FATIMA COLLEGE (AUTONOMOUS)

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

NAME OF THE DEPARTMENT : CHEMISTRY

NAME OF THE PROGRAMME : B.Sc. CHEMISTRY

PROGRAMME CODE : UACH

ACADEMIC YEAR : 2023-2024

Fatima College (Autonomous) Madurai – 18

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

Members Present

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

5	S. Manikandan, Senior Research Associate, Par Pharma, R&D Department. Chengalpattu.	Industrialist
6	Ms. B. Shobana, Research Scholar, Research Department, Thiagarajar College. S. Shobana (03/04/2023)	Alumna.
7.	Dr. A. Rajeswari, Assistant Professor, Dept. of Chemistry, Fatima College	3/4/2023 Dean of Academic Affairs.

Staff Members

Dr. S. Sukumari	S. Sukumari
Dr. B. Vinosha	B. Vinosha
Dr. B. Suganthana	B. Suganthana
Dr. J. Arulmary	Sr. Arulmary
Dr. V. Arul Deepa	V. Arul Deepa
Dr. M. Priyadharsani	M. Priyadharsani
Dr. K.R. Subimol	K.R. Subimol
Dr. J. Belinda Asha	J. Belinda Asha
Dr. J. Jone Celestina	For N. Vimala Sundari

Minutes of the Board of Studies: UG

1. Presentation of the Action Taken Report

Action Taken Report for 2022-2023

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

Change of Course Title

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

New Courses Introduced

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

Revised Courses

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

2. updation of Open Educational Resources — Nil.

3. Revision of Courses.

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

	Chemistry – III	Isomerism (Ionisation, linkage, ligand, hydrate & Co-ordinate Position Isomerism) & in Unit – III – Reaction Mechanism in 6 coordinate complexes – S_N1 & S_N2, Acid hydrolysis, Base Hydrolysis, SN'CB can be included.						
2	19C5ME1 Spectroscopy	Unit-I – Basic Problems. Unit-II & III – Problems involving Small molecule. Unit-V. Problems involving Simple fragmentation (150-200) with Nitrogen & Halogen functional Groups	5				G	E M P S
3	19C6CC17 Organic Chemistry – IV	Deletion of the following Unit I – Preparation & Properties of 1,2-, 1,4- & 2,6-Naphtha quinones, Naphthoic acids, 9,10-anthraquinone & Phenanthraquinone Unit-III. Stereochemistry of amino acids, Primary structure and denaturation of Proteins – Fribrous & Globular Proteins. Unit-IV – Structure and Synthesis of Camphor & Zingiberene & in Unit-V – Structure & Synthesis of Quinine	20%	Since the Course is found to be too heavy for Students			G	E M P
4	19C6ME3 Advanced Organic Chemistry	Unit-III – Contents in organic Photochemistry – Elaborated Unit-IV – In Contents, only Name of the Rearrangements can be specified Unit-V – Title can be changed as Reagents & Rearrangements can be deleted in Title & Contents	15%	As per the suggestions Given by subject Experts & course Teachers			G	E P

4. New Courses Introduced.

III UG (OBE)

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

I UG (TANSCHE SYLLABUS)

CORE COURSES INTRODUCED (PART-III)

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

Elective courses Introduced (Part-III)

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

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

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

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

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

Other Suggestions

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

Commendations:

Our UG Syllabus is Good & too heavy

Minutes of the Board of Studies: PG

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

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

Change of Course Title:

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

New Courses Introduced

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

Revised Courses

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

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

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

I PG (TANSCHE SYLLABUS)

Core Courses Introduced (Part A)

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

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

Elective courses Introduced (Part-A)

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

Skill Enhancement/Ability Enhancement Course (Part-B)

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

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

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

7. Rubrics for Internship/Project : NIL

8. Details of Proposed/Signed MoU :

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

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

Other Suggestions

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

Commendations.

1. The syllabus for all the courses are very Good

OLD

10%

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	Inorgani Chemistr - III	Major Core	5	4

COURSE DESCRIPTION: The Course enables the students to gainknowledge 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

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)

a) Mechanism of hydrolysis reactions in octahedral complexes.

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

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	Theories of Coordination – I	**(15HRS)**		
1.1	Introduction	1	Chalk & Talk	Black Board
1.2	Classification of ligands	2	Chalk & Talk	Black Board
1.3	Nomenclature	3	Lecture	Black Board
1.4	Preparation of complexes	1	Lecture	Black Board

1.5	Detection of complexes 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 plan 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

HOD'S Signature

NEW

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	Major Core	5	4

COURSE DESCRIPTION: The Course enables the students to gainknowledge 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

UNITS

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

Introduction – classification of ligands, nomenclature, preparation of complexes anddetection of complexes using solubility,colour change,conductance measurements and visible absorption studies. Basis for isomerism in complexes and different types of isomerism. Structural isomerism (Ionisation, linkage, ligand, hydrate and co-ordination position isomerism

c). 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)

d) Mechanism of hydrolysis reactions in octahedral complexes.

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

f) Spectroscopic states: L-S coupling & J-J coupling schemes, derivation of spectroscopic states for free C-atom. Reaction Mechanism in 6-coordinate complexes SN_1 and SN_2, Acid hydrolysis, Base hydrolysis SN_1CB

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	Theories of Coordination – I	**(15HRS)**		
1.1	Introduction	1	Chalk & Talk	Black Board
1.2	Classification of ligands	2	Chalk & Talk	Black Board
1.3	Nomenclature	3	Lecture	Black Board
1.4	Preparation of complexes	1	Lecture	Black Board

1.5	Detection of complexes 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 plan 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

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 structure and mode of bonding in organometallic compounds	K1, K2, K3 & K4	PSO7
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:

3. **Dr.A. Rajeswari**
4. **Ms. RM Nagalakshmi**

OLD

5%

III B.Sc. CHEMISTRY

5SEMESTER –V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5ME1	SPECTROSCOPY	Elective	5	5

COURSE DESCRIPTION

This course will focus on interpretation of spectra and application of these tools to address questions of structures.

COURSE OBJECTIVES

In this course the students are exposed to various spectroscopic techniques that are used in structural elucidation. This paper will be of much use of the students to take up higher studies.

UNITS

UNIT –I UV-VISIBLE SPECTROSCOPY (15HRS.)

Introduction, Absorption laws – instrumentation. Types of electronic transitions Absorption and intensity shifts – solvents effects.λmax calculation using Woodward rules for dienes (Open chain and alicyclic) and unsaturated carbonyl compounds.

Self Study: Applications of UV spectroscopy.

UNIT –II FT-IR SPECTROSCOPY (15HRS.)

Introduction, molecular vibrations vibrational frequency – Number of fundamental vibrations – Factors influencing vibrational frequencies – Instrumentation – Sampling technique Finger print region – skeletal and group vibrations.

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, bissalicylaldimine 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:

1. Y.R. Sharma, Organic Spectroscopy, Fourth revised and enlarged Edn., 2007, S. Chand & Co.
2. Puri, Sharma &Pathania, Principles of Physical Chemistry, 3rd Edn., Vishal publishing Company.

3. P. S. Kalsi, Stereochemistry of carbon compounds, 3rdEdn., New Age International Publishers, 1995.

4. R. S. Drago, *PhysicaI Methods in Chemistry*; Saunders: Philadelphia, 1977.

5. 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 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 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

NEW

III B.Sc.

CHEMISTRY

SEMESTER –V

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C5ME1	SPECTROSCOPY	Elective	5	5

COURSE DESCRIPTION

This course will focus on interpretation of spectra and application of these tools to address questions of structures.

COURSE OBJECTIVES

In this course the students are exposed to various spectroscopic techniques that are used in structural elucidation. This paper will be of much use of the students to take up higher studies.

UNITS

UNIT –I UV-VISIBLE SPECTROSCOPY (15HRS.)

Introduction, Absorption laws – instrumentation. Types of electronic transitions Absorption and intensity shifts – solvents effects.λmax calculation using Woodward rules for dienes (Open chain and alicyclic) and unsaturated carbonyl compounds. Basic Problems only

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 group vibrations. Problems involving small molecules only

Self Study: Applications of FT-IR spectroscopy.

UNIT –III ^{1}H-NMR SPECTROSCOPY (15HRS.)

Introduction, principle, Number of signals, position of signals(chemical shift) – shielding and deshielding effects. Factors influencing chemical shift. Instrumentation, Solvents used -peak area – splitting of the signals. Coupling constant (J) geminal Vicinal (cis&trans) and aromatic coupling (J- ortho, J-meta & J-para). Problems involving small molecules only

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, bissalicylaldimine 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. Problems involving simple fragmentation (150-200) with Nitrogen and halogen functional groups.

Self Study: Applications in Mass spectroscopy.

REFERENCES:

6. Y.R. Sharma, Organic Spectroscopy, Fourth revised and enlarged Edn., 2007, S. Chand & Co.
7. Puri, Sharma &Pathania, Principles of Physical Chemistry, 3rd Edn.,

Vishal publishing Company.

8. P. S. Kalsi, Stereochemistry of carbon compounds, 3rdEdn., New Age International Publishers, 1995.
9. R. S. Drago, *PhysicaI Methods in Chemistry*; Saunders: Philadelphia, 1977.
10. 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

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

OLD

20%

III B.Sc. CHEMISTRY

SEMESTER –VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6CC17	ORGANIC CHEMISTRY – IV	Major Core	5	4

COURSE DESCRIPTION

This paper includes the topics, Polynuclear Hydrocarbons, Heterocyclic Compounds, Amino Acids and Proteins, Terpenes and Alkaloids.

COURSE OBJECTIVES

In this course the students are exposed to develop efficient, synthetic methods in organic chemistry. And to be familiar with properties and reactions of most important poly nuclear hydrocarbons, heterocyclic compounds, amino acids, peptides, proteins. And gain advanced knowledge and understanding in aspect of alkaloids and terpenes.

UNITS

UNIT I. POLY NUCLEAR HYDROCARBONS (15 Hrs.)

Structure of Naphthalene, aromaticity, preparation-Haworth and Fitting's synthesis. Chemical properties- reduction, oxidation, electrophilic substitution. Derivatives of naphthalene 1- Naphthol and 2- Naphthol – Preparation and chemical properties. 1-Naphthylamine and 2-Naphthylamine, Preparation- Bucherer reaction, and Chemical properties. 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 phenanthra quinone.

Fused polynuclear heterocyclic systems- Quinoline and Isoquinoline-Preparation of quinoline –Skraup's and Friedlander's synthesis, Chemical properties of quinoline- electrophilic, nucleophilic substitution, oxidation, and reductions reactions. Preparation of isoquinoline –Bischler-Napieralski reaction, and chemical properties.

UNIT II. HETEROCYCLIC COMPOUNDS (15 Hrs.)

Introduction, numbering the position in heterocyclic compounds. Five membered heterocyclic compounds of pyrrole, furan, thiophene. Structure and aromaticity,general methods of preparations of pyrrole, furan, thiophene, Preparation of pyrrole (Knorr-pyrrole, Hanstzchsynthesis),Chemical properties of pyrrole, furan, thiophene-electrophilic substitution, reduction reactions, Kolbes-Schmitt reaction in pyrrole and Diels-Alder reaction of furan. Comparison of reactivity of furan, pyrrole and thiophene.

Six- membered heterocyclic compound – Pyridine- Structure aromaticity and basicity. Preparation and Chemical properties of pyridine-electrophilic, nucleophilic substitution and reduction reactions. Indole-preparation- Fischer's indole, Madelung, Reissert synthesis. Electrophilic substitution and reduction reactions. Five membered heterocyclic containingtwo 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. Colour reactions of proteins and denaturation of proteins – Fibrous & globular proteins.

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 and Quinine.

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 Scholast	-	-	-	-		5	5	

ic								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 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 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

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	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
CO5								

Mapping 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

NEW

III B.Sc. CHEMISTRY

SEMESTER –VI

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UACH	19C6CC17	ORGANIC CHEMISTRY – IV	Major Core	5	4

COURSE DESCRIPTION

This paper includes the topics, Polynuclear Hydrocarbons, Heterocyclic Compounds, Amino Acids and Proteins, Terpenes and Alkaloids.

COURSE OBJECTIVES

In this course the students are exposed to develop efficient, synthetic methods in organic chemistry. And to be familiar with properties and reactions of most important poly nuclear hydrocarbons, heterocyclic compounds, amino acids, peptides, proteins. And gain advanced knowledge and understanding in aspect of alkaloids and terpenes.

UNITS

UNIT I. POLY NUCLEAR HYDROCARBONS (15 Hrs.)

Structure of Naphthalene, aromaticity, preparation-Haworth and Fitting's synthesis. Chemical properties- reduction, oxidation, electrophilic substitution. Derivatives of naphthalene 1- Naphthol and 2- Naphthol – Preparation and chemical properties. 1-Naphthylamine and 2-Naphthylamine, Preparation- Bucherer reaction, and Chemical properties. 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 phenanthra quinone.

Fused polynuclear heterocyclic systems- Quinoline and Isoquinoline- Preparation of quinoline –Skraup's and Friedlander's synthesis, Chemical properties of quinoline- electrophilic, nucleophilic substitution, oxidation, and reductions reactions. Preparation of isoquinoline –Bischler-Napieralski reaction, and chemical properties.

UNIT II. HETEROCYCLIC COMPOUNDS (15 Hrs.)

Introduction, numbering the position in heterocyclic compounds. Five membered heterocyclic compounds of pyrrole, furan, thiophene. Structure and aromaticity,general methods of preparations of pyrrole, furan, thiophene, Preparation of pyrrole (Knorr-pyrrole, Hanstzchsynthesis),Chemical properties of pyrrole, furan, thiophene-electrophilic substitution, reduction reactions, Kolbes-Schmitt reaction in pyrrole and Diels-Alder reaction of furan. Comparison of reactivity of furan, pyrrole and thiophene.

Six- membered heterocyclic compound – Pyridine- Structure aromaticity and basicity. Preparation and Chemical properties of pyridine-electrophilic, nucleophilic substitution and reduction reactions. Indole-preparation- Fischer's indole, Madelung, Reissert synthesis. Electrophilic substitution and reduction reactions. Five membered heterocyclic containingtwo 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. Colour reactions of proteins and denaturation of proteins – Fibrous & globular proteins.

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 and Quinine.

Text Books

Unit I ,II andIII

4. I.L.Finar Organic Chemistry Vol II, 5thEdn, ELBS &Longmann group Ltd.
5. I.L FinarOrganic ChemistryVol. I –, 6thEdn., ELBS &Longmann group Ltd.

6. 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

2. 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 Scholast	-	-	-	-		5	5	

ic								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 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 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

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
CO5	3	3	1	1	1	2	2	1

Mapping 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

OLD

III B.Sc. CHEMISTRY

SEMESTER –VI

15%

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6ME3	ADVANCED ORGANIC CHEMISTRY (CONFORMATIONAL ANALYSIS, ORGANIC PHOTOCHEMISTRY AND MOLECULAR REARRANGEMENTS)	Elective	5	5

COURSE DESCRIPTION

The course is offered to expose the advanced topics in the field of organic chemistry.

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.

UNITS

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 age international publishers, 2009.

5.I.L.Finar, Vol-I, Organic Chemistry, sixth Edn., ELBS & Longmann group Ltd.

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

NEW

III B.Sc.

CHEMISTRY

SEMESTER –VI

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UACH	19C6ME3	ADVANCED ORGANIC CHEMISTRY (CONFORMATIONAL ANALYSIS, ORGANIC PHOTOCHEMISTRY AND MOLECULAR REARRANGEMENTS)	Elective	5	5

COURSE DESCRIPTION

The course is offered to expose the advanced topics in the field of organic chemistry.

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.

UNITS

UNIT –I CONFORMATIONAL ANALYSIS- I (15 HRS.)

Stereoisomerism of ring systems- number and kind of stereoisomers- cyclopropane, cyclobutane, cyclopentane and cyclohexane. Conformations of ethane and n-butane-conformational energy diagram. Conformation of mono substituted cyclohexane-stability and optical activity-conformation of disubstitutedcyclohexanes-stability and optical activity and decalins their

stability and optical activity.

UNIT –II CONFORMATIONAL ANALYSIS- II (15 HRS.)

Conformation and physical properties, and conformation and chemical reactivity-S_N1, S_N2, ionic eliminations, rearrangements, NGP, epoxide ring closure and ring opening reactions, addition to cyclohexene derivatives, pyrolysis of acetates, xanthates and amine oxides.

UNIT –III ORGANIC PHOTOCHEMISTRY (15 HRS.)

Organic photochemistry –Photochemical Elimination in carbonyl compounds and nitrites- Norrish type-I & Norrish type-II, Barton reaction. Photochemical reduction, oxidation and cis-trans isomerisation, Intermolecular cycloaddition (2π +2π) & (4π +2π) cycloadditions, supara and antara overlap-FMO approach, and electrocyclic reactions ring opening and ring closure reactions- 4n & 4n+2 systems. Conrotation, disrotation. FMO approach to predict stereochemistry.

UNIT –IV MOLECULAR REARRANGEMENTS-I (15HRS.)

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 AND REAGENTS (15 HRS.)

Favorski, Baeyer Villiger, Cope, Curtius and Beckmann rearrangements, Synthetic importance of N – Bromosuccinimide, Osmium tetroxide, Selenium dioxide, PyridiniumChloro Chromite, Lithium Aluminium Hydride and Sodium Boro Hydride.

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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
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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
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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

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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.**	
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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.Priyadharsani2.Dr.B.Vinosha

Forwarded

HoD Signature