freedom, Types of equilibrium and derivation of phase rule.	3	Chalk & Talk	Black Board

5.2	One component system – (e.g.) water system, Sulphur system, CO_2system, Effect of temperature and pressure on these systems	3	Chalk & Talk	Black Board
5.3	Two component system- (solid-liquid equilibrium): Simple eutectic - (e.g.) Lead-Silver system.	3	Chalk & Talk	Black Board
5.4	Compound formation – General description	3	Chalk & Talk	Black Board
5.5	Solid-solid equilibrium: Salt hydrate- water system, incongruent melting point, Potassium iodide-water system, Ferric chloride – Water system,	3	Chalk & Talk	Black Board
5.6	Sodium- Potassium system, Copper Sulphate – Water system. Transition temperature and its determination.	3	Chalk & Talk	Black Board

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

CIA	
Scholastic	35
Non Scholastic	5
	40

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

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

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

in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Explain all the terms in thermodynamics and mathematically formulate it.	K1	PSO1& PSO2
CO 2	Understand the three laws of thermodynamics and evolve the concepts of enthalpy,entropy and free energy	K1, K2,	PSO3

CO 3	Explain the parts of phase diagrams of unary and binary component system	K1 & K3	PSO5
CO 4	Explain the behaviour of the systems in equilibrium using Pressure-Temperature and Composition Temperature curves	K1, K2, K3 &	PSO6
CO 5	Classify the molecules on the basis Of symmetry elements into different point groups using the rules of groups	K2 & K4	PSO7

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

DR.S.SELVARANI

DR.B.MEDONA

Forwarded By

B-Medona.

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc.CHEMISTRYSEMESTER -V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5CC15	Inorganic practicals (GRAVIMETRIC ANALYSIS)	Lab In	4	2

COURSE OBJECTIVE: This paper deals with the preparation of someinorganic complexes and gravimetric estimation of metal ions

- Estimation of Lead as lead chromate.
- Estimation of chloride as silver chloride.
- Estimation of barium as barium chromate.
- Estimation of barium as barium sulphate.

Inorganic Complex preparations:

- Thiourea complex
- Tetrammine Cu complex
- Ferrous oxalate

References:

Venkatesan, Kulandhaivelu, “Practical chemistry”, 2002.

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	Acquire the knowledge of concept of gravimetric estimations	PSO1& PSO2
CO 2	Recognise the role of reagents in chemistry	PSO3

CO 3	Determine the amount of analyte precipitate.	PS03, PSO5
CO 4	Analyse the experimental observations and inferences with theory behind practicals	PSO1,PSO5
CO 5	Gain knowledge of preparing complexes	PSO2,PSO5

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr.A.Rajeswari

2.Dr.B.Vinosha

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc chemistry

SEMESTER -VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	22C5CC16	CONVENTIONAL AND GREEN SYNTHESIS	Lab IN	4	2

COURSE OBJECTIVE: This paper includes the greener methods of preparationof Organic compounds and nano particles

After the completion of the course the students are able to

- To understand the green synthesis methods
- To know about the Acetylatation/ Propionelation of aniline using water as eco friendly solvent.
- To familiarise about the silver nanoparticles by green synthesis
- To learn about the preparation of organic compounds by using clay.
- To equip the Preparation of Schiff base by microwave technique.·

i) Greener methods of preparation of organic compounds

1. Preparation of bis-naphthol in solvent free conditions
2. Preparation of Aryl nitro compounds using greener nitrating mixture.
3. Preparation of *p*-bromoacetanilide from acetanilide using greener brominating agent.
4. Preparation of Aspirin using micro wave irradiation
5. Preparation of Benzillic acid from Benzil using greener method.

ii) Greener methods of preparation of Nanomaterials (Demonstration)

1. Preparationof Silver nanoparticles from Silver nitrate
2. Preparation of Zinc oxide from Zinc acetate

Conventional Methods:

1) Preparation of Benzoic acid from Benzaldehyde

2 Preparation of Salicylic acid from methyl salicylate

3) Preparation of Benzoic acid from Benzamide.

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	To understand the green synthetic methods	PSO1,PSO5& PSO6
CO 2	To know about the eco friendly solvents for green synthesis.	PSO1, PSO5& PSO6
CO 3	To familiarise about the silver nanoparticles by green synthesis	PSO1,PSO5& PSO6
CO 4	To learn about the preparation of organic compounds by using clay	PSO1, PSO5& PSO6
CO 5	To equip the Preparation of Schiff base by microwave technique.	PSO1,PSO5, PSO6 & PSO7

Mapping of COs with PSOs

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

Mapping of COs with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER

1. **Dr.Sr.ArulMary.J**

1. **Dr. S.Sukumari**

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRY

SEMESTER -V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5ME1	SPECTROSCOPY	UG Core	5	5

COURSE DESCRIPTION

This course will focus on interpretation of spectra and application of these tools to address questions of structures.

COURSE OBJECTIVES

In this course the students are exposed to various spectroscopic techniques that are used in structural elucidation. This paper will be of much use of the students to take up higher studies.

UNITS

UNIT -I UV-VISIBLE SPECTROSCOPY (15HRS.)

Introduction, Absorption laws – instrumentation. Types of electronic transitions Absorption and intensity shifts – solvents effects. λ_{max} calculation using Woodward rules for dienes (Open chain and alicyclic) and unsaturated carbonyl compounds.

Self Study: Applications of UV spectroscopy.

UNIT -II FT-IR SPECTROSCOPY (15HRS.)

Introduction, molecular vibrations vibrational frequency – Number of fundamental vibrations – Factors influencing vibrational frequencies – Instrumentation – Sampling technique Finger print region – skeletal and groupvibrations.

Self Study: Applications of FT-IR spectroscopy.

UNIT -III ^{1}H-NMR SPECTROSCOPY (15HRS.)

Introduction, principle, Number of signals, position of signals(chemical shift) – shielding and deshielding effects. Factors influencing chemical shift. Instrumentation, Solvents used -peak area – splitting of the signals. Coupling constant (J) geminal Vicinal (cis&trans) and aromatic coupling (J- ortho, J-meta & J-para).

Self Study: Applications of ^{1}H-NMR spectroscopy.

UNIT -IV ^{13}C AND ESR SPECTROSCOPY (15HRS.)

Natural abundance of ^{13}C – Resolution, multiplicity – H_1 decoupling – Noise decoupling. NOE Signal enhancement -broad bands – off resonance – proton decoupling. Chemical shifts for ^{13}C in various kind of carbon. (sp^3,sp^2, sp, hybridized carbon and carbonyl carbon) comparison of ^{13}C NMR &PMR (elementary level).

Introduction, Hyperfine splitting in Hydrogen atom, CH_3 free radicals, Benzene anion radical, bis salicylaldimine Copper(II)Complex.

Self Study: Zero field splitting & Kramers's degeneracy.

UNIT -V MASS SPECTROSCOPY (15HRS.)

Basic principles, Instrumentation, Determination of molecular formula using nitrogen rule – Molecular ion peal – base peak (M+1), (M+2) peaks metastable peaks. General fragmentation modes, simple cleavage – Retro Diels Alder reaction. Hydrogen transfer rearrangements – McLafferty rearrangement, problems.

Self Study: Applications in Mass spectroscopy.

REFERENCES:

5. Y.R. Sharma, Organic Spectroscopy, Fourth revised and enlarged Edn.,2007, S. Chand & Co.
6. Puri, Sharma & Pathania, Principles of Physical Chemistry, 3rd Edn., Vishal publishing Company.
7. P. S. Kalsi, Stereochemistry of carbon compounds, 3rd Edn., New Age International Publishers, 1995.

8. R. S. Drago, *PhysicaI Methods in Chemistry*; Saunders:Philadelphia, 1977.

9. C. N. Banwell and E. M. Mc Cash, *Fundamentals of Molecular Spectroscopy*, 4th Edn., Tata Mc Graw Hill, New Delhi, 2000.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 UV-VISIBLE SPECTROSCOPY				
1.1	Introduction, Absorption laws	2	Chalk & Talk	Black Board
1.2	Instrumentation	1	Chalk & Talk	LCD
1.3	Types of electronic transitions	1	Lecture	Black Board
1.4	Absorption and intensity shifts	3	Lecture	Black Board
1.5	Solvents effects	3	Lecture	Black Board
1.6	λmax calculation using Woodward rules for dienes	2	Lecture	Chalk and Talk
1.7	λmax calculation using Woodward rules for Open chain and alicyclic compounds	1	Lecture	PPT & White board
1.8	λmax calculation using Woodward rules for unsaturated carbonyl compounds.	2	Discussion	Black Board
UNIT -2 FT-IR SPECTROSCOPY				
2.1	Introduction	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	Molecular vibrations vibrational frequency	2	Chalk & Talk	Green Board
2.3	Number of fundamental vibrations	2	Chalk & Talk	Black Board
2.4	Factors influencing vibrational frequencies	3	Lecture	PPT & White board
2.5	Instrumentation	2	Discussion	LCD
2.6	Sampling technique Finger print region	1	Lecture	Black Board
2.7	Skeletal and group vibrations.	4	Lecture	PPT & White board
UNIT -3 ^{1}H-NMR SPECTROSCOPY				
3.1	Introduction, principle	2	Lecture	Black Board
3.2	Number of signals, position of signals(chemical shift).	3	Discussion	LCD
3.3	Shielding and deshielding effects.	3	Lecture	PPT & White Board
3.4	Factors influencing chemical shift.	2	Lecture	Black Board
3.5	Instrumentation	1	Discussion	LCD
3.6	Solvents used -peak area – splitting of the signals.	2	Lecture	Black Board
3.7	Coupling constant (J) geminal Vicinal (cis&trans)	1	Lecture	Black Board
3.8	Aromatic coupling (**J**- ortho, **J**-meta & J-para).	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -4 ^{13}CAND ESR SPECTROSCOPY				
4.1	Natural abundance of ^{13}C – Resolution, multiplicity.	1	Lecture	Black Board
4.2	H_1 decoupling – Noise decoupling.	3	Chalk & Talk	Green Board
4.3	NOE Signal enhancement -broad bands – off resonance – proton decoupling.	2	Chalk & Talk	Black Board
4.4	Chemical shifts for ^{13}C in various kind of carbon. (sp^3,sp^2, sp, hybridized carbon and carbonyl carbon)	3	Lecture	PPT & White board
4.5	Comparison of ^{13}C NMR &PMR (elementary level).	1	Discussion	LCD
4.6	Introduction, Hyperfine splitting in Hydrogen atom	1	Lecture	Black Board
4.7	CH_3 free radicals, Benzene anion radical	2	Lecture	PPT & White board
4.8	bissalicylaldimine Copper(II) complex.	2	Lecture	Black Board
UNIT -5 MASS SPECTROSCOPY				
5.1	Basic principles, Instrumentation	2	Lecture	Black Board
5.2	Determination of molecular formula using nitrogen rule	2	Chalk & Talk	Green Board
5.3	Molecular ion peak – base peak (M+1), (M+2) peaks metastable peaks	3	Chalk & Talk	Black Board
5.4	General fragmentation modes	1	Lecture	PPT & White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.5	Simple cleavage	2	Discussion	LCD
5.6	Retro Diels Alder reaction	1	Lecture	Black Board
5.7	Hydrogentransfer rearrangements	2	Lecture	PPT & White board
5.8	McLafferty rearrangement, problems.	2	Lecture	Black Board

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	to calculate λmax values for different organic molecules and to identify the systems using UV spectroscopy.	K1, K2,K3 &K4	PSO1& PSO2
CO 2	to identify various functional groups present in organic molecules using IR frequency.	K1, K2,K3 &K4	PSO3
CO 3	to predict the number and nature of protons/ carbons in organic moleculesin ^{1}H-NMR/ ^{13}C-NMR spectroscopy.	K1, K2,K3 &K4	PSO5
CO 4	to study the structures of systems with unpaired electrons using ESR spectroscopy.	K1, K2,K3&K4	PSO3
CO 5	to findoutthe mass of the molecule and to arrive at the formulae of the molecules using fragmentation patterns.	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

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

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

COURSE DESIGNER:
1.Dr.M.Priyadharsani

2.Dr.V.Aruldeepa

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18
B.Sc.Chemistry -V
SEMESTERBIO
CHEMISTRY-
19C5ME2

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5ME2	BIO CHEMISTRY	Lecture	5	5

Course Description:

This course deals with the structure of RNA and DNA and their function. It gives an overview of classification of enzyme and mechanism of enzyme action. This course also deals with bio-energetics.

COURSE OBJECTIVES

In this course the students are exposed to various Biomolecules, bioenergetics and spectroscopy of biomolecules. This paper will be of much use of the students to take up higher studies.

UNIT I-NUCLEIC ACID **15 Hrs**
UNIT II- ENZYMES **15 Hrs**
UNIT III -METABOLISM **15 Hrs**
UNIT IV BIOENERGETICS-I **15 Hrs**
UNIT V BIOENERGETICS- II **15 Hrs**

Unit I-NUCLEIC ACID **(15 Hrs)**

Definition, Three components, Phosphoric acid, Pentose sugar, Nitrogenous bases(Purine and Pyrimidine derivatives)

Nucleosides, nucleotides, Deoxyribonucleic acid, Internucleotide linkages, Base composition, Double helical structure, Denaturation

and renaturation, Molecular weight, shape and size, single stranded DNA, Ribonucleic acid, differences with RNA, Types of RNA , Ribosomal and transfer RNA, Messenger and heteronucleic RNA.

UNIT II- ENZYMES **(15 Hrs)**

Classification- Isozymes, Multienzyme systems- Biological role of enzymes. Mechamism- Activation energy, Michaelis Menten Hypothesis, Michaelis Menten equation, Line weaver Burk equation, Active site – fisher's lock and key model. Modifiers of enzyme activity- Inorganic modifiers or

enzyme activators. Organic modifiers or enzyme inhibitors, competitive inhibition, Non-competitive inhibition.

Unit III - METABOLISM **(15 Hrs)**

Metabolism of carbohydrates – Glucose metabolism – Glucose uptake,Phosphorylation, Glycolysis and oxidation and Glucose storage, Fructose metabolism. Metabolism of Proteins .

Unit IV BIOENERGETICS -I **(15 Hrs)**

Coupling, concept of energy, Thermodynamic principles ATP as universal currency of free energy in Biological systems. Free energy of hydrolysis of ATP and other organo phosphates.

Unit V BIOENERGETICS II **(15 Hrs)**

Structural basis of the high group transfer potential of ATP. ATP hydrolysisand equilibria of coupled reactions. Role of high energy phosphates as the energy currency of the cell, Heme

Text Book:

1. Fundamentals of Bio Chemistry – J.L.Jain.
2. J. Ghosh, A Textbook of Pharmaceutical Chemistry, New Delhi: S. Chand &Company,
1999.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 UV-VISIBLE SPECTROSCOPY				
1.1	Definition, three components, phosphoric acid and pentose sugar.	2	Chalk & Talk	Black Board
1.2	Nitrogenous bases(Purine and Pyrimidine derivatives).	1	Chalk & Talk	LCD
1.3	Nucleosides, nucleotides, Deoxyribonucleic acid, Internucleotide linkages,	1	Lecture	Black Board
1.4	Denaturation and renaturation,	3	Lecture	Black Board
1.5	single stranded DNA, Ribonucleic acid	3	Lecture	Black Board
1.6	Ribonucleic acid, differences with RNA, Types of RNA	2	Lecture	Chalk and Talk
1.7	Ribosomal and transfer RNA	1	Lecture	PPT & White board
1.8	Messenger and heteronucleic RNA.	2	Discussion	Black Board
UNIT -2 FT-IR SPECTROSCOPY				
2.1	Classification- Isozymes, Multienzyme systems-	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.2	Biological role of enzymes.	2	Chalk & Talk	Green Board
2.3	Mechamism- Activation energy, Michaelis Menten Hypothesis	2	Chalk & Talk	Black Board
2.4	Michaelis Menten equation, Line weaver Burk equation,	3	Lecture	PPT & White board
2.5	Line weaver Burk equation, Active site –fisher's lock and key model	2	Discussion	LCD
2.6	Modifiers of enzyme activity- Inorganic modifiers or enzyme activators.	1	Lecture	Black Board
2.7	Organic modifiers or enzyme inhibitors, competitive inhibition, Non-competitive inhibition.	4	Lecture	PPT & White board
UNIT -3 ^{1}H-NMR SPECTROSCOPY				
3.1	Metabolism of carbohydrates –	3	Lecture	Black Board
3.2	– Glucose metabolism – Glucose uptake	3	Discussion	LCD
3.3	Phosphorylation, Glycolysis	3	Lecture	PPT & White Board
3.4	Fructose metabolism	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.5	Metabolism of Proteins .	3	Discussion	LCD
UNIT -4 ^{13}CAND ESR SPECTROSCOPY				
4.1	Coupling, concept of energy, .	5	Lecture	Black Board
4.2	Thermodynamic principles ATP as universal currency of free energy in Biological systems.	5	Chalk & Talk	Green Board
4.3	Free energy of hydrolysis of ATP and other organo phosphates.	5	Chalk & Talk	Black Board
UNIT -5 MASS SPECTROSCOPY				
5.1	Structural basis of the high group transfer potential of ATP	2	Lecture	Black Board
5.2	ATP hydrolysis and equilibria of coupled reactions.	3	Chalk & Talk	Green Board
5.3	Role of high energy phosphates as the energy currency of the cell	5	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.4	Heme.	5	Lecture	PPT & White board

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

CIA	
Scholastic	**35**

Non Scholastic	**5**
	40

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Have an in-depth knowledge on various organic biomolecules	K1, K2,K3 &K4	PSO1& PSO2
CO 2	Have an in-depth knowledge on various inorganic biomolecules	K1, K2,K3 &K4	PSO3
CO 3	to predict the number and nature of protons/ carbons in inorganic biomoleculesin using different spectroscopic techniques.	K1, K2,K3 &K4	PSO5
CO 4	to analyze the redox behaviours of biomolecules using electroanalytical techniques.	K1, K2,K3&K4	PSO3
CO 5	To gain in-depth knowledge on biopolymers.	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

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

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

COURSE DESIGNER:

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

Forwarded By

HOD'S

Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc chemistry

SEMESTER -V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5SB3	Medicinal chemistry	Skill Based	2	2

COURSE DESCRIPTION

This paper focuses on all the important aspects of drugs, mechanism ofdrugs and also highlights the causes of common diseases, role of Indian medicinal plants and the importance of hormones.

COURSE OBJECTIVES

This course gives an introduction to the types of drugs and metabolism in the body. It also highlights the causes of common diseases, role of Indian medicinal plants and the importance of hormones.

UNITS

UNIT -I DRUGS (6 HRS.)

Drugs – Introduction – source, study, classification – Biological, Chemical and by Lay Public, Nomenclature of Drugs – IUPAC system, Heterocyclic systems and stereochemical system.

UNIT -II MECHANISM OF DRUGACTION (6 HRS.)

Mechanism of Drug action and metabolism of Drugs, Absorption ofDrugs and Assay of Drugs.

UNIT -III COMMON DISEASES (6 HRS.)

Causes of common Diseases – Classification of diseases and theirtreatment.

UNIT -IV INDIAN MEDICINAL PLANTS (6 HRS.)

Indian Medicinal plants – tulsi, aloevera, basil, gotu kola, neem and their medicinal properties.

UNIT -V HORMONES (6 HRS.)

Definition, Classification, Hormones with special reference to Testosterone, Progesterone and Thyroxine (structural elucidations not necessary).

REFERENCES:

Test Books

1. J. Ghosh, A Textbook of Pharmaceutical Chemistry, New Delhi: S. Chand &Company,
1999.
2. P. Parimoo, A Textbook of Medical Chemistry, New Delhi: CBSPublishers.1995.
3. S. Ramakrishnan, K. G. Prasannan and R. Rajan, Textbook of MedicalBiochemistry,
Hyderabad: Orient Longman. 3rd ed, 2001.

Reference Books

1. F. S. K. Barar, Essential of Pharmacotherapeutics, New Delhi: S. Chand &Company, 2000.
2. S. N. Pandeya and J. R. Dimmock, An Introduction to Drug Design, NewDelhi: New Age
International, 1997.
3. G. Patrick, Medical Chemistry, New Delhi: Viva Books, 2002.
4. Richard B. Silverman. The organic chemistry of drug design and drugaction, 2nd ed.,
Academic Press, 2004.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I DRUGS				
1.1	Drugs – Introduction, source, study,	1	Chalk & Talk	Black Board
1.2	classification of drugs - biological	2	Chalk & Talk	Black Board
1.3	classification of drugs – Chemical and by Lay Public	1	Chalk & Talk	Black Board
1.4	Nomenclature of Drugs – IUPA system	1	Chalk & Talk	Black Board
1.5	Heterocyclic systems and stereochemical system.	1	Chalk & Talk	Black Board
UNIT II MECHANISM OF DRUG ACTION				
2.1	Mechanism of Drug action	2	Chalk & Talk	Black Board
2.2	metabolism of Drugs	2	Chalk & Talk	Black Board
2.3	Absorption of Drugs	1	Chalk & Talk	Black Board
2.4	Assay of Drugs.	1	Chalk & Talk	Black Board
UNIT III COMMON DISEASES				
3.1	Causes of common Diseases	1	Chalk & Talk	Black Board
3.2	Classification of diseases and their treatment	5	Chalk & Talk	Black Board

UNIT IV INDIAN MEDICINAL PLANTS				
4.1	Indian Medicinal plants – tulsi, and their medicinal properties.	2	Chalk & Talk	Black Board
4.2	Indian Medicinal plants – aloevera and their medicinal properties.	1	Chalk & Talk	Black Board
4.3	Indian Medicinal plants – basil and their medicinal properties.	1	Chalk & Talk	Black Board
4.4	Indian Medicinal plants - gotu kola and their medicinal properties.	1	Chalk & Talk	Black Board
4.5	Indian Medicinal plants – neem and their medicinal properties.	1	Chalk & Talk	Black Board
UNIT V HORMONES				
5.1	Definition, Classification of hormones	2	Chalk & Talk	Black Board
5.2	Testosterone	2	Chalk & Talk	Black Board
5.3	Progesterone	1	Chalk & Talk	Black Board
5.4	Thyroxine	1	Chalk & Talk	Black Board

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

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

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

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

✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To acquire basic awareness on drugs and its sources	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 2	To study the mechanism of drugs and its effect on human system	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 3	To study the symptoms, preventions and therapeutic methods of common diseases	K1,K2,K3,K4	PSO1,PSO5, PSO7

CO 4	To predict the healing properties and applications of the Indian medicinal plants	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 5	To state the definition and function of testosterone, progesterone and thyroxine	K1,K2,K3,K4	PSO1,PSO5, PSO7

Mapping COs Consistency with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:
Mrs.Rm.Nagalakshmi

Forwarded By

HoD Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc

chemistry

.

SEMESTE

R -V

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5SB4	NANO SCIENCE	SKILL BASED	2	2

Course Objective: This paper deals with study of synthesis, properties,structure and applications of nano particles.

Unit-I: BASICS OF NANOCHEMISTRY **(6Hrs)**

Basics of nanomaterials: Properties of nanomaterials, quantum confinement effect, surface properties of nanoparticles. Classification of the nano materials
– zero dimensional, one dimensional, two dimensional and three dimensionalnanostructures.

Unit-II: PROPERTIES OF NANOMATERIALS AND CNTS: **(6Hrs)**

Mechanical, optical, electronic, magnetic, thermal and chemical properties of nanomaterials.

Carbon nano structures: Introduction – Carbonmolecules – Carbon clusters,Carbon nanotubes – application of Carbon nano tubes.

Unit-III: SYNTHETIC TECHNIQUES **(6Hrs)**

Chemical methods: sol-gel synthesis, solvothermal synthesis, thermolysisroute.

Physical methods: Pulsed laser deposition- Magnetron sputtering.

Unit-IV: APPLICATIONS OF NANOMATERIALS **(6Hrs)**

Application of nano materials as sensors, catalysts, and nano medicine.

.

Unit-V: Characterization Techniques **(6Hrs)**

X-ray diffraction(XRD) - Electron microscopes – scanning electron microscopes(SEM) –transmission electron microscopes (TEM) – scanning probe microscopy
– atomic force microscopy (AFM) –**basic principles only.**

Text Books:

1. Introduction to nanotechnology – Charles P. Poole Jr, Frank J. Owens.
2. Understanding nanoscience and nanotechnology – T. Pradeep

Reference Books:

1. S.Shanmugam, Nanotechnology, , MJP Publishers, Chennai (2010).
2. Patrick Salomon , A Handbook on Nanochemistry,, Dominant PublishersandDistributers, New Delhi.
3. S. Balaji ,Nanobiotechnology, MJP Publishers, Chennai (2010).
4. CNR RaoThe Chemistry of Nanomaterial: Synthesis, Properties andApplications, Vol. I and II, Springer (2006).
5. Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson,Kamali Kannangara, Geoff Smith, Michelle Simmons, BurkhardRaguse, OverseasPress, (2005).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I : BASICS OF NANOMATERIALS				
1.1	Basic concepts	2	Chalk & Talk	Black Board
1.2	surface properties of nanoparticles	2	Chalk & Talk	Black Board
1.3	classification of nanomaterials - one dimentional,twodimentional and three dimentional nanostructures	2	Chalk &Talk	Black Board
1.4	Carbon nanostructures- carbon molecules	2	Chalk & Talk	PPT & White board
1.5	carbon nanotubes	2	Chalk & Talk	Black Board
1.6	Nanopolymers	1	Chalk & Talk	LCD

1.7	Nnocrystals	1	Chalk & Talk	Black Board
UNIT II : SYNTHETIC METHODS OF NANOMATERIALS				
2.1	Synthesis of semiconductors .	2	Chalk & Talk	Black Board
2.2	synthesis of ceramics.	3	Chalk & Talk	Black Board
2.3	synthesis of carbon nanotubes	3	Chalk & Talk	PPT & White board
2.4	Synthesis of fullerenes	4	Chalk & Talk	Black Board
UNIT III :PROPERTIES OF NANOMATERIALS				
3.1	Properties of carbon nanotubes –Thermal conductivity and Kinetic property	2	Chalk & Talk	Black Board
3.2	Elecrical and electronical properties of CNT	2	Chalk & Talk	Black Board
3.3	Mechanical properties of CNT	1	Chalk & Talk	LCD
3.4	Electrical and electronic properties of CNT	1`	Chalk & Talk	Black Board
3.5	Vibrational properties and tensile strength	1	Chalk & Talk	Black Board
3.6	Physical properties of fullerene	1	Chalk & Talk	Black Board
3.7	Chemical properties of fullerenes	2	Chalk & Talk	Black Board
3.8	Inert gas cluster and rare gas clusters.	2	Chalk & Talk	Black Board

UNIT IV : CHARACTERIZATION TECHNIQUES				
4.1	Microscopy-Atomic force microscope(AFM), scanning electronmicroscope(SEM)	3	Chalk & Talk	Black Board
4.2	Transmission electron microscope(TEM), scanning probe microscope(SPM), scanning tunelling microscope (STM)	2	Chalk & Talk	Black Board
4.3	Spectroscopy-UV-visible	2	Chalk & Talk	Black Board
4.4	Nuclear magnetic resonance spectroscopy	1	Chalk & Talk	Black Board
4.5	Raman spectroscopy	1	Chalk & Talk	Black Board
4.6	Photo electron spectroscopy.	1	Chalk & Talk	Black Board
4.8	Infra-red spectroscopy,	2	Chalk & Talk	Black Board
UNIT V : APPLICATIONS OF NANOMATERIALS				
5.1	Applications of optical nanosensors chemical nanosensors,	2	Chalk & Talk	Black Board
5.2	Electrochemical nanosensors,	1	Chalk & Talk	Black Board
5.3	Biosensors	1	Chalk & Talk	PPT & White board
5.4	micro-electro mechanical sensors,	1	Chalk & Talk	Black Board
5.5	platinum,palladium,silver,cobalt nanoparticles as nanocatalyst	2	Chalk & Talk	Black Board
5.6	CNTs and polymeric naomaterials as nanocatalyst	1	Chalk & Talk	Black Board

5.7	Nanomaterials in drug delivery,photodynamic therapy, molecular imaging	2	Chalk & Talk	PPT & White board
5.8	Cancer treatment,molecularmotors,neuro-electronic interfaces and tissue engineering	2	Chalk & Talk	Black Board

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

CIA	
Scholastic	35
Non Scholastic	5
	40

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Distinguish between bulk material and nanomaterials	K1, K2, K3 &K4	PSO1& PSO2
CO 2	Choose the suitable synythetic methods to prepare particular nanomaterials	K1, K2, K3 &K4	PSO1& PSO3

CO 3	Interpret the structure of nanomaterials using various characterisation techniques	K1, K2, K3 &K4	PSO1&PSO6
CO 4	Catagorize and identify the different types Carbon nano structures	K1, K2, K3 &K4	PSO1& PSO3
CO 5	Summarise the uses of nanomaterials in various fields	K1, K2, K3 &K4	PSO3 & PSO6

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. B.SUGANTHANA

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc chemistry.

SEMESTER -VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6CC17	Organic chemistry –IV (POLYNUCLEAR HYDROCARBONS, HETEROCYCLIC COMPOUNDS, AMINO ACIDS AND PROTEINS)	UG Core	5	4

COURSE DESCRIPTION

This paper includes the topics, Polynuclear Hydrocarbons, Heterocyclic Compounds, Amino Acids and Proteins, Terpenes and Alkaloids.

COURSE OBJECTIVES

In this course the students are exposed to develop efficient, synthetic methods in organic chemistry.And to be familiar with properties and reactions of most important poly nuclear hydrocarbons, heterocycliccompounds, amino acids, peptides, proteins. And gain advanced knowledge and understanding in aspect of alkaloids and terpenes.

UNITS

UNIT I. POLY NUCLEAR HYDROCARBONS (15 Hrs.)

Structure of Naphthalene, aromaticity, preparation-Haworth and Fitting's synthesis. Chemical properties- reduction, oxidation, electrophilic substitution.Derivatives of naphthalene 1- Naphthol and 2- Naphthol – Preparation and chemical properties.1-Naphthylamine and2-Naphthylamine Preparation- Bucherer reaction, and Chemical properties. Naphthaquinone- Preparation and properties of 1, 2-Naphthaquinone, 1,4- Naphthaquinoneand 2,6- Naphthaquinone, Naphthoic acids.

Structure of Anthracene, aromaticity, preparation- Fridel-Crafts reaction.Chemical properties- Electrophilic substitution, oxidation, reduction and Diels –Alder reaction. Preparation and property of 9,10-Anthraquinone. Preparation- Pschorr and Haworth synthesis and properties of Phenanthrene. Preparation and property and phenanthraquinone.

Fused polynuclear heterocyclic systems- Quinoline and Isoquinoline- Preparation of quinoline –Skraup's and Friedlander's synthesis, Chemical properties of quinoline- electrophilic, nucleophilic substitution, oxidation, and reductions reactions.Preparation of isoquinoline –Bischler-Napieralski reaction, and chemical properties.

UNIT II. HETEROCYCLIC COMPOUNDS (15 Hrs.)

Introduction,numbering the position in heterocyclic compounds.Five membered heterocyclic compounds of pyrrole, furan, thiophene.Structure and aromaticity,general methods of preparations ofpyrrole, furan, thiophene, Preparation of pyrrole (Knorr-pyrrole, Hanstzchsynthesis),Chemical properties of pyrrole, furan, thiophene- electrophilic substitution,reduction reactions, Kolbes-Schmitt reaction in pyrrole and Diels-Alder reaction of furan.Comparison of reactivity of furan, pyrrole and thiophene.

Six- membered heterocyclic compound – Pyridine- Structure aromaticity and basicity.Preparation andChemical properties of pyridine- electrophilic, nucleophilic substitution and reduction reactions.Indole- preparation- Fischer's indole, Madelung, Reissert synthesis.Electrophilic substitution and reduction reactions.Five membered heterocyclic containing two hetero atoms: Pyrazole

UNIT III. AMINO ACIDS AND PROTEINS (15 Hrs.)

Amino acids – Classification based on chemical structure and on nutrition importance,Stereochemistry of amino acids - methods of preparation- Perkin et al., Gabriel phthalimide, Strecker, Malonicester, The Darapsky, and Erlenmeyer azalctone synthesis. Physical properties - Zwitterions and isoelectric points. Chemical properties- Reactions due to amino groups, Reactions due to carboxylic group and reactions due to both NH_2 and –COOH groups.

Peptides and their synthesis- Use of protecting group in synthesis

of polypeptides, protection of amino group, synthesis of peptide using protected amino and carboxylic acid ends, and Merrifield solid phase polypeptide synthesis. End group Analysis - N- terminal - DNP, Dansyl methods and Edman's degradation. C- terminal- Carboxypeptidase and Kumpfs method. Primary, Secondary and Tertiary structure of proteins.Colourreactions of proteins and denaturation of proteins – Fibrous & globularproteins.

UNIT IV.TERPENES (15Hrs.)

Introduction, Occurrence classification, Isolation, general properties, isoprene and special isoprene rule. Gem-dialkylerule.Structure,synthesis of Citral, Limonene and Camphor, Zingiberene.

UNIT V. ALKALOIDS (15Hrs.)

Definition, occurrence, extraction and general methods for determining the structure-functional nature of oxygen, Nitrogen, Herzigmayer and Kuhnroth method for estimation of C-methyl group.Degradation of alkaloids-Hofmann exhaustive methylation,Emde's degradation, Von Braun's.Reductive degradation,alkali fusion and oxidation.Structure and synthesis of Coniine, Piperine, Nicotine andQuinine.

Text Books

Unit I ,II andIII

1. I.L.Finar Organic Chemistry Vol II, 5thEdn, ELBS &Longmann group Ltd.
2. I.L FinarOrganic ChemistryVol. I –, 6thEdn., ELBS &Longmann group Ltd.
3. BhupinderMetha and Manjumetha – organic chemistry-Fifth printing Published by Asoke. K.Ghosh

Unit IV

1. GurdeepR.Chatwal Organic chemistry of Natural products Vol.II, 5thEdn, Himalaya publishing housePvt.ltd.

Unit V

1. Gurdeep .R.Chatwal Organic chemistry of Natural products Vol.I, 4thEdn, Himalaya publishing house Pvt.ltd.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I. POLY NUCLEAR HYDROCARBONS				
1.1	Structure of Naphthalene, aromaticity, preparation- Haworth and Fitting's synthesis.	2	Chalk & Talk	Black Board
1.2	Chemical properties- reduction, oxidation,electrophilic substitution. Derivatives of naphthalene 1- Naphthol and 2- Naphthol – Preparation and chemical properties.	1	Chalk & Talk	LCD
1.3	Preparation and chemical properties of 1-Naphthylamine and 2-Naphthylamine, Bucherer reaction, and Chemical properties. Naphthaquinone- Preparation and properties of 1, 2-Naphthaquinone	1	Lecture	Black Board
1.4	Preparation and properties of 1,4- Naphthaquinone and 2,6-Naphthaquinone, Naphthoic acids, Structure of Anthracene,	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	aromaticity, preparation- Fridel-Crafts reaction.Chemical properties-Electrophilic substitution.			

1.5	oxidation, reduction and Diels –Alder reaction. Preparation and property of 9,10-Anthraquinone. Preparation-Pschorr and Haworth synthesis and properties of Phenanthrene. Preparation and property and phenanthraquinone.	3	Lecture	Black Board
1.6	Preparation of quinoline – Skraup's and Friedlander's synthesis, Chemical properties of quinolone.	2	Lecture	Chalk and Talk
1.7	electrophilic,nucleophilic substitution, oxidation, and reductions reactions.	1	Lecture	PPT & White board
1.8	Preparation of isoquinoline – Bischler-Napieralski reaction, and chemical properties.	2	Discussion	Black Board
UNIT II. HETEROCYCLIC COMPOUNDS				**(12 Hrs)**
2.1	Introduction,numbering the position in heterocyclic compounds.	1	Lecture	Black Board
2.2	Structure and aromaticity,general methods of preparations ofpyrrole,	3	Chalk & Talk	Green Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Preparation of pyrrole (Knorr-pyrrole, Hanstzchsyntesis),			
2.3	Structure and aromaticity,general methods of preparations offuran, thiophene,	2	Chalk & Talk	Black Board

2.4	Chemical properties of pyrrole, furan, thiophene- electrophilic substitution,reduction reactions,	1	Lecture	PPT & White board
2.5	Kolbes-Schmitt reaction in pyrrole and Diels-Alder reaction of furan.Comparison of reactivity of furan, pyrrole and thiophene.	2	Lecture &Discussion	Black Board &LCD
2.6	Six- membered heterocyclic compound – Pyridine- Structure aromaticity and basicity.Preparation,	2	Lecture	Black Board
2.7	Chemical properties of pyridine- electrophilic, nucleophilic substitution and reduction reactions.Indole- preparation- Fischer's indole, Madelung, Reissert synthesis.Electrophilic substitution and reduction reactions.Five membered heterocyclics containing two hetero atoms: Pyrazole	4	Lecture	PPT &Black Board
UNIT III. AMINO ACIDS AND PROTEINS				
3.1	Amino acids – Classification based on chemical structure and on nutrition importance	1	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.2	Stereochemistry of amino acids - methods of preparation- Perkin et al., Gabriel phthalimide of amino acids.	2	Chalk & Talk	Black Board &LCD
3.3	Strecker, Malonicester, The Darapsky, and Erlenmeyer azalctone synthesis of amino acids.	2	Chalk & Talk	PPT & White Board

3.4	Physical properties - Zwitterions and isoelectric points. Chemical properties- Reactions due to amino groups	3	Chalk & Talk	Black Board
3.5	Reactions due to carboxylic group and reactions due to both -NH_2 and –COOH groups.	2	Chalk & Talk	Black Board &LCD
3.6	Use of protecting group in synthesis of polypetides, protection of amino group, synthesis of peptide using protected amino and carboxlic acid ends.	1	Lecture	Black Board
3.7	Merrifield solid phase polypeptide synthesis. End group Analysis - N- terminal - DNP, Dansyl methods and Edman's degradation.	2	Chalk & Talk	Black Board
3.8	C- terminal- Carboxypeptidase and Kumpfs method. Primary, Secondary and Tertiary structure of proteins. Colour reactions of proteins and denaturation of proteins – Fibrous & globular proteins	2	Lecture & Discussion	Black Board& LCD
UNIT -4 TERPENES				
4.1	Introduction, Occurrence classification, Isolation.	2	Lecture	Black Board

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
4.2	general properties.	1	Chalk & Talk	Green Board
4.3	Isopreneand special isoprene rule. Gem-dialkylerule.Structure,synthesis of Citral,	3	Chalk & Talk	Black Board
4.4	Structure,synthesis of Limonene	2	Chalk & Talk	Black Board
4.5	Structure,synthesis of Limonene ,Camphor.	1	Chalk & Talk	Black Board

4.6	Structure,synthesis of Camphor.	1	Chalk & Talk Lecture	Black Board
4.7	Structure,synthesis of Camphor, Zingiberene.	3	Chalk & Talk Lecture	PPT & White board
4.8	Structure,synthesis of Zingiberene.	2	Chalk & Talk Lecture	Black Board
UNIT -5 ALKALOIDS				
5.1	Definition, occurrence	1	Lecture	Black Board
5.2	extraction and general methods for determining the structure-functional nature of oxygen, Nitrogen.	2	Chalk & Talk	Green Board
5.3	Herzigmayer and Kuhnroth method for estimation of C-methyl group.	3	Chalk & Talk	Black Board
5.4	Degradation of alkaloids-Hofmannexhaustive methylation,Emde's degradation, Von Braun's.	2	Chalk & Talk	White board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.5	Reductive degradation,alkali fusion and oxidation.	2	Discussion	LCD
5.6	Structure and synthesis of Coniine.	1	Chalk & Talk Lecture	Black Board
5.7	Structure and synthesis of Piperine, Nicotine.	2	Chalk & Talk	White board
5.8	Structure and synthesis of Quinine.	2	Chalk & Talk	Black Board

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

CIA	
Scholastic	35
Non Scholastic	5
	40

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To develop novel, efficient, convenient, selective synthetic methods in organic chemistry.	K1	PSO1& PSO2
CO 2	To get familiar with particular properties and reactions for the most important heterocyclic as well as different systems of nomenclature.	K1, K2	PSO3
CO 3	To fully comprehend the chemistry of amino acids, peptides, proteins.	K1 & K3	PSO5

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

CO 4	To provide an advanced understanding of the core principles and topics of chemistry of natural products.	K1, K2 & K3	PSO1
CO 5	To demonstrate advanced knowledge and understanding in aspect of alkaloids.	K2 & K4	PSO1

apping of C0s with POs

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

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

COURSE DESIGNER:
Dr.Sr.ArulMary.J

Forwarded By

HOD'S Signature

& Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc

chemistry.

SEMESTER

-VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSETITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6CC18	Physical chemistry-IV (ELECTROLYTIC CONDUCTANCE AND ELECTROCHEMISTRY)	UG Core	5	4

COURSE DESCRIPTION

This course gives a detailed study of electrochemistry & photochemistry

UNIT -I ELECTROLYTIC CONDUCTANCE (15 HRS.)

a) Electrolytic Conductance –specific and equivalent conductance and their determination – effect of temperature, pressure, concentration, solvents and viscosity on conductance. Effect of dilution on specific and equivalent conductance.

b) Migration of ions – transport number and their determinations – Kohlrausch's law of ionic mobility and their application – absolute velocities of ions and their determination.

c) Theories of electrolytic dissociation – Grotthus theory-Arrhenius theory of electrolytic dissociation – defects of the theory – strong and weak electrolytes -Debye Huckel theory – Onsagar's equation.

d) Application of conductivity measurements – determination of degreeof dissociation , solubility of a sparingly soluble salt , degree of hydrolysis&ionic product of water. Conductivity titrations-acid-base

and precipitation titrations –.

SELF STUDY: Ohm's law, Faraday's law of electrolysis

UNIT -II IONIC EQUILIBRIUM

(15HRS.)

Acids and bases.(Different concepts just mention) – dissociation of weak acids and bases, Dissociation constants of weak acid and base, relative strengths of weak acid and bases -ionic product of water, pH scale, common ion effect-Buffer solutions-mechanism of Buffer action-calculation of pH ofBuffer mixtures.

Hydrolysis of salts-salts of strong acid and strong base, weak acid and strong base, strong acid and weak base and weak acid and weak base- Hydrolysis constants, Kh-. Indicators- Theory of acid –base indicators-Solubility product and its applications.

SELF STUDY: Acids and bases.(Different concepts)

UNIT -III ELECTRO CHEMISTRY - I (15HRS)

Galvanic cells and EMF – electrode reactions – electrode potentials and cell reactions – representations of electrodes – sign conventions , electrochemical series– measurements of EMF.

Thermodynamics of the reactions in a galvanic cells – Relation between EMF and ⊗G, ⊗H, ⊗S electrode potentials – different types of electrode potentials – thermodynamics of reversible cells and reversible electrodes – EMF and equilibrium constant – Nernst equation – Standard electrode potential – electrochemical series – EMF of galvanic cells – the cell reactions – concentration cell – activity co-efficient-determination of activity by solubility.

SELF STUDY: redox indicators

UNIT -IV ELECTRO CHEMISTRY - II (15 HRS.)

Application of EMF measurements- determination of pH using quinhydrone and glass electrode - determination of transport number, solubility of sparingly soluble salt, degree of hydrolysis, ionic product of

water- acid – base, oxidation – reduction and precipitation titration potentiometrically – free energy and EMF. Determination of the valency of an ion.

Polarisation – over voltage – decomposition potential and deposition potential- storage battery- Lead –acid battery, dry cells and fuel cells – electrochemicalprinciples of corrosion and passivity – polarography – limiting diffusion current.

SELF STUDY: half wave potential

UNIT-V PHOTO CHEMISTRY: (15 HRS.)

Introduction - Laws of photo chemistry – Beer – Lamberts law, Grotthus Draper law and Stark Einstein law, Quantum efficiency and determination, Consequences of light absorption by atoms and molecules (Jablonsky diagram), Comparison between thermal and photochemical reactions.

Kinetics of photochemical reactions:

Gaseous reactions: Hydrogen – Halogen reaction (HCl, HBr and HI). Photolysis of ammonia and formation of $COCl_2$.

Reactions of liquid phase (in solution): Isomeric transformation of maleic tofumaric acid, polymerization of Anthracene.

Photochemical equilibrium – flash photolysis, photosensitization, chemiluminescenceBiological application – Photosynthesis.

Radiation Chemistry – photolysis of waterSELF STUDY: Hazards of radiation.

REFERENCES:

Text Book:

1. The principles of Physical chemistry by Puri, Sharma and Pathania.

Reference Book:

2. Introduction to Electrochemistry By Samuel Glasstone

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**TITLE**			
1.1	Electrolytic Conductance specific and equivalent conductance and their determination.	1	Chalk & Talk	Black Board
1.2	Effect of temperature, pressure, concentration, solvents and viscosity on conductance. Effect of dilution on specific and equivalent conductance.	1	Chalk & Talk	LCD
1.3	Migration of ions – transport number and their determinations –	4	Lecture	PPT & White board
1.4	Kohlrausch's law of ionic mobility and their application – absolute velocities of ions and their determination.	1	Lecture	Smart Board
1.5	Theories of electrolytic dissociation – Grotthus theory-Arrhenius theory of electrolytic dissociation – defects of the theory – strong and weak electrolytes -.	1	Lecture	Black Board
1.6	Debye Huckel theory –Onsagar's equation	2	Discussion	Google classroom
1.7	Application of conductivity measurements – determination of degree of dissociation , solubility of a sparingly soluble salt , degree of hydrolysis	2	Specimen	Microscope
1.8	Ionic product of water, Conductivity titrations-acid-base and precipitation titrations –.	2	Discussion	Black Board

UNIT -2	**IONIC EQUILIBRIUM**			
2.1	Acids and bases. (Different concepts just mention) – dissociation of weak acids and bases, Dissociation constants of weak acid and base, relative strengths of weak acid and bases	3	Lecture	Green Board Charts
2.2	Ionic product of water, pH scale, common ion effect-Buffer solutions-mechanism of Buffer action-calculation of pH of Buffer mixtures.	3	Chalk & Talk	Green Board
2.3	Hydrolysis of salts of strong acid and strong base, weak acid and strong base,	3	Chalk & Talk	Black Board
2.4	Strong acid and weak base and weak acid and weak base-Hydrolysis constants, Kh-Solubility product and its applications.	3	Chalk & Talk	Black Board
2.5	Indicators- Theory of acid –base indicators-	3	Chalk & Talk	Black Board
UNIT- 3	**ELECTRO CHEMISTRY – I**			
3.1	Galvanic cells – electrode reactions – electrode potentials and half cell reactions – representations of electrodes – –.	3	Chalk & Talk	Black Board
3.2	Different types of electrode potentials – thermodynamics of reversible cells and reversible electrodes – EMF and	3	Chalk & Talk	Black Board

	equilibrium constant – Nernst equation – Standard electrode potential – electrochemical series.			
3.3	Thermodynamics of the reactions in a galvanic cells – Relation between EMF and ⊗G, ⊗H, ⊗S electrode potentials –	3	Chalk & Talk	Black Board
3.4	EMF of galvanic cells – the cell reactions –––	3	Chalk & Talk	Black Board
3.5	Concentration cells activity co-efficient- determination of activity by solubility& redox indicators	3	Chalk & Talk	Black Board
UNIT- 4	**ELECTRO CHEMISTRY – II**			
4.1	Application of EMF measurements- determination of pH using quinhydrone and glass electrode -– free energy and EMF. Determination of the valency of an ion.	3	Chalk & Talk	Black Board
4.2	Determination of transport number, solubility of sparingly soluble salt, degree of hydrolysis, ionic product of water-	3	Chalk & Talk	Black Board
4.3	Acid – base, oxidation – reduction and precipitation titration potentiometrically	3	Chalk & Talk	Black Board
4.4	Storage battery- Lead –acid battery, dry cells and fuel cells –	3	Chalk & Talk	Black Board
4.5	Polarisation – over voltage – decomposition potential and deposition potential-	3	Chalk & Talk	Black Board

	electrochemical principles of corrosion and passivity – polarography – half wave potential, limiting diffusion current.			
UNIT-5	**PHOTO CHEMISTRY**			
5.1	Introduction - Laws of photo chemistry – Beer – Lamberts law, Grotthus Draper law and Stark Einstein law,.	3	Chalk & Talk	Black Board
5.2	Quantum efficiency and determination, Consequences of light absorption by atoms and molecules (Jablonsky diagram), Comparison between thermal and photochemical reactions	3	Chalk & Talk	Black Board
5.3	Kinetics of photochemical reactions: Gaseous reactions: Hydrogen – Halogen reaction (HCl, HBr and HI). Photolysis of ammonia and formation of $COCl_2$.	3	Chalk & Talk	Black Board
5.4	Reactions of liquid phase (in solution): Isomeric transformation of maleic to fumaric acid, polymerization of Anthracene.	3	Chalk & Talk	Black Board
5.5	Photochemical equilibrium – flash photolysis, photosensitization, chemiluminescenceBiological application – Photosynthesis. Radiation Chemistry – photolysis of water, Hazards of radiation.	3	Chalk & Talk	Black Board

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

CIA	
Scholastic	35
Non Scholastic	5
	40

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

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

✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Understand the different types of condutances and their relations and the effect of dilution	K1	PSO1& PSO2

CO 2	Apply the conductance measurement to calculate degree of dissociation , ionic product etc… and to estimate the unknown concentration using conductivity titrations	K1, K2,	PSO3
CO 3	Use Nernst equation to calculate the electrode potential and emf of electrochemical cells	K1 & K3	PSO5
CO 4	Study the applications of electrochemical measurements	K1, K2, K3 &	PSO3
CO 5	Understand the basics of photochemistry using laws of photochemistry and Jablonsky diagram Derive the rate constants of certain photochemical reactions	K2 & K4	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

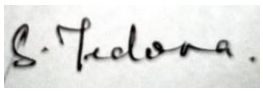
Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:
1.Dr. B. Medona 2.Dr. P.

Silviya Reeta

Forwarded By



(Dr. B. Medona)

HOD'S Signature & Name

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc.

CHEMISTRY

SEMESTER -VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6ME3	ADVANCED ORGANIC CHEMISTRY	UG Core	5	5

COURSE DESCRIPTION

The course is offered to expose the advanced topics in the field of organicchemistry.

COURSE OBJECTIVES

This course helps the students to acquire a thorough knowledge of the advanced topics of organic chemistry related to conformational analysis of cyclohexanes, Photochemistry and molecular rearrangements.

UNIT -I CONFORMATIONAL ANALYSIS- I (15 HRS.)

Stereoisomerism of ring systems- number and kind of stereoisomers- cyclopropane, cyclobutane, cyclopentane and cyclohexane. Conformations of ethane and n-butane-conformational energy diagram. Conformation of mono substituted cyclohexane-stability and optical activity-conformation of disubstitutedcyclohexanes-stability and optical activity and decalins their stability and optical activity.

UNIT -II CONFORMATIONAL ANALYSIS- II (15 HRS.)

Conformation and physical properties, and conformation and chemical reactivity-S_N1, S_N2, ionic eliminations, rearrangements, NGP, epoxide ring closure and ring opening reactions, addition to

cyclohexene derivatives, pyrolysis of acetates, xanthates and amine oxides.

UNIT -III ORGANIC PHOTOCHEMISTRY (15 HRS.)

Organic photochemistry –Photochemical Elimination in carbonyl compounds and nitrites- Norrish type-I & Norrish type-II, Barton reaction. Photochemical reduction, oxidation and cis-trans isomerisation, Intermolecular cycloaddition ($2\pi + 2\pi$) & ($4\pi + 2\pi$) cycloadditions, supara and antara overlap-FMO approach, and electrocyclic reactions- 4n & 4n+2 systems. Conrotation, disrotation. FMO approach to predict stereochemistry.

UNIT -IV MOLECULAR REARRANGEMENTS-I (15 HRS.)

Rearrangement to electron deficient atom or nucleophilic rearrangements – Mechanism of Pinacol-Pinacolone, Wagner-Meerwin, Hoffman and benzilic acid rearrangement. Rearrangements to electron rich atom or electrophilic rearrangements – Stevens rearrangements. Aromatic rearrangements – Claisen, Benzidine and Fries rearrangement.

UNIT -V MOLECULAR REARRANGEMENTS -II (15 HRS.)

Favorski, Baeyer Villiger, Cope, Curtius and Beckmann rearrangements, Synthetic importance of N – Bromosuccinimide, Osmium tetroxide, Selenium dioxide, PyridiniumChloro Chromite, Lithium Aluminium Hydride and Sodium Boro Hydride.

REFERENCES:

1. Eliel- Stereochemistry of carbon compounds, Tata Mc-Graw Hill Edn, 1995.

2. Dr.P. Ramesh, Basic principles of Organic Stereochemistry, First Edn,Meenu Publications.

3. Morrison & Boyd, -Organic chemistry , 6th Edn, Prentice-hall of India pvt,Ltd, 2005.

4. Jagdamba Singh, Photochemistry and Pericyclic Reactions, New ageinternational publishers, 2009.

5.I.L.Finar, Vol-I, Organic Chemistry, sixth Edn., ELBS & Longmann groupLtd.

6.V.K.Ahluwalia & R.K.Prashar, Organic Reaction Mechanism, First Edn,2002, Narosa publishing House.

7. K. K. Rohatgi-Mukherjee, fundamentals of photochemistry, New age international publishers, 2006.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 CONFORMATIONAL ANALYSIS-I				
1.1	Stereoisomerism of ring systems-number and kind of stereoisomers - cyclopropane, cyclobutane, cyclopentane and cyclohexane.	2	Chalk & Talk	Black Board
1.2	Conformations of ethane	1	Chalk & Talk	LCD
1.3	Conformations of n-butane-conformational energy diagram	1	Lecture	Ball & Stick Models
1.4	Conformation of mono substituted cyclohexane-stability and optical activity	3	Lecture	Black Board

1.5	conformation of disubstituted cyclohexanes stability	3	Lecture	Ball & Stick Models
1.6	conformation of disubstituted cyclohexanes optical activity	2	Lecture	Ball & Stick Models
1.7	decalins their stability	1	Lecture	PPT & White board
1.8	Decalins optical activity.	2	Discussion	Black Board
UNIT -2	**CONFORMATIONAL ANALYSIS- II**			
2.1	Conformation and physical properties	1	Lecture	Black Board
2.2	conformation and chemical reactivity	2	Chalk & Talk	Green Board
2.3	S_N1, S_N2, ionic eliminations	2	Chalk & Talk	Black Board
2.4	Rearrangements, NGP	3	Lecture	PPT & White board
2.5	Epoxide ring closure and ring opening reactions	2	Discussion	LCD
2.6	Addition to cyclohexene derivatives	1	Lecture	Black Board
2.7	Pyrolysis of acetates	2	Lecture	PPT & White board
2.8	Pyrolysis of xanthates and amine oxides	2	Lecture	Black Board
UNIT -3	**ORGANIC PHOTOCHEMISTRY**			
3.1	Organic photochemistry – Photochemical Elimination in carbonyl compounds and nitrites	2	Lecture	Black Board
3.2	Norrish type-I & Norrish type-II, Barton reaction	3	Discussion	LCD
3.3	Photochemical reduction, oxidation and cis-trans isomerisation	3	Lecture	PPT & White Board
3.4	Intermolecular cycloaddition ($2\pi + 2\pi$) & ($4\pi + 2\pi$) cycloadditions	2	Lecture	Black Board

3.5	supara and antara overlap-FMO approach	1	Discussion	LCD
3.6	electrocyclic reactions- 4n & 4n+2 systems	2	Lecture	Black Board
3.7	Conrotation, disroattion	1	Lecture	Black Board
3.8	FMO approach to predict stereochemistry	1	Lecture	Black Board
UNIT -4	**MOLECULAR REARRANGEMENTS-I**			
4.1	Rearrangement to electron deficient atom or nucleophilic rearrangements	1	Lecture	Black Board
4.2	Mechanism of Pinacol-Pinacolone rearrangement	3	Chalk & Talk	Green Board
4.3	Mechanism of Wagner-Meerwin rearrangement	2	Chalk & Talk	Black Board
4.4	Mechanism of Hoffman and benzilic acid rearrangements	3	Lecture	PPT & White board
4.5	Rearrangements to electron rich atom or electrophilic rearrangements	1	Discussion	LCD
4.6	Mechanism of Stevens rearrangement	1	Lecture	Black Board
4.7	Aromatic rearrangements – Mechanism of Claisen rearrangement	2	Lecture	PPT & White board
4.8	Mechanism of Benzidine and Fries rearrangements.	2	Lecture	Black Board
UNIT -5	**MOLECULAR REARRANGEMENTS-I I**			
5.1	Favorski rearrangement	2	Lecture	Black Board
5.2	Baeyer Villiger rearrangement	2	Chalk & Talk	Green Board
5.3	Cope and Curtius rearrangements	3	Chalk & Talk	Black Board
5.4	Beckmann rearrangement	1	Lecture	PPT & White board

5.5	Synthetic importance of N – Bromosuccinimide and Osmium tetroxide	2	Discussion	LCD
5.6	Synthetic importance of Selenium dioxide	1	Lecture	Black Board
5.7	Synthetic importance of Pyridinium Chloro Chromite	2	Lecture	PPT & White board
5.8	Synthetic importance of Lithium Aluminium Hydride and Sodium Boro Hydride	2	Lecture	Black Board

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

CIA

Scholastic **35**

Non Scholastic **5**

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

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

CO 1	To interpret the concept of conformations of acyclic and cyclic alkanes and to discuss mono and disubstituted cyclohexanes.	K1, K2, K3 &K4	PSO1& PSO2
CO 2	To explore reactivity patterns of cyclohexanes and to employ conformational reactivity in cis and trans decalins.	K1, K2, K3 &K4	PSO2 &PSO3
CO 3	To sketch Frontier molecular orbitals in photochemistry and to dramatize photochemical and electrocyclic reactions	K1, K2, K3 &K4	PSO3 &PS05
CO 4	To differentiate the molecular rearrangements and to solve the simple problems	K1, K2, K3 &K4	PS03&PS05
CO 5	To prepare the various organic reagents and to recall its synthetic importance and to categorize the reducing and oxidizing agents and its applications.	K1, K2, K3 &K4	PS05 &PSO7

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:

1.Dr.M.Priyadharsani

2.Dr.B.Vinosha Forwarded By

HoD Signature

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18
B.Sc-ChemistryVI SEMESTER
POLYMER CHEMISTRY- 19C6ME4

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6ME4	POLYMER CHEMISTRY	Elective	5	5

COURSE DESCRIPTION

This course will focus on importance of polymers and application

COURSE OBJECTIVES

In this course the students are exposed to various polymer studies andthe techniques that are used in their preparation and properties.

UNIT I INTRODCUTION

UNIT II CONDENSATION POLYMERIZATION

UNIT III ADDITION POLYMERIZATION

UNIT IV COPOLYMERIZATION

UNIT V APPLICATIONS

UNIT I. - INTRODUCTION **(15Hrs)**

Historical introduction – Natural and synthetic polymer – Polymerization –Forms of polymers – Co-polymerization.

UNIT II - CONDENSATION POLYMERIZATION: **(15Hrs)**

Introduction – Types of condensation polymer – kinetic of linear condensationpolymerization – Somelinear condensation polymers – Three – dimensional polymers – Inorganic polymers – Ring opening polymerization.

UNIT III.- ADDITION POLYMERIZATION: **(15Hrs)**

Introduction – Addition polymerization – Inhibition and retardation – Variouspolymerization techniques – Ionic addition polymerization – Coordination polymerization – Some addition polymers-Ion exchange resing – Condensation polymerization versus addition polymerization.

UNIT IV. -CO-POLYMERIZATION **(15Hrs)**

Introduction, Co-polymerization composition equation - Block and graft co-polymers – Polymer blends – Step co-polymerization – Some important co-polymer.

UNIT V. APPLICATIONS **(15Hrs)**

(A) Elastomeric materials – introduction – structure property relationshipsin polymers, natural rubber, raw rubber – vulcanization of rubber – synthetic rubber buna rubber – buna rubber S(Sbr, Grs)rubber, neoprene rubber (Gr-M), Thiokol, poly butanes and butyl rubbers.

(B) Fiber – forming polymers – rayon's proteins nylons – polyesters – vinyls –spinning

(C) Fabrication of polymers – moulding of thermosetting resins, mouldingof thermoplastics, extrusion moulding, casting of films – calendaring.

(D) Naturally occurring polymer:

Cellulose, starch, lignin, proteins, nucleic acids.

TEXT BOOK:

Introductory Polymer Chemistry – G.S. Misra

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -I				
1.1	Historical introduction –	3	Chalk & Talk	Black Board
1.2	Natural and synthetic polymer –	3	Chalk & Talk	LCD

1.3	Polymerization –	3	Lecture	Black Board
1.4	Forms of polymers	3	Lecture	Black Board
1.5	– Co- polymerization	3	Lecture	Black Board
UNIT - II				
2.1	Introduction –	3	Lecture	Black Board
2.2	Types of condensation polymer – kinetic of linear condensation polymerization	3	Chalk & Talk	Green Board
2.3	– Somelinear condensation polymers –	3	Chalk & Talk	Black Board
2.4	Three – dimensional polymers –	3	Lecture	PPT & White board
2.5	Inorganic polymers – Ring opening polymerization	2	Discussion	LCD
UNIT -				

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.1	Introduction –	2	Lecture	Black Board
3.2	Addition polymerization – Inhibition and retardation – Various polymerization techniques	3	Discussion	LCD
3.3	– Ionic addition polymerization – Coordination polymerization – Some addition	3	Lecture	PPT & White Board
3.4	polymers-Ion exchange resing –	3	Lecture	Black Board
3.5	Condensation polymerization versus addition polymerization	3	Discussion	LCD

UNIT -				
4.1	Co-polymerization	3	Lecture	Black Board
4.2	composition equation	3	Chalk & Talk	Green Board
4.3	- Block and graft co-polymers –	3	Chalk & Talk	Black Board
4.4	Polymer blends –	3	Lecture	PPT & White board
4.5	Step co-polymerization – Some important	3	Discussion	LCD
UNIT -5				
5.1	Elastomeric materials – introduction – structure property relationships in polymers, natural rubber, raw rubber – vulcanization of rubber	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.2	buna rubber – buna rubber S(Sbr, Grs)rubber, neoprene rubber (Gr-M), Thiokol, poly butanes and butyl rubbers	3	Chalk & Talk	Green Board
5.3	Fiber – forming polymers – rayon's proteins nylons – polyesters – vinyls – spinning	3	Chalk & Talk	Black Board
5.4	Naturally occurring polymer:	3	Lecture	PPT & White board

5.5	Cellulose, starch, lignin, proteins, nucleic acids.	3	Discussion	LCD

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Able to understand Polymerization – Forms of polymers – Co- polymerization.	K1, K2,K3 &K4	PSO1& PSO2
CO 2	To gain knowledge theTypes of polymers- addition	K1, K2,K3 &K4	PSO3
CO 3	To gain knowledge theTypes of polymers- condensation	K1, K2,K3 &K4	PSO5

CO 4	To understand the properties of copolymerisation	K1, K2,K3&K4	PSO3
CO 5	Learn about application	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

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

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

COURSE DESIGNER

1. **Dr.M.Priyadharsani**
2. **Dr.V.Aruldeepa**

Forwarded By

S-Tedona.

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRY

SEMESTER -VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6ME5	ADVANCED PHYSICAL CHEMISTRY (QUANTUM MECHANICS, PHYSICAL SPECTROSCOPY AND MACROMOLECULES)	Lecture	5	5

COURSE DESCRIPTION

This course helps the students to acquire a thorough knowledge of the basics of physical chemistry related to quantum mechanics spectroscopy, and macromolecules.

COURSE OBJECTIVES

The course is offered to expose the advanced topics in the field of physical chemistry.

UNITS

UNIT -I QUANTUM MECHANICS I (15 HRS.)

Operator algebra- Linear operators, commutation of operator. Hamiltonian operators, Expressions for operators- Postulates of quantum mechanics. The Schrödinger time independent wave equation- Eigen values and Eigen functions- significance of wave function ψ - statistical interpretation of ψ&ψ^2. Solutions of Schrödinger equation for simple systems, particle in one-dimensional and three – dimensional box, rigid rotator and hydrogen atom (discussion of results only- problems). Quantum numbers- probability distribution curves.

UNIT -II QUANTUM MECHANICS II (15 HRS.)

Application of quantum mechanics to multi electron system – Approximation methods – variation and perturbation methods (elementary idea) – application of variation method to helium atom, symmetric and antisymmetric wave function, Pauli's exclusion principle.

UNIT -III SPECTROSCOPY-I (15 HRS.)

Introduction to molecular spectroscopy,

Rotational spectroscopy (micro wave) spectra of diatomic molecules.Relativeintensities of rotational spectral lines and application.

Vibrational spectra (IR) spectra of diatomic molecules, Rotational – Vibrational spectra of diatomic molecules, Vibrational spectra of polyatomic molecules.

Raman Spectroscopy – Selection rules, rotation vibration – Ramanspectrum, mutual exclusion principle.

UNIT -IV SPECTROSCOPY-II (15 HRS.)

Electronic spectroscopy- Introduction- various transitions –Frank Condon principle

Nuclear Magnetic Resonance Spectroscop-nmr equation – Larmor frequency- chemical shift- simple problems

Electron Spin Resonance Spectroscopy.- ESR spectrum of of an unpaired electron- Hyperfine structure in ESR spectra- Hydrogen atom,methyl radical,1,4- Benzosemiquinone radical anion, Naphthalene and anthracene negative ion, triphenylmethyl free radical,g factor- Applications

UNIT -V MACROMOLECULES (15 HRS.)

Types of macro molecules, classification of polymers, properties of polymers. Molecular weight of polymers – number average and weight average molecularweight , determination of molecular weight – osmotic pressure method, sedimentation velocity method and viscosity method, kinetics of free radical polymerization.

REFERENCES:

1. V:Puri, Sharma and Pathania., Principles of physical chemistry , 3rdEdn,Vishal publishing Company.
2. A.K. Chandra -Quantum Mechanics, 4thEdn, tataMc-Graw hill, 1994 &B.K.Sen -Quantum Mechanics , Tata Mc-Graw Hill 2nd reprint 1995.

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 QUANTUM MECHANICS-I				
1.1	Operator algebra- Linear operators, commutation of operator.	2	Chalk & Talk	Black Board
1.2	Hamiltonian operators, Expressions for operators- Postulates of quantum mechanics. The Schrödinger time independent wave equation	1	Chalk & Talk	LCD
1.3	Eigen values and Eigen functions- significance of wave function y	2	Lecture	Ball & Stick Models

1.4	Statistical interpretation of $y\&y^2$.	3	Lecture	Black Board
1.5	Solutions of Schrödinger equation for simple systems	3	Lecture	Ball & Stick Models
1.6	particle in one-dimensional and three – dimensional box,	3	Lecture	Ball & Stick Models
1.7	rigid rotator and hydrogen atom (discussion of results only- problems).	2	Lecture	PPT & White board
1.8	Quantum numbers-probability distribution curves.	2	Discussion	Black Board
UNIT -2	**QUANTUM MECHANICS-II**			
2.1	Application of quantum mechanics to multi electron system	1	Lecture	Black Board
2.2	Approximation methods	2	Chalk & Talk	Green Board
2.3	variation methods (elementary idea)	2	Chalk & Talk	Black Board
2.4	perturbation methods (elementary idea)	3	Lecture	PPT & White board
2.5	variation and perturbation methods (elementary idea)	2	Discussion	LCD

2.6	application of variation method to helium atom	1	Lecture	Black Board
2.7	symmetric and antisymmetric wave function	2	Lecture	PPT & White board
2.8	Pauli's exclusion principle.	2	Lecture	Black Board
UNIT -3 SPECTROSCOPY-I				
3.1	Introduction to molecular spectroscopy	2	Lecture	Black Board
3.2	Rotational spectroscopy (micro wave) spectra of diatomic molecules.Relative intensities of rotational spectral lines and application.	3	Discussion	LCD
3.3	Vibrational spectra (IR) spectra of diatomic molecules	3	Lecture	PPT & White Board
3.4	Rotational – Vibrational spectra of diatomic molecules	2	Lecture	Black Board
3.5	Vibrational spectra of polyatomic molecules.	1	Discussion	LCD
3.6	Raman Spectroscopy – Selection rules	2	Lecture	Black Board

3.7	rotation vibration	1	Lecture	Black Board
3.8	Raman spectrum, mutual exclusion principle	1	Lecture	Black Board
UNIT -4 SPECTROSCOPY-II				
4.1	Electronic spectroscopy-Introduction- various transitions –Frank Condon principle	1	Lecture	Black Board
4.2	Nuclear Magnetic Resonance Spectroscop-nmr equation	3	Chalk & Talk	Green Board
4.3	Larmor frequency- chemical shift- simple problems	2	Chalk & Talk	Black Board
4.4	Electron Spin Resonance Spectroscopy.- ESR spectrum of of an unpaired electron	3	Lecture	PPT & White board
4.5	Hyperfine structure in ESR spectra	1	Discussion	LCD
4.6	Hydrogen atom, methyl radical	1	Lecture	Black Board
4.7	1,4- Benzosemiquinone radical anion	2	Lecture	PPT & White board

4.8	Naphthalene and anthracene negative ion, triphenylmethyl free radical,g factor-Applications	2	Lecture	Black Board
UNIT -5 MACROMOLECULES				
5.1	Types of macro molecules, classification of polymers	2	Lecture	Black Board
5.2	properties of polymers. Molecular weight of polymers	2	Chalk & Talk	Green Board
5.3	number average and weight average molecular weight	3	Chalk & Talk	Black Board
5.4	determination of molecular weight	1	Lecture	PPT & White board
5.5	osmotic pressure method	2	Discussion	LCD
5.6	sedimentation velocity method	1	Lecture	Black Board
5.7	viscosity method	2	Lecture	PPT & White board
5.8	kinetics of free radical polymerization	2	Lecture	Black Board

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

CIA	
Scholastic	35
Non Scholastic	5
	40

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

  ***K2**-Understand,* ***K3**-Apply,* ***K4**-Analyse, K5 - Evaluate*

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To know the evolution of quantum mechanics and to know about the postulates and operators	K1	PSO1& PSO2
CO 2	Devise the Schrodinger equation for systems like particle in 1D and3D box, rigid rotor,hydrogen and helium and discuss the results	K1, K2	PSO3
CO 3	Understand the theories behind the spectral techniques like MW.IR,NMR and ESR	K1 & K3	PSO5
CO 4	Study the applications of the above techniques to elucidate the structures of molecules	K1, K2 & K3	PSO3
CO 5	Study some of the basic terminologies in polymers To learn about the different polymerization reactions	K2 & K4	PSO4

Mapping of C0s with PSOs

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

CO1	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**
CO2	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**
CO3	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**
CO4	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**
CO5	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

Mapping of C0s with POs

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

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

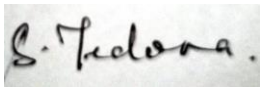
♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr. B. Medona

1. **Dr. P. Silviya Reeta**

Forwarded By



(Dr. B. Medona)

HOD'S Signature & Name

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

B.Sc-Chemistry-VI SEMESTER

ADVANCED INORGANIC CHEMISTRY-19C6ME6

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6ME6	ADVANCED INORGANIC CHEMISTRY	Lecture	5	5

COURSE DESCRIPTION

This course helps the students to acquire a thorough knowledge of the basics of Bioinorganic chemistry and inorganic polymers

COURSE OBJECTIVES

The course is offered to expose the advanced topics in the field of bio inorganic chemistry

UNIT I. - BIOINORGANIC CHEMISTRY-I (15HRS)

UNIT II - BIOINORGANIC CHEMISTRY-II (15RS)

UNIT III.-INORGANIC PHOTOCHEMISTRY (15HRS)

UNIT IV- ANALYTICAL CHEMISTRY (15HRS)

UNIT V - INORGANIC POLYMERS (15HRS)

UNIT I. - BIOINORGANIC CHEMISTRY-I: (15HRS)

Structure and function of chlorophyll – Role of Mg^{2+} ion – Structure and function of Haemoglobin – Cooperative effect in Haemoglobin – Role of Globin –Structure and function ofMyoglobin – Structure and function of Cytochrome C.

UNIT II - BIOINORGANIC CHEMISTRY-II: (15HRS)

Structure and function of Blue copper proteins – Structure and function of Vitamin B12 - Invivo nitrogen fixation – Fe-S proteins – Ionophores – Ion

transport mechanism in cell membrane –Na-K pump. Role of metal ions in DNA replication.

UNIT III.-INORGANIC PHOTOCHEMISTRY: (15HRS)

Types of electronic transitions in transition metal complexes – Photo chemistry of transition metal complexes – Photo substitution – Photo aquation – Adamson's rules – Photo rearrangement – Photo redox reactions. Photo chemistry of organometallic compounds.

UNIT IV- ANALYTICAL CHEMISTRY (15HRS)

Electroanalytical techniques : voltametry, cyclic voltametry, polarography, amperometry, colorimetry and conductometry, ionelective electrodes, anodic strippingvoltammetry, TGA, DTA,DSC and online analysers.

UNIT V - INORGANIC POLYMERS: (15HRS)

Definition – special characteristics – glass transition temperature – solubility classification – preparation, properties and uses of – boron nitride – silicones – polymeric sulphur nitride, chalcogenic glasses – polyphosphazene – borophosphate glass – coordinationpolymers – volan,quilon, metallophthalocyanine – factors affecting the formation of coordination polymer

TEXT BOOK:

1.Selected topics in Inorganic Chemistry - Madan, Malik &Tuli.

2.B.R.Puri, L.R.Sharma&Kalia.- Principles of Inorganic chemistry, VishalPublishing House, -13thEdn,, 2009.

3.James.E.Huheey, Inorganic Chemistry, pearson publications, 4thEdn, 2008

COURSE CONTENTS & LECTURE SCHEDULE

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 UV-VISIBLE SPECTROSCOPY				
1.1	Structure and function of chlorophyll	2	Chalk & Talk	Black Board
1.2	Role of Mg2+ ion Structure andfunction of Haemoglobin –	3	Chalk & Talk	LCD

1.3	Cooperative effect in Haemoglobin.	2	Lecture	Black Board
1.4	Role of Globin-Structure and function of Myoglobin	3	Lecture	PPT & White board
1.5	Structure and function of Cytochrome C	3	Lecture	Black Board
1.6	function of Cytochrome C	2	Lecture	Chalk and Talk
2.1	Structure and function of Blu copper proteins Structure	2	Chalk & Talk	Black Board
2.2	function of Vitamin B12	3	Chalk & Talk	LCD
2.3	- Invivo nitrogen fixation	2	Lecture	Black Board
2.4	– Fe-S proteins	3	Lecture	PPT & White board
2.5	– Ionophores – Ion transport mechanism in cell membrane – pump.	3	Lecture	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.1	Types of electronic transition in transition metal complexe –	2	Chalk & Talk	Black Board
3.2	Photo chemistry o transitionmetal complexes –	3	Chalk & Talk	LCD
3.3	Photo substitution Photo aquation	2	Lecture	Black Board
3.4	Adamson's rules Photo rearrangement	3	Lecture	PPT & White board
3.5	Photo redox reactions.	3	Lecture	Black Board
3.6	Photo chemistry o organometallic compounds.	2	Lecture	Chalk and Talk
4.1	Electroanalytical techniques :	2	Chalk & Talk	Black Board
4.2	voltametry, cyclic voltametry,	3	Chalk & Talk	LCD
4.3	polarography,	2	Lecture	Black Board
4.4	amperometry, colorimetry and conductometry,	3	Lecture	PPT & White board
4.5	ionelective electrodes, anodic stripping ionelective electrodes,	3	Lecture	Black Board
4.6	anodicstripping voltammetry,	2	Lecture	Chalk and Talk
4.7	TGA, DTA, DSC and online analysers	2	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
5.1	Definition – special characteristics – glass transition temperature –	2	Lecture	Black Board
5.2	solubilityclassification– preparation, properties and uses of	2	Chalk & Talk	Green Board
5.3	– boron nitride – silicones – polymeric sulphur nitride, chalcogenic glasses –	3	Chalk & Talk	Black Board
5.4	polyphosphazene – borophosphate glass –	1	Lecture	PPT & White board
5.5	coordination polymers – volan, quilon,	2	Discussion	LCD
5.6	metallophthalocyanine – factors affecting the formation of coordination polymer	1	Lecture	Black Board

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	to calculate oxidation state and oxidation number of CMI.	K1, K2,K3 &K4	PSO1& PSO2
CO 2	to identify various functional groups present in Bio inorganic molecules	K1, K2,K3 &K4	PSO3
CO 3	to predict photochemical reactions	K1, K2,K3 &K4	PSO5
CO 4	to study Electroanalytical techniques	K1, K2,K3&K4	PSO3

CO 5	to find outthe mass of the polymers	K1, K2,K3 &K4	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

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

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

COURSE DESIGNER:

Mrs.RM.Nagalakshmi

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc. CHEMISTRY

SEMESTER -VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6SB5	COMPUTERS IN CHEMISTRY	Skill based	2	2

COURSE DESCRIPTION

The course is offered to expose the software applications in the field of chemistry.

COURSE OBJECTIVES

This course deals with the use of computers in molecular modelling and drug design, the use of internet and its application in data search. It also highlights the programming in C language and its applications.

UNITS

UNIT -I INTRODUCTION TO MOLECULAR MODELLING (6 HRS.)

Structure drawing by Chem Draw - Representation of molecules - Properties calculation – NMR analysis - Molecular mechanics and molecular dynamics – simulations - Docking of simple molecules.

UNIT -II APPLICATION OF MOLECULAR MODELLING (6 HRS.)

Elements of cheminformatics and drug design. Use of crystallographic and NMR data as inputs for computation. 3D data base searching.

UNIT -III INTERNET AND ITS APPLICATION (6 HRS.)

Data base search- chemical data bank, CCDC, PDB - 3D pharmacophore, Structure based drug design-De Nova drug design.

UNIT -IV PROGRAMMING IN C LANGUAGE (6 HRS.)

Introduction, Character set in C, Style of C Language – Identifiers and Key words – Constants, Variables and Data types, Operators in C. Input and Output in C, Control statements in C, Storage classes in C, Functions in C, Arrays and

pointers, Preprocessors in C, The type def statement and Files in C language.

UNIT -V APPLICATIONS OF C LANGUAGE IN CHEMISTRY (6 HRS.)

Writing the Program using the various features of C language – Determination of lattice energy of a crystal using Born-Lande equation, Determination of Normality, Molarity and Molality of solutions, Determination of half life of a radioactive nucleus and Calculation of Binding energy.

REFERENCES:

1. Molecular Modeling -Andrew R. Leach
2. Guide Book in Molecular Modeling in Drug Design- N. Claude Cohen
3. Programming in ANSI C - E. Balagurusamy
4. Computers in Chemistry - K.V. Raman

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**INTRODUCTION TO MOLECULAR MODELLING**			
1.1	Structure drawing by Chem Draw - Representation of molecules - Properties calculation	2	Chalk & Talk	LCD
1.2	NMR analysis - Molecular mechanics and molecular dynamics	2	Chalk & Talk	LCD
1.3	Simulations - Docking of simple molecules.	2	Chalk & Talk	LCD
UNIT -2	**APPLICATION OF MOLECULAR MODELLING**			

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.1	Elements of cheminformatics and drug design.	2	Chalk & Talk	LCD
2.2	Use of crystallographic and NMR data as inputs for computation.	2	Chalk & Talk	LCD
2.3	3D data base searching.	2	Chalk & Talk	LCD
UNIT -3	**INTERNET AND ITS APPLICATION**			

3.1	Data base search- chemical data bank	2	Lecture	Black Board
3.2	CCDC, PDB - 3D pharmacophore	2	Discussion	LCD
3.3	Structure based drug design-De Nova drug design.	2	Lecture	PPT & White Board
UNIT -4	**PROGRAMMING IN C LANGUAGE**			
4.1	Introduction, Character set in C, Style of C Language – Identifiers and Key words – Constants, Variables and Data types, Operators in C.	2	Lecture	Black Board
4.2	Input and Output in C, Control statements in C, Storage classes in C, Functions in C.	2	Chalk & Talk	Green Board
4.3	Arrays and pointers, Preprocessors in C, The type def statement and Files in C language.	2	Chalk & Talk	Black Board
UNIT -5	**APPLICATIONS OF C LANGUAGE IN CHEMISTRY**			
5.1	Writing the Program using the various features of C language – Determination of lattice energy of a crystal using Born-Lande equation.	2	Chalk & Talk	LCD
5.2	Determination of Normality, Molarity and Molality of solutions	2	Chalk & Talk	LCD
5.3	Determination of half life of a radioactive nucleus and	2	Chalk & Talk	Black Board

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session - wise Averag	**Better of W1, W2**	**M1+M2**	**MID-SEM TEST**				
	5 Mks.	**5 Mks**	**5+5=10 Mks.**	**15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	

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

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

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

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

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

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To study intergrating modeling tool, CHEMDRAW software and predict chemical properties and NMR analysis for a compound.	K1,K2,K3& K4	PSO1& PSO2
CO 2	To perform 2D and 3D data base searching for a given chemical compounds	K1,K2,K3& K4	PSO3
CO 3	To develop a greater basic aware of issues involving in C programming language design and implementation.	K1,K2,K3& K4	PSO5
CO 4	To specify the syntax of C programming language and in-depth understanding of functions, logic, array etc.	K1,K2,K3& K4	PSO1
CO 5	To write programs to determine lattice energy, half-life, normality, molarity, molality etc.	K1,K2,K3& K4	PSO2

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Dr.M.Priyadharsa

ni2.Dr.B.Vinosha

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc Chemistry

SEMESTER -VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6SB6	GREEN CHEMISTRY	Skill based	2	2

COURSE DESCRIPTION

This course highlights the need for green chemistry approach which is the need of hour to protect the environment from hazardous chemical pollution.

Unit-I: BASICS OF NANOCHEMISTRY (6Hrs)

Definition for Green Chemistry, Need for Green Chemistry- Goals of Green Chemistry – Obstacles and Advantages of Green chemistry, Progress of Green Chemistry- Twelve principles of Green Chemistry and Examples.

UNIT -IIYIELD AND ATOM ECONOMY (6 HRS.)

Concept of Yield and its calculation, Atom economy – Definition, Calculation of Atom economy in rearrangement, addition, substitution and elimination reactions.

UNIT -IIISELECTIVITY IN GREEN CHEMISTRY (6 HRS.)

Concept of selectivity, Types of selectivity -Chemo-, regio-, enantio- and diastereoselectivities, Reactions using Green solvents - Super critical CO_2-Cleaner technology with CO_2.Ionic liquids-Friedel-crafts reaction, halogenation &Diels- Alder reaction. and water.

UNIT -IVSOLVENT FREE REACTIONS (6 HRS.)

Organic synthesis in solid state-Thermal reactions, rearrangements &photochemical reactions. Mode of supplying energy-microwave and ultrasonic-Advantages of MW techniques.Reactiona like oxidation, reduction

&rearrangements.

UNIT -V DESIGNING OF GREEN SYNTHESIS (6 HRS.)

Basic concepts in designing Green synthesis - choice of starting materials, reagents, catalysts-catalytic approach in green chemistry. and solvents withsuitable examples

References

1. V.K. Ahluwalia and M.R. Kidwai, *New Trends in Green Chemistry*,Anamalaya Publishers, 2005.
2. P.T. Anastas, and J.K . Warner,:*Green Chemistry - Theory and Practical*, OxfordUniversity Press, 1998.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	Definition for Green Chemistry	1	Chalk & Talk	Black Board
1.2	Need for Green Chemistry, Goals of Green Chemistry	1	Chalk & Talk	Black Board
1.3	Obstacles and Advantages of Green chemistry	2	Chalk & Talk	PPT & White board
1.4	Progress of Green Chemistry- Twelve principles of Green Chemistry and Examples.	2	Chalk & Talk	Black Board
UNIT-2 YIELD AND ATOM ECONOMY				
2.1	Concept of Yield and its calculation	2	Chalk & Talk	Black Board
2.2	Atom economy – Definition	1	Chalk & Talk	Black Board
2.3	Calculation of Atom economy in rearrangement	2	Chalk & Talk	Black Board

2.4	Addition, substitution, and elimination reactions.	1	Chalk & Talk	PPT & White board
UNIT -3SELECTIVITY IN GREEN CHEMISTRY				
3.1	Concept of selectivity, Types of selectivity -Chemo-, regio-, enantio- anddiastereoselectivities.	2	Chalk & Talk	Black Board
3.2	Reactions using Green solvents - Super critical CO_2- Cleaner technology with CO_2.	2	Chalk & Talk	PPT & White board
3.3	Ionic liquids-Friedel-crafts reaction, halogenation &Diels-Alder reaction. and water.	2	Chalk & Talk	Black Board
UNIT -4SOLVENT FREE REACTIONS				
4.1	Organic synthesis in solid state-Thermal reactions, rearrangemen &photochemical reactions.	2	Chalk & Talk	PPT & White board
4.2	Mode of supplying energy-microwave and ultrasonic-Advantages of MW techniques.	2	Chalk & Talk	Black Board
4.3	Reactiona like oxidation, reductio &rearrangements.	2	Chalk & Talk	Black Board
UNIT-V DESIGNING OF GREEN SYNTHESIS				
5.1	Basic concepts in designing Green synthesis - choice of starting materials	2	Chalk & Talk	Black Board
5.2	Reagents,catalysts-catalytic approach in green chemistry	2	Chalk & Talk	Black Board

5.3	Solvents with suitable examples	2	Chalk & Talk	Black Board

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

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

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

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

- ✔ **The I UG course teachers are requested to start conducting**

S1, W1, M1, in due intervals of time.

EVALUATION PATTERN

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

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To understand the need for green chemistry and goals of Green Chemistry	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 2	To differentiate between yield and atom economy	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 3	To interpret the concept of Stereo selectivity, Chemo selectivity and Regio selectivity	K1,K2,K3,K4	PSO1,PSO5, PSO7

CO 4	To describe the uses of Microwave and ultraTo describe the uses of Microwave and ultrasonic radiations to carry our reaction.	K1,K2,K3,K4	PSO1,PSO5, PSO7
CO 5	To explain use of ionic liquids in organic synthesis.	K1,K2,K3,K4	PSO1,PSO5, PSO7

Mapping COs Consistency with PSOs

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

Mapping of C0s with POs

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

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

COURSE DESIGNER:
V.Arul Deepa

Forwarded By

HOD'S Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI -18

III B.Sc Chemistry

SEMESTER -VI

(For those who joined in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6CC19	PHYSICAL PRACTICALS	Lab IN	6	4

COURSE OBJECTIVE: This paper involves the experimental studies on Rast method, determination of transition temperature, phase diagrams, & electro chemistry.

List of experiments

1. Determination of molecular weight by Rast method. 2. Transition temperature.
3. Simple phase diagram.
4. Critical solution temperature.
5. Ester hydrolysis.
6. Heat of solution by solubility method. 7. Determination of coefficient of viscosity. 8. Partition or Distribution coefficient.
9. Conductometric titration.
10. Inversion of sucrose.

Reference Book

B.Viswanathan, P.S. Raghavan, Practical Physica

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	PSOs ADDRESSED
CO 1	To Develope an understanding of the breadth and concepts of physical chemistry	PSO1& PSO2
CO 2	An appreciation of the role of physical chemistry in the chemical sciences and engineering	PSO3
CO 3	An understanding of methods employed for problem solving in physical chemistry	PSO5
CO 4	To Develope skills in procedures and instrumental methods applied in analytical and practical tasks of physical chemistry	PSO5
CO 5	To Develope some understanding of the professional and safety responsibilities residing in working with chemical systems.	PSO3, PSO5

Mapping of C0s with PSOs

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

Mapping of C0s with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr.A.Rajeswari

2.Dr.B.Vinosha

Forwarded By

B-Medona.

(Dr. B. Medona)

HOD'S Signature

Self-Learning Inter-Disciplinary Courses in UG

SEMESTER-I

(For those who join from June- 2021 onwards)

DEPARTMENT OF CHEMISTRY AND COMMERCE

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS /WEEK	CREDITS
------	21UG2SLCA	HOUSE HOLD PRODCUTS AND MARKETING	SELF LEARNING	2	2

COURSE DESCRIPTION

To enable students to have basic understanding & knowledge about the House hold chemicals and marketing

COURSE OBJECTIVE:

This course is designed for the students to learn about

- To study the basic concepts involved in the preparation of house hold chemicals
- To study the procedure involved in marketing of house hold prepared articles

Course out –comes

- To cultivate the entrepreneur skills of students.
- To inculcate the synthetic importance of house hold chemicals
- To synthesize the profitable house hold chemicals at home.

- To get hands on experience in field of synthesis cum marketing
- To learn the economic importance of house hold chemicals in marketing fields

UNITS

UNIT – 1 – BASIC CONCEPTS INVOLVED IN THE PREPARATION OF HOUSE HOLD LIQUID CHEMICAL PRODUCTS (6 HRS.)

Preparation of Phenoyl – Black phenoyl – white phenoyl – synthetic importance – Preparation of Ink – synthetic importance – Preparation of shampoos – Synthetic importance – Preparation of sanitizers – synthetic importance – Preparation of Antiseptics and disinfectants – uses.

UNIT – 2 – BASIC CONCEPTS INVOLVED IN THE PREPARATION OF HOUSE HOLD SOLID CHEMICAL PRODUCTS (6 hrs)

Preparation of Talcum powder – Lipstick – varnishing creams – synthetic importance – Preparation of detergent powder – cleaning powder -– Synthetic importance – Preparation of candles – Chalk crayons – Computer sambrani -synthetic importance .

UNIT – 3 –Practicals - Hands On training in the preparation of HOUSE HOLD SOLID CUM LIQUIDCHEMICAL PRODUCTS (6 hrs)

- Candles
- Black phenoyl
- White phenoyl
- Sanitizers
- Computer sambrani
- Detergent powder

UNIT – 4 –Product and Pricing (6 hrs)

Definition – Product life cycle – New product development – Pricing – methods of pricing – Psychological pricing – Dual pricing –Monopoly Pricing – Skimming Pricing – Penetration pricing

UNIT – 5 –Physical Distribution and promotion (6 hrs)

Advertising —Procedure – wholesaler- retailer- ultimate consumer -sales promoter at consumers level – coupons, price – off – offer (discount), samples –Advertising -Advantages and disadvantages

REFERENCES:

1.Jayashree Gosh, Textbook of Pharmaceutical Chemistry, S.Chand&Chand publications New Delhi (1997).

2. Marketing – Dr. Rajam Nair and Sanjith .R. Nair – sultan chand and sons – 7th edition – 2018 (print)

3. Marketing – R.S.N., Pillai., chand and company ltd ., 2010

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% 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) - Theory	1	-	10 Mks
C2	-	Test (CIA 2) - practical	1	-	10 Mks
C3	-	Assignment	1	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Quiz	2 *	-	5 Mks
C6	-	Attendance		-	5 Mks

**** The best out of two will be taken into account***

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	To cultivate the entrepreneur skills of students.	K1	PSO5
CO 2	To inculcate the synthetic importance of house hold chemicals	K1, K2,	PSO2
CO 3	To synthesize the profitable house hold chemicals at home.	K1 & K3	PSO6
CO 4	To get hands on experience in field of synthesis cum marketing	K1, K2, K3 &	PSO7
CO 5	To learn the economic importance of house hold chemicals in marketing fields	K2 & K4	PSO7

Mapping of C0s with PSOs

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

Mapping of C0s with Pos

CO/ PSO	PO1	PO2	PO3	PO4	PO5
CO1	1	1	3	1	1
CO2	1	3	1	1	1
CO3	1	1	1	2	1
CO4	1	1	1	1	3
CO5	1	3	1	1	1

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1.Dr. B.SUGANTHANA

2.Dr. SAHAYARANI

3. Dr. JEYANTHI

Forwarded By

B-Medona.

(Dr. B. Medona)

HOD'S Signature

SELF LEARNING INTERDISCIPLINARY COURSE

SEMESTER –IV

Offered by The Research Centre of Home Science and Department of Chemistry

(For those who joined in 2021 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAHS	22UG4SLNC	Textile Coloration	Self Learning	-	2

COURSE DESCRIPTION

This course enlightens the students on the textile fibres, dyes and the coloration process. It also deals with the application process of mordant and disperse dyes.

COURSE OBJECTIVES

CO1: To gain knowledge about textile fibres and dyes
CO2: To understand the textile coloration process
CO3: To develop familiarity with the machinery used for dyeing and the application process
CO4: To study the concept of mordant dyes and properties
CO5: To learn about disperse dyes and the process of dispersion

UNITS

UNIT –I FIBRES AND DYES

Classification of textile fibres, types of dyes, suitability to textile fibres.

UNIT –II COLORATION PROCESS

Stages of dyeing. Methods of dyeing fabrics: jet dyeing, jig dyeing, pad dyeing and beam dyeing.

UNIT –III MACHINERY AND APPLICATION

Machinery: Conical-pan-loose-stock machine, The Hussong machine, Package dyeing machine, The Winch dyeing machine.

Application process: Forces by which dye molecules are bound to fibre (i) ionic force (ii) hydrogen bonding(iii) van der Waals forces (iv) covalent chemical linkages

UNIT –IV MORDANT DYES

Introduction -Natural mordant dyes - Synthetic mordant dyes- structure and properties of Eriochrome Black A and Alizarin.

UNIT –V DISPERSE DYES

Introduction – Ion amines, disperse acetate dyes and solacet dyes - Chemical structure of disperse dyes- Dispersion process -Function of dispersing agents

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only)

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2.P.V.Vidyasagar, 'Handbook of Textiles', Mittal Publications, New Delhi (1998)

3. SusheelaDhantyagi, 'Fundamentals of Textiles and their care', Orient Longman, New Delhi. (1991)

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