MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

(An Autonomous College)

Affiliated to Periyar University, Salem | Accredited by **NAAC** with '**A**' Grade

Recognized by **UGC** under Section 2(f) & 12 (B)

MUTHAYAMMAL
COLLEGE OF ARTS
AND SCIENCE
(Autonomous)
A UNIT OF VANETRA GROUP
ESTD-1994
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DEGREE OF BACHELOR OF SCIENCE

Learning Outcomes – Based Curriculum Framework
– Choice Based Credit System

Syllabus for B.Sc., Chemistry

(Semester Pattern)

(For Candidates admitted from the academic year
2021 -2022 and onwards)

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS), RASIPURAM

VISION

To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, thereby nurturing a generation of committed, Knowledgeable and socially responsible citizens

MISSION

- To Ensure State of the world learning experience
- To espouse Value Based Education
- To empower rural education
- To instill the spirit of entrepreneurship and enterprises
- To create a resource pool of socially responsible world citizens

QUALITY POLICY

To Seek – To Strive – To Achieve greater heights in Arts and Science, Engineering, Technological and Management Education without compromising on the Quality of Education

DEPARTMENT OF CHEMISTRY

VISION

Department is dedicated to provide a high quality education in Chemistry for the students and to create young chemist to survive for social and scientific well-being.

MISSION

- To develop the department as a research ground for rural students
- To ensure that the department is equipped with highly sophisticated instruments

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates will be able to promote learning environment to meet the industry expectation.

PEO2: Graduates will be incorporated the critical thinking with good Communication and Leadership skills to become a self-employed

PEO3: Graduates will be uphold the human values and environmental sustenance for the betterment of the society.

GRADUATE ATTRIBUTES

The Graduate attributes of B. Sc., Chemistry are

GA1: Analytical Reasoning

GA2: Critical Thinking

GA3: Problem Solving Skills

GA4: Communication Skills

GA5: Leadership Quality

GA6: Team work

GA7: Lifelong Learning

PROGRAMME OUTCOMES (POs)

PO1: Graduates will acquire dynamic skills through proper perception of the course objectives that leads to scientific and analytical comprehension of the concepts;

PO2: Graduates will focus on sustainable goals that might bring about spherical developments

PO3: Graduates will infuse a spirit converging on bricking a team work, interpersonal and administrative skills to think critically and execute effectively

PO4: Graduates will apply reasoning appropriately to scale the humps in learning and solute them to the core.

PO5: Graduates will engage the skills obtained in independent and collaborative learning as a perennial process.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Become Chemistry professionals with a high level of knowledge in various sub-disciplines of applying it in day-to-day life

PSO2: Gain practical knowledge and analytical skills in designing and carrying out chemical experiments

PSO3: Identify and analyze problems and the capability to interpret chemical information, which finds application in industry, medicine, and research.

PSO4: To communicate concepts of Chemistry effectively and will enable the students to get jobs and competency to clear competitive examinations.

PSO5: To attain preparedness to go for higher studies and get trained for industrial entrepreneurship

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B.Sc.- Chemistry Abstract under LOCF-CBCS Pattern with effect from 2021-2022 Onwards

Structure of Credit Distribution as per the TANSCHE/UGC guidelines

S. No.	Study Components	Part	Sem I		Sem II		Sem III		Sem IV		Sem V		Sem VI		No. of Paper	Total Credit
			No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit		
1	LANGUAGE - I	I	1	3	1	3	1	3	1	3					4	12
2	LANGUAGE - II	II	1	3	1	3	1	3	1	3					4	12
3	DISCIPLINE SPECIFIC COURSE(DSC)-THEORY	III	1	4	1	4	1	4	1	4	3	12	3	12	10	40
4	DSC - PRACTICAL	III			1	3			1	3			2	7	4	13
5	GENERIC ELECTIVE COURSES(GEC)-THEORY	III	1	4	1	4	1	4	1	4					4	16
6	GEC PRACTICAL	III			1	2			1	2					2	4
7	DISCIPLINE SPECIFIC ELECTIVE COURSES(DSE)	III									2	8	2	8	4	16
8	PROJECT WORK	III											1	2	1	4
9	INTERNSHIP	III														
10	ONLINE - COMPETITIVE EXAMINATION	III											1	2	1	2
11	SKILL ENHANCEMENT COURSES(SEC)-SBEC	IV			1	2	1	2	1	2	1	2			4	8
12	NON MAJOR ELECTIVE COURSES(NMEC)	IV					1	2	1	2					2	4
13	PROFESSIONAL ENGLISH	IV	1	2	1	2									2	4

14	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC)-EVS	IV			1	2									1	2
15	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC)-VALUE EDUCATION - YOGA	IV	1	2											1	2
16	EXTENSION ACTIVITY	V											1	1	1	1
	Cumulative Credits		**6**	**18**	**9**	**25**	**6**	**18**	**8**	**23**	**6**	**22**	**10**	**34**	**45**	**140**

Total No. of Subjects	45
Marks	**4100**

PART	**No. of Credits**
PART - I	12
PART - II	12
PART - III	95
PART - IV	20
PART - V	1
Grand Total	**140**

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE(Autonomous) - Rasipuram - 637 408

Scheme of Examinations LOCF-CBCS Pattern

(for the Students Admitted from the Academic Year:2021-2022 Onwards)

Programme : B.Sc.CHEMISTRY

S.No.	PART	STUDY COMPONENTS	SUBJECT_CODE	TITLE OF THE SUBJECT	Hrs.		CREDIT	MARKS		
					Lect.	Lab .		CIA	EA	TOTAL
SEMESTER - I										
1	I	LANGUAGE - I	21M1UFTA01	TAMIL - I	5	-	3	25	75	100
2	II	LANGUAGE - II	21M1UCEN01	COMMUNICATIVE ENGLISH - I	5	-	3	25	75	100
3	III	DSC THEORY - I	21M1UCHC01	GENERAL CHEMISTRY - I	6	-	4	25	75	100
4	III	GEC THEORY - I	21M1UMAA01	ALGEBRA AND CALCULUS	4	-	4	25	75	100
5	III	GEC THEORY - I	21M1UZOA01	ALLIED ZOOLOGY - I	-	-	-	-	-	-
6	III	DSC PRACTICAL - I	21M2UCHP01	PRACTICAL: VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS	-	3	-	-	-	-
7	III	GEC PRACTICAL - I	21M2UMAAP1/22M2UMAAP1	PRACTICAL : ALLIED MATHEMATICS	-	3	-	-	-	-
8	III	GEC PRACTICAL - I	21M2UZOAP1	PRACTICAL : ZOOLOGY	-	-	-	-	-	-
9	IV	AECC - VALUE EDUCATION	21M1UVED01	YOGA	2	-	2	100	-	100
10	IV	PROFESSIONAL ENGLISH - I	21M1UPES01	PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES - I	2	-	2	25	75	100
				TOTAL	**24**	**6**	**18**	**225**	**375**	**600**
SEMESTER - II										
1	I	LANGUAGE - I	21M2UFTA02	TAMIL - II	5	-	3	25	75	100
2	II	LANGUAGE - II	21M2UCEN02	COMMUNICATIVE ENGLISH - II	5	-	3	25	75	100
3	III	DSC THEORY - II	21M2UCHC02	GENERAL CHEMISTRY - II	4	-	4	25	75	100
4	III	GEC THEORY - II	21M2UMAA02	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	4	-	4	25	75	100
5	III	GEC THEORY - II	21M2UZOA02	ALLIED ZOOLOGY - II	-	-	-	-	-	-
6	III	DSC PRACTICAL - I	21M2UCHP01	PRACTICAL: VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS	-	3	3	40	60	100
7	III	GEC PRACTICAL - I	21M2UMAAP1/22M2UMAAP1	PRACTICAL: ALLIED MATHAMETICS	-	3	2	40	60	100
8	III	GEC PRACTICAL - I	21M2UZOAP1	PRACTICAL: ZOOLOGY	-	-	-	-	-	-
9	IV	SEC - I	21M2UCHS01	FOOD AND NUTRITION	2	-	2	25	75	100
10	IV	AECC - ENVIRONMENTAL STUDIES	21M2UEVS01	ENVIRONMENTAL STUDIES	2	-	2	100	-	100
11	IV	PROFESSIONAL ENGLISH - II	21M2UPES02	PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES - II	2	-	2	25	75	100
				TOTAL	**24**	**6**	**25**	**330**	**570**	**900**

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Scheme of Examinations LOCF-CBCS Pattern

(for the Students Admitted from the Academic Year:2021-2022 Onwards)

Programme : B.Sc.CHEMISTRY

S.No.	PART	STUDY COMPONENTS	SUBJECT_CODE	TITLE OF THE SUBJECT	Hrs.		CREDIT	MARKS		
					Lect.	Lab		CIA	EA	TOTAL
SEMESTER - III										
1	I	LANGUAGE - I	21M3UFTA03	TAMIL - III	5	-	3	25	75	100
2	II	LANGUAGE - II	21M3UCEN03	COMMUNICATIVE ENGLISH - III	5	-	3	25	75	100
3	III	DSC THEORY - III	21M3UCHC03	GENERAL CHEMISTRY - III	6	-	4	25	75	100
4	III	GEC THEORY - III	21M3UPHA01	ALLIED PHYSICS-I	4	-	4	25	75	100
5	III	DSC PRACTICAL - II	21M4UCHP02	PRACTICAL: INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS	-	3	-	-	-	-
6	III	GEC PRACTICAL - II	21M4UPHAP1	PRACTICAL: ALLIED PHYSICS	-	3	-	-	-	-
7	IV	SEC - II	21M3UCHS02	POLYMER CHEMISTRY	2	-	2	25	75	100
8	IV	NMEC - I	21M3UCSN02	OFFICE AUTOMATION	2	-	2	25	75	100
				TOTAL	24	6	18	150	450	600
SEMESTER - IV										
1	I	LANGUAGE - I	21M4UFTA04	TAMIL - IV	5	-	3	25	75	100
2	II	LANGUAGE - II	21M4UCEN04	COMMUNICATIVE ENGLISH - IV	5	-	3	25	75	100
3	III	DSC THEORY - IV	21M4UCHC04	GENERAL CHEMISTRY - IV	6	-	4	25	75	100
4	III	GEC THEORY - IV	21M4UPHA02	ALLIED PHYSICS-II	4	-	4	25	75	100
5	III	DSC PRACTICAL - II	21M4UCHP02	PRACTICAL: INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS	-	3	3	40	60	100
6	III	GEC PRACTICAL - II	21M4UPHAP1	PRACTICAL: ALLIED PHYSICS	-	3	2	40	60	100
7	IV	SEC - III	21M4UCHS03	CHEMPRENEUR	2	-	2	25	75	100
8	IV	NMEC - II	21M4UCSN03	IMAGE EDITING TOOL	2	-	2	25	75	100
				TOTAL	24	6	23	230	570	800

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Scheme of Examinations LOCF-CBCS Pattern

(for the Students Admitted from the Academic Year:2021-2022 Onwards)

Programme : B.Sc.CHEMISTRY

S.No.	PART	STUDY COMPONENTS	SUBJECT_CODE	TITLE OF THE SUBJECT	Hrs.		CREDIT	MARKS		
					Lect.	Lab		CIA	EA	TOTAL
SEMESTER - V										
1	III	DSC THEORY - V	21M5UCHC05	INORGANIC CHEMISTRY-I	4	-	4	25	75	100
2	III	DSC THEORY - VI	21M5UCHC06	ORGANIC CHEMISTRY-I	4	-	4	25	75	100
3	III	DSC THEORY - VII	21M5UCHC07	PHYSICAL CHEMISTRY-I	4	-	4	25	75	100
4	III	DSE - I	21M5UCHE01	ANALYTICAL CHEMISTRY	4	-	4	25	75	100
5	III	DSE - II	21M5UCHE02	INTRODUCTORY NANOSCIENCE	4	-	4	25	75	100
6	III	DSC PRACTICAL - III	21M6UCHP03	PRACTICAL: PHYSICAL CHEMISTRY	-	3	-	-	-	-
7	III	DSC PRACTICAL - IV	21M6UCHP04	PRACTICAL: GRAVIMETRIC ESTIMATIONS AND ORGANIC ANALYSIS	-	5	-	-	-	-
8	IV	SEC - IV	21M5UCHS04	AGRICULTURAL CHEMISTRY	2	-	2	25	75	100
9	IV	INTERNSHIP	21M5UCHIS1	INTERNSHIP	-	-	-	-	-	-
				TOTAL	**22**	**8**	**22**	**150**	**450**	**600**
SEMESTER - VI										
1	III	DSC THEORY - VIII	21M6UCHC08	INORGANIC CHEMISTRY-II	4	-	4	25	75	100
2	III	DSC THEORY - IX	21M6UCHC09	ORGANIC CHEMISTRY-II	4	-	4	25	75	100
3	III	DSC THEORY - X	21M6UCHC10	PHYSICAL CHEMISTRY-II	5	-	4	25	75	100
4	III	DSE - III	21M6UCHE04	INDUSTRIAL CHEMISTRY	4	-	4	25	75	100
5	III	DSE - IV	21M6UCHE05 / 21M6UCHE06	PHARMACEUTICAL CHEMISTRY / FORENSIC CHEMISTRY	4	-	4	25	75	100
6	III	DSC PRACTICAL - III	21M6UCHP03	PRACTICAL: PHYSICAL CHEMISTRY	-	3	3	40	60	100
7	III	DSC PRACTICAL - IV	21M6UCHP04	PRACTICAL: GRAVIMETRIC ESTIMATIONS AND ORGANIC ANALYSIS	-	6	4	40	60	100
8	III	PROJECT WORK	21M6UCHPR1	PROJECT WORK	-	-	4	40	60	100
9	III	ONLINE - COMPETITIVE EXAMINATION	21M6UCHOE1	CHEMISTRY FOR COMPETITIVE EXAMINATION	-	-	2	100	-	100
10	V	EXTENSION ACTIVITY	21M6UEXA01	EXTENSION ACTIVITY	-	-	1	100	-	100
11		NAAN MUDHALAVAN COURSE		EMPLOYABILITY READINESS	-	-	-	-	-	-
				TOTAL	**21**	**9**	**34**	**445**	**555**	**1000**
				OVERALL TOTAL	**139**	**41**	**140**	**1530**	**2970**	**4100**

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Scheme of Examinations LOCF-CBCS Pattern

(for the Students Admitted from the Academic Year:2021-2022 Onwards)

Programme : B.Sc.CHEMISTRY

S.No.	PART	STUDY COMPONENTS	SUBJECT_CODE	TITLE OF THE SUBJECT	Hrs.		CREDIT	MARKS		
					Lect.	Lab.		CIA	EA	TOTAL
		EXTRA CREDIT COURSE	21M6UCHEC1	MOOC Courses offered in SWAYAM / NPTEL	-	-	2	-	-	-
		EXTRA CREDIT COURSE		VALUE ADDED COURSE - WATER ANALYSIS	-	-	2	-	-	-

N. Nithya

HEAD OF THE DEPARTMENT,
Department of Chemistry,
Muthayammal College of Arts & Science,
Rasipuram-637 408, Namakkal (Dt)

PRINCIPAL
MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)
RASIPURAM - 637 408,
NAMAKKAL DISTRICT.

UG - REGULATION

1. Internal Examination Marks - Theory

Components	Marks
CIA I & II	15
Attendance	5
Assignment	5
Total	25

Attendance Percentage	Marks
96 %to 100%	5
91%to 95%	4
86%to 90%	3
81%to 85%	2
75%to 80%	1
Below 75%	0

2. QUESTION PAPER PATTERN FOR CIA I, II AND ESE (3 HOURS) **MAXIMUM: 75 Marks**

SECTION-A (10 Marks) (Objective Type)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (10 x1=10 marks)

SECTION-B(10 Marks)(Short Answer)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 2 = 10 marks)

SECTION-C (25 Marks)(Either or Type)

Answer any **FIVE** questions

ALL Questions Carry **EQUAL** Marks

Either or Type (5 x 5 = 25 marks)

SECTION-D (30 Marks)(Analytical Type)

Answer any **THREE** Questions out of **FIVE** questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30 marks)

(**Syllabus for CIA-I 2.5 Unit, Syllabus for CIA-II All 5 Unit)**

2a) Components for Practical CIA

Components	Marks
CIA –I	15
CIA - II	15
Observation Note	5
Attendance	5
Total	**40**

2b) Components for Practical ESE

Components	Marks
Completion of Experiments	50
Record	5
Viva	5
Total	**60**

3. Guidelines for Value Education Yoga and Environmental Studies (Part IV)

- The Course Value Education Yoga is to be treated as 100% CIA course which is offered in I Semester for I year UG students.
- The Course Environmental Studies is to be treated as 100% CIA course which is offered in II Semester for I year UG students.
- Total Marks for the Course = 100

Components	Marks
Two Tests (2 x30)	60
Field visit and report (10+10)	20
Two assignments (2 x10)	20
Total	100

The passing minimum for this course is 40%

- In case, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent odd/even semesters.

4. Guidelines for Extension Activity (Part V)

- Atleast two activities should be conducted within semester consisting of two days each.
- The activities maybe Educating Rural Children, Unemployed Graduates, Self-Help Group etc.

The marks may be awarded as follows

No. of Activities	Marks
2 x 50 (Each Activity for two days)	100

5. Internship/Industrial Training, Mini Project and Major Project Work

Internship / Industrial Training		Mini Project	Major Project Work		
Components	**Marks**	**Marks**	**Components**		**Marks**
CIA*[2] Work Diary Report Viva-voce Examination	 25 50 25	 - 50 50	**CIA** a) Attendance **b)** Review /Work Diary*[1]	10 Marks 30 Marks	40
Total	**100**	**100**	**ESE*[2]** a)Final Report b)Viva-voce	 40 Marks 20 Marks	 60
				Total	**100**

*[1]Review is for Individual Project and Work Diary is for Group Projects (Group consisting of minimum 3 and maximum 5)

*[2]Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

6. Guidelines for Competitive Exams- Online Mode (Part III) - Online Exam 3 hours

Components	Marks
100 Objective Type Questions 100*1 = 100 Marks	100

Objective type Questions from Question Bank.

- The passing minimum for this paper is 40%
- In case, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent semesters.

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B.Sc- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCHC01	GENERAL CHEMISTRY - I	DSC THEORY - I	I	6	3	3	0	4
Objective	To know the Handling of chemicals and the principles of volumetric analysis, Various concepts of atomic structure, periodicity properties of elements, nomenclature of organic compounds and Behaviour and kinetic theory of gases.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Handling of Chemicals and Volumetric Analysis** 1.1. Handling of chemicals – Safety and hygiene in the chemical laboratory - Storage and handling of chemicals, handling of acids, ethers, toxic and poisonous chemicals, antidotes, Threshold vapours concentration and first aid procedure. 1.2. Principles of Volumetric analysis - Definitions of molarity, normality, molality and mole fraction – Primary and secondary standards – Types of titrimetric reactions – acid - base, redox, Iodometric, Iodimetric precipitation and complexometric titrations – Indicators – pH and pOH– buffer solutions and types.	K1,K3	15
II	**Atomic Structure** 2.1. Models on the atomic structure – J. J. Thomson's model – Rutherford's model of atom – Bohr's model - Comparison between Rutherford's model of atom and Bohr's model- Outline of the Bohr - Sommerfield model - its limitations – de Broglie theory - Heisenberg's uncertainty principle - Quantum numbers. Wave mechanical concept of atom – Schrodinger's wave equation (derivation not needed)-significance of Ψ and $\Psi 2$–Eigen functions and Eigen values-shapes of different orbitals – Difference between orbit and orbital.	K1,K2	15
III	**Electronic Structure, s and p-block elements** 3.1. Pauli's Exclusion principle and its applications - Hund's rule and its applications - stability Of half-filled and completely filled orbitals – Aufbau's principle and its limitations. 3.2. Periodic properties, atomic and ionic radii, ionization energy, electron affinity and electro- negativity – variation of the periodic properties along periods and groups - theoretical explanation for the variations. 3.3 s-block elements – Characteristic properties of group I and II elements, Diagonal relationship between Li and Mg, Be and Al. 3.4 p-block elements – Boron family: Synthesis and structure of diborane and higher boranes (B4H10 and B5H9). Carbon family: Carbides – Classifications (ionic, covalent and interstitial). Chemistry of carborundum and boron carbide.	K3,K5	15
IV	**Nomenclature of Organic Compounds, Concept of Bonding and Cleavage of Bonds** 4.1 Classification of organic compounds - Nomenclature of organic compounds - Functional groups - Homologous series 4.2 Basic concepts of bonding in organic chemistry - hybridization - tetravalency of carbon - geometry of molecules - methane, ethane,	K2,K3	15

	ethylene, acetylene and benzene, electron displacement effects – Inductive, Resonance, Hyperconjugation and Steric effects. 4.3 Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond, reaction intermediates - structure and stability of carbocations - carbanions and free radicals.		
V	**The Gaseous state** 5.1 Behaviour of ideal gases, kinetic theory of gases-the kinetic gas equation-derivation of the gas laws-kinetic theory and temperature-Boltzmann constant-Maxwell's distribution of molecular velocities - types of molecular velocities - expansivity and compressibility - collision diameter - collision frequency - mean free path (concept only). 5.2 Behaviour of real gases, deviations from ideal behaviour - explanation of deviations - Boyle point, the Virial equation of state-derivation of the principle of corresponding states.	K2	15
Course Outcome	CO1: Recite the principles of volumetric analysis and estimate an unknown ion .	**K1**	
	CO2: Describe the postulates of the kinetic theory of gases, behaviour of real gases	**K2**	
	CO3: Explain the atomic structure through the basic concepts of quantum mechanics	**K3**	
	CO4: Elaborate the properties of period and groups in periodic table	**K4**	
	CO5: Categorize the properties and structure of s & p block elements.	**K5**	

Learning Resources

Text Books	1. R. D. Madan, Modern Inorganic Chemistry, 3rd edition, S. Chand & Co. Ltd., Reprint 2014. 2. P. L. Soni, Textbook of Inorganic Chemistry, 20th edition, Sultan Chand & Sons, 2000. 3. B. S. Bhal, and Arun Bhal, A Text book of Organic Chemistry, Sultan Chand and Sons, 1992
Reference Books	1. J. D. Lee, Concise Inorganic Chemistry, Blackwell Science and Wiley-India, 5th edition, 2009 2. S. M. Mukerji, S. P. Singh, R. P. Kapoor and R. Dass, Organic Chemistry, New Age International Publishers, 2017 3. R.T. Morrison and R. N. Boyd, Organic Chemistry, 6th Edition Prentice- Hall, 2016.
Website Link	1. https://chem.libretexts.org/Courses/Sacramento_City_College/SCC%3A_Chem_309_-_General_Organic_and_Biochemistry_(Bennett)/Text/02._Atomic_Structure 2.https://en.m.wikipedia.org/wiki/Electronic_structure 3.https://www.bu.edu/ehs/ehs-topics/chemical/safe-handling-and-storage-of-chemicals/

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCHC01	GENERAL CHEMISTRY - I	DSC THEORY - I	I	6	3	3	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	L	M	S	S	M	L	M
CO2	S	M	L	M	M	S	M	L	M	M
CO3	S	L	S	M	M	S	L	S	M	M
CO4	M	M	S	S	L	M	M	S	S	L
CO5	M	L	L	M	M	M	L	L	M	M
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

Tutorial Schedule	Unit I- Handling of chemicals-Lab visit, Uint -III- s & p block elements- Group discussion, Uint- IV-Nomenclature- Quiz.
Teaching and Learning Methods	Chalk and talk, Visualization, Ball and stick model & smart class
Assesment Methods	Unit test, Assignment, Internal & Semester examinations

Designed By	Verified By	Approved By
Miss.S.ESWARI	Dr.P.SUMATHI	

MUTHAYAMMAL COLLEGE OF ARTS & SCIENCE
RASIPURAM
637 408
Tamil Nadu

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHC02	GENERAL CHEMISTRY - II	DSC THEORY - II	II	4	4	0	0	4
Objective	To study about the methods of formation of Cycloalkanes, Aromatic hydrocarbons and reaction mechanism, understand the nature of covalent and ionic bonds,hydrides and Carbides. Application of and Liquid Crystals							

Unit	Course Content	Knowledge Levels	Sessions
I	**Chemical Bonding** 1.1. Ionic bond - mode of formation – properties of ionic compounds - inert pair effect - Born Haber Cycle - polarization of ions- factors affecting polarization - importance of polarization of ions - Fajan's rules 1.2. Covalent bond - mode of formation-properties of covalent compounds - valence bond theory -postulates of Pauling - Slater's theory-different types of overlapping molecular orbital theory - Postulates-bonding and anti-bonding molecular orbitals - tabulation of various MO's formed from atomic orbitals-energy level diagrams for MO's-bond order-electronic configuration of hetero nuclear diatomic molecules - CO, NO and HF - A comparative study of VB and MO theories.	K1,K2	9
II	**Hydrides and Carbides** 2.1. Hydrides-classification-types of hydrides, ionic hydrides - LiH and NaH - preparation, properties, uses and structures, covalent hydrides, silanes - general study - chemistry of monosilanes and disilanes, difference between silanes and alkanes, metallic hydrides – preparation, properties, structures and uses (A brief study), complex hydrides - NaBH4 and LiAlH4 - preparation, properties, uses and structures. 2.2. Carbides - preparation, properties and technical applications.	K3	9
III	**Organic reaction Mechanism** 3.1. Aliphatic nucleophilic substitution, SN1, SN2 and SNi reactions, mechanism and stereochemistry, relative reactivity of ethyl, isopropyl, tertiary butyl, vinyl and benzyl halides, competition between substitution and elimination reactions. 3.2. Elimination reactions - mechanism of E1 and E2 reactions, Hofmann and Saytzeff rule. 3.3. Dienes - isolated and conjugated dienes - 1, 2 and 1, 4 - additions.	K2	9

IV	**Cycloalkanes and Aromatic Hydrocarbons** 4.1. Cycloalkanes- methods of formation-Wurtz reaction, Dieckmann ring closure, Baeyer's Strain theory and its limitations. 4.2. Aromatic hydrocarbons and aromaticity, reasonance in benzene, delocalised cloud in benzene, aromaticity-Huckel's (4n+2) rule and its simple applications. 4.3. Electrophilic substitution reactions in aromatic compounds, general mechanism, nitration, halogenation, sulphonation, Friedel- Crafts acylation and alkylation, orientation and reactivity in monosubstituted benzene, nuclear and side chain halogenation. 4.4. Polynuclear aromatic hydrocarbons, naphthalene, anthracene, phenanthrene, fullerene and pyrene – structure, properties and uses.	K4	9
V	**The Liquid State and Liquid Crystals** 5. 1. Structure of liquids-vapour-pressure, Trouton's rule, surface tension, surface energy, effects of surface tension, viscosity, effect of temperature on viscosity (experimental determination of surface tension and viscosity not necessary), refractive index, specific refraction, molar refraction. Physical properties and chemical constitution - molar volume and chemical constitution - parachor and chemical constitution - viscosity and chemical constitution - molar refraction and chemical constitution. 5.2. Liquid crystals, the mesomorphic state, thermography, classification of thermotropic liquid crystals, smectic liquid crystals, nematic liquid crystals, cholesteric liquid crystals, application of liquid crystals – LCD, LED and OLED.	K2,K3	9
Course Outcome	**CO1**:Gain knowledge about the chemical bonding involved in molecule formation via ionic and covalent bonding	K1	
	CO2:Illustrate the structure and properties of hydrides and Carbides, and their technical applications	K2	
	CO3:Derive an easy and elegance way of mechanism of aliphatic,Aromatic,nucleophilic substitution and elimination reactions	K3	
	CO4:Able to identify the Cycloalkanes & Aromatic hydrocarbons.	K4	
	CO5:Comprehend the structure, types and properties of Liquid crystals	K5	
Learning Resources			
Text Books	1. R. D. Madan, Modern Inorganic Chemistry, 3rd edition, S. Chand & Co. Ltd., Reprint 2014. 2. P. L. Soni, Textbook of Inorganic Chemistry, 20th edition, Sultan Chand & Sons, 2000. 3. B. S. Bhal, and Arun Bhal, A Text book of Organic Chemistry, Sultan Chand and Sons, 1992		

Reference Books	1. J. D. Lee, Concise Inorganic Chemistry, Blackwell Science and Wiley-India, 5th edition, 2009 2. S. M. Mukerji, S. P. Singh, R. P. Kapoor and R. Dass, Organic Chemistry, New Age International Publishers, 2017 3. R.T. Morrison and R. N. Boyd, Organic Chemistry, 6th Edition Prentice- Hall, 2016.
Website Link	1.https://chem.libretexts.org/Bookshelves/Chemical_Bonding 2.https://chem.libretexts.org/Bookshelves/Liquid_Crystals 3.https://www.britannica.com/science/hydrocarbon

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHC02	GENERAL CHEMISTRY - II	DSC THEORY - II	II	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	M
CO2	S	S	M	M	M	S	S	M	M	M
CO3	S	M	M	M	M	S	M	M	M	M
CO4	M	S	S	M	M	M	S	S	M	M
CO5	S	M	M	M	L	S	M	M	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion, Self- Learning
Teaching and Learning Methods	Chalk and talk, Visualization,PPT
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Miss.S.ESWARI	Dr.P.SUMATHI	

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHS01	FOOD AND NUTRITION	SEC - I	II	2	2	0	0	2
Objective	To learn about the sources of Nutrients, guidelines of good health and BMI.Preservatives of food and adulterations in food industry,requirements and deficiency of vitamins and minerals.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Food Sources** Sources of foods, types, constituents of foods - carbohydrate, protein, fats, oils and their functions. Food colours, flavours and natural toxicants.	K1,K2	6
II	**Nutrition** Definition of nutrition, nutrients, functions. Nutritional status – Definition, signs of good and poor nutritional status. Malnutrition - Definition, forms, causes and remedy. Health –Definition, guidelines for good health, Balanced diet, Food pyramid. BMI (Body Mass Index), Obesity: causes complications, treatment and prevention.	K2,K3	6
III	**Food Poisoning, Adulteration and Food Preservation** Food poisoning - Sources, causes and remedy. Causes and remedies for acidity, gastritis, indigestion and constipation Food adulteration - Types of adulterants - intentional and incidental, Adulterants in different foods - Milk and milk products - vegetable oils and fats – spices – cereals - pulses, detection and prevention. Food spoilage, causes of food spoilage, types of Food spoilage Food preservation - preservation and processing by heating - sterilization, pasteurization. Food preservation by low temperature method, fermentation.	K2,K3	6
IV	**Vitamins and Minerals** Sources, requirement and deficiency diseases of fat soluble vitamins - A, D, E, and K, water soluble vitamins - B1, B2 and B6 Mineral elements in food - source, function, deficiency diseases and daily requirements of Na, K, Mg, Fe, S and P	K3	6

V	**Foods in relation to disease** Food borne illness, bacterial and viral food borne disorder, animal parasites, mycotoxins. Deficiency diseases - nutritional anaemia, PEM, IDD, VAD - chemical finding, prevention and treatment	K3,K4	6
Course Outcome	**CO1**: To impart knowledge in various aspects of Food through Theory	K1	
	CO2: Understanding the role of food and nutrients in health, concept of BMI and its causes	K2	
	CO3: To understand the importance of quality and safety of foods	K2	
	CO4: Understanding certain vitamins and minerals is essential for normal functioning of the body	K3	
	CO5:Describe the dangers of food borne illness and symptoms of nutritional deficiency diseases	K4	

Learning Resources

Text Books	1. Seema Yadav, Food Chemistry, Anmol Publishing (P) Ltd, 2002. 2. B. Sivasankar, Food Processing and Preservation, Prentice Hall of India Pvt. Ltd, New Delhi, 2002. 3. B. Sri Lakshmi, Food Science, New Age International Publisher 3rd Edition, 2005.
Reference Books	1. Car H. Synder, The Extraordinary Chemistry for ordinary thing, John Wiley & Sons Inc., NewYork, 1992.
Website Link	1.https://en.m.wikipedia.org/wiki/Food_preservation 2. https://nptel.ac.in/courses/126105013 3.https://www.youtube.com/watch?v=6fpOsbuE4v0

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHS01	FOOD AND NUTRITION	SEC - I	II	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	S
CO2	M	S	M	M	M	M	S	M	M	M
CO3	S	M	M	M	M	S	M	M	M	M
CO4	S	M	M	M	M	S	M	M	M	M
CO5	M	S	M	L	M	M	S	M	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion
Teaching and Learning Methods	Chalk and talk, Visualization,PPT
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Miss.S.ESWARI	Dr.P.SUMATHI	

Curriculum Development Cell MCAS Autonomous Rasipuram

B. Sc.,-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHP01	VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS	DSC PRACTICAL - I	II	3	0	0	3	3
Objective	To provide a practical knowledge and understand the methodology of acid-base, redox, precipitation,complexometric titrations and preparation of organic compounds							
S. No.	**List of Expriments / Programmes**						**Knowledge Levels**	**Sessions**
1	ESTIMATIONS. 1. Acidimetry - Alkalimetry: a) Estimation of sodium hydroxide - standard sodium carbonate b) Estimation of Oxalic acid - Standard Oxalic acid 2. Permanganometry a) Estimation of ferrous iron - Standard Oxalic acid 3. Dichrometry a) Estimation of ferrous iron using diphenylamine internal indicator Standard Ferrous sulphate 4. Iodometry and iodimetry a) Estimation of potassium dichromate Standard potassium dichromate 5. Complexometric Titrations a) Estimation of Zn and Mg using EDTA. b) Estimation of hardness of water							K1,K2,K3	30

2	ORGANIC PREPARATIONS 1. Preparations involving the following: a) Oxidation of benazldehyde. b) Hydrolysis of Methyl salicylate or ethyl benzoate. c) Nitration - p-nitroacetanilide and m-dinitrobenzene d) Bromination - p- bromoacetanilide and tribromophenol (Not for examination) e) Benzoylation -- -naphthylbenzoate	K3,K4	30
Course Outcome	**CO1:** Understand the concept of weighing any substance and prepare standard solutions	**K1**	
	CO2: Comprehend the principles of titrations and the working of indicators	**K2**	
	CO3: Estimate the amount of substance present in the given solution by calcuation	**K3**	
	CO4: Apply the reaction scheme to prepare simple organic compounds	**K4**	
	CO5: Understand and apply the technique of recrystallisation	**K5**	
Learning Resources			
Text Books	1. Basics Principles of Practical Chemistry, Kulanthaivelu A. R. Veeraswamy R. Venkateswaran, Sultan Chand & Sons, 2017 2. Practical Chemistry, Pandey D. N., Sultan Chand Publishers, 2018		
Reference Books	1. Vogel's Textbook of Practical Organic chemistry, Brian S. Furniss, Antony j. Hannaford, Peter W. G. Smith, 5th Edition, Bath press, Great Britan, 1989 2. Vogel's Textbook of Quantitative Chemical Analysis, G. H Jeffery, J. Bassett, J. Mendham, R C Denney 5th Edition, Bath press, Great Britan, 1989		
Website Link	1. https://www.youtube.com/watch?v=sFpFCPTDv2w 2. https://www.youtube.com/watch?v=oROSQnzSdZE 3. https://www.youtube.com/watch?v=jfzcBhr1zmE		

L- Lecture T-Tutorial P-Practical C-Credit

B. Sc.,-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2UCHP01	VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS	DSC PRACTICAL - I	II	3	0	0	3	3

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	M	M	S	M	M	M
CO2	M	S	S	M	M	M	S	S	M	M
CO3	M	S	S	M	M	M	S	S	M	M
CO4	M	S	S	M	M	M	S	S	M	M
CO5	M	S	S	M	M	M	S	S	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Preparation of solid and liquid standard solutions
Teaching and Learning Methods	Demostration of estimations and preparation
Assessment Methods	Class Practical, Model & Main Practical examinations

Designed By	Verified By	Approved By
Dr. N. NITHIYA	Dr. P. SUMATHI	A-h-5

N. Nithiya P. Sumathi

Curriculum Development Cell MCAS Autonomous Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCHC03	GENERAL CHEMISTRY - III	DSC THEORY - III	III	6	3	3	0	4
Objective	To understand the principles of Inorganic Qualitative Analysis,concept of Nuclear Chemistry, Reactivity of Carbonyl compounds and to know about thermodynamics and thermochemistry.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Inorganic Qualitative Analysis and Nuclear Chemistry** Principles of Qualitative analysis: Principles involved in Na2CO3 extract preparation - Common ion effect and its application - Solubility product principle & applications in qualitative analysis - complexation reactions in qualitative analysis - separation of cation into groups. Nuclear chemistry: Nuclear Stability n/p ratio - nuclear forces - Natural radioactivity - modes of decay - Geiger-Nuttal rule - Kinetics of radioactivity disintegration. Mass defect and binding energy - Artificial transmutation and artificial radioactivity Nuclear reactors – types - common features like fuels - moderators, coolant control materials.	K1,K3	15
II	**Halogens and chemistry of rare gases** Position of halogens in periodic table – Oxides and Oxy acids of halogens. Inter halogen compounds. Basic properties of halogens. Rare gases: Position of rare gases in the periodic table – General properties – compounds of Xenon oxides, halides and oxy - halides.	K2,K3	15
III	**Carbonyl Compounds** General methods of preparation of aldehydes and ketone - Addition reaction of carbonyl group - addition of HCN, NH2OH, NH2NH2, phenyl hydrazines, semicarbazide, and Grignard reagent. Mechanism of reduction of carbonyl group by NaBH4, LiAlH4, Wolf Kishner, Clemmenson and Meerwin - Ponndorf Verley (MPV) reduction. Carbonyl polarization - Reactivity of carbonyl group - Acidity of carbonyl group – Haloform reaction - Mechanism. Aldol condensation and Cannizaro reaction - mechanism.	K3,K4	15

IV	**Thermodynamics and Thermochemistry** Terminology of Thermodynamics - thermodynamic equilibrium - Work and heat – first law of thermodynamics - internal energy- Enthalpy of a system - Heat capacity of a system Expansion of an ideal gas - work done in reversible isothermal expansion - work done in reversible isothermal compression - work done in reversible adiabatic expansion - Joule - Thomson effect, Joule - Thomson coefficient - Inversion temperature - Zeroth Law of thermodynamics - Absolute temperature scale - Kirchoff's equation.	K1,K2	15
V	**Second Law of Thermodynamics - I** Limitations of the first Law - need for second law - Spontaneous process - cyclic process Carnot cycle – Efficiency - Carnot theorem - thermodynamic scale of temperature. Concept of entropy- Entropy - a state function - Entropy change in isothermal expansion of an ideal gas - Entropy change in reversible and irreversible processes - Clausius inequality - Entropy change accompanying change of phase - Entropy of mixture of ideal gases - entropy of mixing- physical significance of entropy.	K2,K3	15
Course Outcome	**CO1**: Remember the principles in Qualitative analysis and fundamentals of nuclear chemistry	K1	
	CO2: Understand the position of Halogen and Rare gases in periodic table and its properties	K2	
	CO3: Predict the products of the reactions of carbonyl compounds with Grignard reagents, hydride	K4	
	CO4: Identify the terminologies and laws of thermodynamics	K2	
	CO5: Understand the concepts of Second law of thermodynamics and its applications	K3	
Learning Resources			
Text Books	1. R. D. Madan, Modern Inorganic Chemistry,Third Edition, S. Chand and Co Ltd., Reprint 2014. 2. P. L. Soni, Textbook of Inorganic Chemistry, Twentyth Edition, Sultan Chand and sons, 2000		
Reference Books	1. K. F. Purcell and J. C. Kotz, Advanced Inorganic Chemistry, Saunders Golden Publishers 2. S. M. Mukherji, Organic Chemistry, Wiley Eastern New Age Publishers, 2017 3. Gurdeep Raj, Advanced Physical Chemistry, Fifth Edition Tata McGraw Hill 1992.		
Website Link	1.https://www.tutorialsduniya.com/notes/thermal-physics-notes/ 2.http://shiacollege.org/uploads/econtent/Aldehydes%20and%20Ketones.pdf 3.http://www.rbmcollege.ac.in/sites/default/files/files/reading%20material/inorganic-qualitative-analysis.pdf		

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCHC03	GENERAL CHEMISTRY - III	DSC THEORY - III	III	6	3	3	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	L	M	M	L	S	S	M	M	M
CO2	S	M	L	M	M	S	M	L	M	M
CO3	L	M	M	M	S	M	M	S	M	S
CO4	M	M	M	M	S	S	M	M	M	M
CO5	S	M	M	M	S	S	M	M	S	S
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

Tutorial Schedule	NIL
Teaching and Learning Methods	Chalk and talk, use of Working model, PPT
Assesment Methods	Class test, Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Mrs. R.JEGANMOHINI	Dr.P.SUMATHI	

MUTHAYAMMAL COLLEGE OF ARTS & SCIENCE
RASIPURAM 637 408 Tamil Nadu

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCHS02	POLYMER CHEMISTRY	SEC - II	III	2	2	0	0	2
Objective	To know about the basic concepts,structure, properties, preparation and processing of natural and synthetic polymers							

Unit	Course Content	Knowledge Levels	Sessions
I	**Basic concepts** Monomer, polymerization, degree of polymerization, repeat units. Classification of Polymers - addition and condensation polymers, natural and synthetic, based on structure, inorganic and organic, thermoplastic and thermosetting resin. General methods of preparation of polymers. Polymerization through functional groups, multiple bonds and ring opening and Coordination polymerization.	K1, K2	6
II	**Structure and properties** Structure of polymers - linear, branched and cross linked. Homo & hetero copolymers. Block copolymers & graft copolymers. Stereochemistry of polymers - Isotactic, Syndiotactic and Atactic. Properties of polymers: The crystalline melting point - The glassy state and glass transition temperature.	K1,K3	6
III	**Molecular weight determination and polymer processing** Molecular weight of polymers Number average molecular weight and weight average molecular weight. Determination of molecular weight by Viscosity and Osmometry methods. Polymer processing - calendaring, Die casting, blow moulding and Wet spinning.	K3,K4	6
IV	**Natural and synthetic polymer** Properties & uses of biopolymer. Preparation, properties and uses of Poly-olefins-polythene, PTFE, Freons, PVC, polypropylene and polystyrene. Natural and synthetic rubbers - Constitution of natural rubber. Butyl, Buna-N, Neoprene, Thiocol, Polyurethane and silicone rubbers.	K3,K4	6

V	**Plastics and Resins** Plastics and Resins - Thermoplastic and thermo setting resins - Constituents of plastic- fillers, dyes, pigments, plasticizers, Lubricants and catalysts - Uses of thermoplastic resins and thermo setting resins.	K5	6
Course Outcome	**CO1:** To recollect the polymerization reactions with respect to mechanisms and distinguishes these reactions.	K1	
	CO2: Identify the effect of variation in polymer structures on crystallinity and its properties.	K2	
	CO3: Concept of molecular weight and its determination and understand polymer processing	K3	
	CO4: Gain knowledge of preparation, properties and uses of polymers and understand various polymer manufacturing techniques.	K4	
	CO5: To select a thermosetting resin suitable to produce plastic product and to asses the constituents of plastics.	K5	
Learning Resources			
Text Books	1. V. R. Gowrikar, N. V. Viswanathan, Polymer Science- Wiley Eastern Limited, New Delhi, 1986. 2. M. G. Arora and M. Singh, Polymer Chemisry, Anmol Publications Pvt. Ltd., 2002 3. F. N. Billmeyer, Text Book of Polymer Science, Wiley-Interscience Publication, 3rd edition, 2007		
Reference Books	1. R. B. Seymour, Introduction to Polymer Chemistry, McGraw Hill, New York 1971. 2. S. S. Dara, Polymer Chemistry, S. Chand& Company Ltd, New Delhi, Third Edition, 1992. 3. P. J. Flory, Principles of Polymer Chemistry, Cornell University Press, New York, 1953.		
Website Link	1.https://youtu.be/a-tUQJl8f3o 2.https://youtu.be/H1Y1oxQ5eUA 3.https://youtu.be/t6Q6ybqlr1o		

L-Lecture T- Tutorial P- Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UCHS02	POLYMER CHEMISTRY	SEC - II	III	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	L	S	S	M	M	S	S
CO2	S	M	L	M	M	S	M	S	M	S
CO3	M	S	M	M	M	M	S	S	M	M
CO4	M	M	M	M	S	M	S	M	M	S
CO5	L	M	S	L	M	M	M	S	S	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion
Teaching and Learning Methods	Chalk and talk, Smart class,Field Visit
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Mrs.M.SARANYA	Dr.N.NITHIYA	

N. Nithiya

Curriculum Development Cell MCAS Autonomous Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHC04	GENERAL CHEMISTRY - IV	DSC THEORY - IV	IV	6	4	2	0	4
Objective	To understand the chemistry of Transition elements,principles of Gravimetric analysis,thermodynamics and concept of reaction mechanisms							

Unit	Course Content	Knowledge Levels	Sessions
I	**d-Block elements & Principles of Metallurgy** Transition elements - position in the periodic table - general characteristics - objectives study of the properties. Occurrence, extraction, properties and uses of Titanium, Zirconium, Molybdenum. Chemistry of Titanium dioxide, Titanium tetra chlorate, Vanadium pentoxide, Ammonium vanadate, Zirconium dioxide, Zirconium halide, Ammonium molybdate & Molybdenum blue. Principles of Metallurgy: Minerals, ores. Different metallurgical operations employed in Extracting metals from ores. Methods of concentration, Reduction of mineral to metal and Refining of metals.	K1,K2	15
II	**Gravimetric Analysis** Principle - Theories of precipitation - conditions of precipitation - co precipitation & post precipitation - Reduction of errors, precipitation from homogeneous solution - Washing & drying of precipitate. Choice of precipitant - Specific & Selective precipitants - Anthranilic acid, Cupferon, Dimethylglyoxime ethylene diamide, 8-hydroxy quinoline - use of masking agent. Crucible – Types, care & uses. Calculation in gravimetric analysis. Use of Gravimetric factor.	K3	15
III	**Carboxylic Acids** Unsaturated acids - preparation and properties of acrylic, crotonic, oleic and cinnamic acids. Hydroxy acids-classification preparation and reactions of glycolic acid, malic acid and citric acid–Action of heat on α, β and γ acids. Dicarboxylic acids - preparation and properties of oxalic, malonic, succinic, glutaric and Adipic acids. Mechanism of conversion of acids into acid derivatives - esterification including trans-esterification - Hydrolysis of esters.	K2	15
IV	**Reaction Mechanism** Reaction and Mechanism of Kolbe's reaction, Reimer - Tiemann reaction, Gattermann, Lederer Manasse and Houben Hoesch reactions. Reaction and Mechanism of Mannich, Stobbe, Darzen, Wittig and Reformatsky reactions	K1,K3	15

V	**Second law of thermodynamics – II** Work and free energy functions - Maxwell's relationships for reversible and irreversible process – Gibbs Helmholtz equation – Partial molar free energy - chemical potential - Gibb's-Duhem Equation. Clapeyron - Clausius equation - Applications of Clapeyron – Clausius equation. Third law of thermodynamics Nernst heat theorem - statement of III law Evaluation of absolute entropy from heat capacity measurements - Test for the validity of the law.	K1,K2	15
Course Outcome	**CO1**:Understand chemistry of Transition Elements extraction, properties, Uses and principles of metallurgy	K1,K2	
	CO2:Recognize the principles of volumetric and gravimetric analysis in analytical chemistry	K1	
	CO3:Learn about preparation, properties of Unsaturated acids, Dicarboxylic acids	K3	
	CO4: Formulate the mechanism of organic reactions and correlating Carbon – hetero multiple bond.	K3	
	CO5: State and explain the second and third laws of thermodynamics	K1	
Learning Resources			
Text Books	1. R. D. Madan, Modern Inorganic Chemistry,Third Edition, S. Chand & Co Ltd., Reprint 2014. 2. P. L. Soni, Textbook of Inorganic Chemistry, twentieth Edition, Sultan Chand and sons, 2000 3. B. S. Bhal, and Arun Bhal, A Text book of Organic Chemistry, Sultan Chand and Sons, 1992		
Reference Books	1. Cotton and Wilkinson, Advanced Inorganic Chemistry Willey Eastern Private Ltd, Wiley; Sixth Edition, 1999 2. I. L. Finar, Organic Chemistry, Vol – I, VLBS, Fifth Edition, 2001 3. K. F. Purcell and J. C. Kotz, Advanced Inorganic chemistry, Saunders Golden Publishers		
Website Link	1.https://www.vedantu.com/chemistry/processes-of-metallurgy 2.https://www.gla.ac.in/pdf/gravimetric-analysis-1.pdf 3.https://collegedunia.com/exams/named-reactions-in-organic-chemistry-chemistry-articleid-2537		

L- Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHC04	GENERAL CHEMISTRY - IV	DSC THEORY - IV	IV	6	5	1	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	M
CO2	M	S	M	M	M	M	S	M	M	M
CO3	S	S	M	M	M	S	M	M	M	M
CO4	S	M	M	M	S	S	M	M	M	S
CO5	S	L	S	M	M	S	M	M	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion,Discuss relevant examples.
Teaching and Learning Methods	Chalk and talk, use of Working model,PPT
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By		Approved By
Mrs. R.JEGANMOHINI	Dr.P.SUMATHI		

Curriculum Development Cell MCAS Autonomous Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHS03	CHEMPRENEUR	SEC - III	IV	2	2	0	0	2
Objective	To Know about the concept of Entrepreneur,Understand the constituent of detergents,soaps,shampoos and conditioners. Understand basics of Cosmetic products and the different types of food packaging							

Unit	Course Content	Knowledge Levels	Sessions
I	**Entrepreneur** Entrepreneur – characteristics, types and financial assistantship to entrepreneurs. Leading firms, brand names, choosing the right product. Packing regulations, Marketing, Licensing – drug license – legal aspects - GMP – ISO 9000/12000 – consumer education - Evaluation of the product – advertisements	K1,K3	6
II	**Detergents and Soaps** Anionic detergents: Manufacture of LAB (linear alkyl benzene), Sulphonation of LAB – preparation of acid slurry. Different ingredients in the formulation of detergent powders and soaps, Liquid detergents, Foam boosters, AOS (alpha olefin sulphonates) Cationic detergents: examples. Manufacture and applications - Non-ionic detergents: examples- Manufacture of ethylene oxide condensate - Mechanism of action of detergents - Comparison of soaps and detergents - Biodegradation – environmental effects. ISI specifications and limits. Medicated soaps. Herbal soaps - Mechanism of action of soap - Soft soaps - Shaving soaps and creams - ISI specifications - Testing procedures and limits.	K2,K3	6
III	**Shampoos** Manufacture of SLS and SLES - Ingredients. Functions - Different kinds of shampoos – anti-dandruff, anti-lice, herbal and baby shampoos - Hair dye - Manufacture of conditioners - Coco betaines or coco diethanolamides – ISI specifications - Testing procedures and limits.	K3	6
IV	**Skin care Products** Face and skin powders. Ingredients and functions - Different types - Snows and face creams - Chemical ingredients used – Antiperspirants - Sun screen preparations. UV absorbers - Skin bleaching agents – Depilatories - Turmeric and Neem preparations - Vitamin oil - Nail polishes - nail polish preparation, nail polish removers. Lipsticks, eyebrow pencils - Ingredients and functions – hazards - ISI specifications.	K4	6

V	**Food packing & food of the future** Edible packing for foods – protein based films – polysaccharide based films – Lipid based coatings – Incorporation of active substances into films. Super foods – berries, cacao, maca, bee products, spirulina, algae, marine phytoplankton, aloe vera, coconut and hemspeed.	K4	6
Course Outcome	**CO1**:Imparts essential knowledge of how to start one's own business	K1	
	CO2:Summarize the science of Detergents and soaps	K3	
	CO3:Learn to make shampoos by using safe ingredients that can result in healthy, strong, and shiny hair	K2	
	CO4: Understand the methodology involved in preparing skin care products	K2	
	CO5:Gain in-depth knowledge about food packaging and future of foods.	K3	

Learning Resources	
Text Books	1. Xvi Xiaozhou, Introduction to Entrepreneurship – Methodology and Practices, Springer Singapore, 1st edition, 2020. 2. EIRI Board, Hand book of synthetic Detergents with formulations, Engineers India Research Institute, 2009 3. Gaurav Kumar, Sharmajayaesh, Gadiya, Meenakshi Dhanawat., A text book of Cosmetic Formulations, pothi.com – e-book.
Reference Books	1. Robert Mellor, Gary Coulton Anne Chick and Antonia Bifulco, Enterpreneurship for everyone: A student textbook, Sage Publications, 2008. 2. Manzoor Bhat, Cosmetic Product formulation and Technical Details, A G Oils and Chemicals, 2014. 3. Gopala Rao M., Marshall Sittig. ,Outlines of Chemical Technology, East West press,1998.
Website Link	1.https://nptel.ac.in/courses/107101092 2.https://www.youtube.com/watch?v=_llTOT6pViA 3.https://www.youtube.com/watch?v=BS6SjL21nPg

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHS03	CHEMPRENEUR	SEC - III	IV	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO 4	PS O5
CO1	M	M	M	M	S	M	M	M	M	S
CO2	M	S	M	S	M	M	S	M	S	M
CO3	M	M	S	M	M	M	M	S	M	M
CO4	M	M	S	M	M	M	M	S	M	M
CO5	S	S	S	S	M	S	M	M	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion
Teaching and Learning Methods	Chalk and talk,Demonstrate Via practical,Lab visit
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Mrs. R.JEGANMOHINI	Dr.P.SUMATHI	

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHP02	INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS	DSC PRACTICAL - II	IV	3	0	0	3	3
Objective	To provide a practical knowledge on the methods involved in inorganic complex preparations & Semi microanalysis.							

Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	INORGANIC PREPARATIONS a) Ferrous ammonium sulphate b) Tetra ammine copper (II) sulphate c) Microcosmic salt d) Sodium cuprous thiosulphate	K2,K3	20
II	Inorganic qualitative analysis: Analysis of a mixture containing two cations and two anions of which one will be an interfering ion. Semi micro methods using the conventional scheme with hydrogen sulphide may be adopted. Anions to be studied: Carbonate, sulphate, chloride, nitrate, fluoride, borate, oxalate and phosphate Cations to be studied: lead, bismuth, copper, cadmium, iron, manganese, aluminium, cobalt, nickel, zinc, barium, strontium, calcium, magnesium and ammonium	K3,K4	40
Course Outcome	CO1:To obtain knowledge involved in the preparations of Ferrous & Copper complexes	K1	
	CO2:To get knowledge involved in the preparations of Sodium & double salts complexes	K2	
	CO3:To impart practical skills in identifying the give mixture Acid radicals & interfering acid radicals	K3	
	CO4:To Gain practical skills in identifying the give	K4	

	mixture basic radicals		
	CO5: Make the student to analyse and apply the skill to analyse the inorganic mixture	K5	
Learning Resources			
Text Books	1. Basics Principles of Practical Chemistry, Kulanthaivelu A. R. Veeraswamy R. Venkateswaran, Sultan Chand & Sons, 2017 2. Practical Chemistry for B. Sc., Chemistry, A. O. Thomas		
Reference Books	1. A Textbook of Qualitative Analysis including semi – micro methods, A. I. Vogel 2. Practical Chemistry for A,O.Thomas		
Website Link	1.https://www.youtube.com/watch?v=O9ba90MJws0 2.https://www.youtube.com/watch?v=oz1LN190SSU		

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHP02	INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS	DSC PRACTICAL - II	IV	3	0	0	3	3

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	M	S	M	S	M	M	S
CO2	S	S	S	M	S	M	S	S	M	S
CO3	M	M	S	L	M	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	M	M
CO5	M	S	S	S	M	S	S	M	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Group discussion
Teaching and Learning Methods	Demonstrate practical techniques, Practical
Assesment Methods	Class Practical, Observation, Record, Model & Semester Practical examinations

Designed By	Verified By	Approved By
Mrs.A.Dhivya	Dr.P.Sumathi	

Curriculum Development Cell MCAS Autonomous Rasipuram

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCHC05	INORGANIC CHEMISTRY-I	DSC THEORY-V	V	4	4	0	0	4
Objective	To know about the theories of Coordination compounds and reaction mechanism, f-block elements, basic concept of acid and base and non aqueous solvents.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Coordination Chemistry** **1.1** Definition of the terms-Classification of ligands- Nomenclature of mononuclear and polynuclear complexes-chelating ligands and chelates- Examples-chelate effect-explanation. **1.2** Werner's theory-conductivity and precipitation studies – Sidgwick's theory-Effective Atomic Number concept. **1.3** Isomerism in complexes-Structural Isomerismtypes. Stereoisomerism- Geometrical isomerism in 4 and 6 coordinated complexes. Optical isomerism in 4-and 6-coordinated complexes.	K1, K2	12
II	**Theories of Coordination Compounds** **2.1** Theories of bonding in complexes-Valence Bond Theory- Postulates – Hybridisation and geometries of complexes-Outer orbital and inner orbital octahedral complexes. Square planar and tetrahedral complexes-V.B. Theory and magnetic properties of complexes-limitations of V.B. Theory. **2.2** Crystal Field Theory (CFT)-postulates-d-orbital splitting in octahedral, tetrahedral and square planar complexes-strong and weak ligands-Spectrochemical series- High spin and low spin complexes-C.F. Theory and magnetic properties of complexes-Crystal Field Stabilisation Energy (CFSE) and its uses-Calculation of CFSE values of d_1 to d_{10} Octahedral and Tetrahedral complexes CFT and colour of complexes-limitations of CFT - comparison between VBT and CFT.	K3	12

III	**Reactions Mechanisms and Applications of Complexes** **3.1** Substitution reactions in square planar complexes-Trans Effect-Trans effect series-uses of Trans effect-Theories of Trans effect- polarisation theory and π- bonding theory. **3.2** Application of coordination compounds in Qualitative and Quantitative analysis-separation of Copper and Cadmium ions, Cobalt and Nickel ions- Identification of Cu, Fe, and Ni. **3.3** EDTA and its applications - estimation of metals, hardness of water and sequesterisation.	K3,K4	12
IV	**Chemistry of f-block elements** **4.1** Position in the Periodic Table-General characteristics of Lanthanides and Actinides Lanthanide contraction and its consequences. **4.2** Isolation of Lanthanides from Monazite including the Ion exchange resin method. **4.3** Actinides-occurrence and preparation. **4.4** Chemistry of Thorium and Uranium-Important compounds - preparation, properties and uses of Uranyl nitrate, Uranium hexafluoride, Thoriumdioxide.	K4	12
V	**Concepts of acids, bases and non aqueous solvents** **5.1** Acids and Bases: Arrhenius, Bronsted-Lowry, the Lewis concepts of acids and bases. Relative strength of acids and bases. **5.2** Hard and Soft Acids and Bases-classification of acids and bases as hard and soft– examples Pearson's HSAB concept, Applications of HSAB principle. **5.3** Non-aqueous solvents- physical properties of a solvent, types of solvents and their general characteristics. Reactions in non- aqueous solvents with reference to liquid NH_3 and liquid SO_2-Comparison.	K5	12

Course Outcome	**CO1:** To gain knowledge about concept of coordination compounds and its theory.	K1	
	CO2: Identify the variation of complex in hybridisation and geometries of complex.	K2	
	CO3: To analyze the mechanism of reactions coordination compounds and its applications.	K3	
	CO4: To compare and contrast the methods of preparation, properties and uses of lanthanide and actinides and understand various series of f block elements.	K4	
	CO5: To Criticize the basic concepts of acid and base and than non aqueous solvents.	K5	
Learning Resources			
Text Books	1. Satya Prakash, Tuli G. D., Basu S. K., Madan R. D. (2009), 24 Advanced Inorganic Chemistry, 18th Edition, S. Chand & Co., New Delhi 2. Lee J D, (1991), Concise Inorganic Chemistry, 4th Edition, ELBS William Heinemann, London. 3. W V Malik, G D Tuli, R D Madan, (2000), Selected Topics in Inorganic Chemistry, S. Chand and Company Ltd.		
Reference Books	1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nd Edition. S. Chand and Company, New Delhi. 2. Gopalan R, (2009) Inorganic Chemistry for Undergraduates, I st Edition, University Press (India) Private Limited, Hyderabad 3. Sivasankar B, (2013) Inorganic Chemistry. I st Edition, Pearson, Chennai 4. Alan G. Sharp (1992), Inorganic Chemistry, 3rd Edition, Addition Wesley, England		
Website Link	1.http://www.t.soka.ac.jp/chem/iwanami/inorg/INO_ch2.pdf 2.https://www.sas.upenn.edu/~mcnemar/apchem/nuclear.pdf 3. www.epgpathshala.nic.in 4. http:/swayam.gov.in		

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCHC05	INORGANIC CHEMISTRY-I	DSC THEORY-V	V	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	M	S	S	M	M	S	S
CO2	M	M	M	S	M	S	M	S	M	S
CO3	M	S	M	M	M	M	S	M	M	M
CO4	M	M	M	M	S	M	S	M	M	S
CO5	S	M	S	M	M	M	M	S	S	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Nil
Teaching and Learning Methods	Chalk and talk, Smart class, Field Visit
Assessment Methods	Class test, Assignment, Internal & Semester examinations

Designed By	Verified By	Approved By
Mr. V. SANTHOSHKUMAR	Dr. N. NITHIYA	

Curriculum Development Cell MCAS Autonomous Rasipuram

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCHC06	ORGANIC CHEMISTRY-I	DSC THEORY - VI	V	4	4	0	0	4
Objective	To learn about the fundamentals of Stereo isomerism and Structure, synthesis of Ureides, Nucleic acids, Alkaloids, Terpenoids and Molecular rearrangements.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Stereo isomerism** 1.1 Stereo isomerism: Definition - classification into optical and geometrical isomerism. Optical isomerism - optical activity - specific rotations - condition for optical activity of stereogenic centre - chirality. 1.2 Elements of symmetry - Enantiomers, Diastereomers and mesomers and their physical and chemical properties. Recemization - resolution - Asymmetric synthesis - Walden inversion. Projection formulae: Fisher and Sawhorse, erythro and thereo representations. Configuration - D, L and R, S notations for optical isomers with one and two asymmetric carbon. Optical activity of biphenyls, allenes and spiranes.	K1, K2	12
II	**Geometrical isomerism** 2.1 Geometrical isomerism - Alkenes - cis - trans and E-Z notations. Geometrical isomerism in maleic, fumaric acids and in unsymmetrical oximes - methods of distinguishing geometrical isomers (dipole moment, dehydration, cyclization and m.p). 2.2 Conformational analysis - Introduction of terms (conformation, conformer, configuration, dihedral angle, torsional strain, conformational analysis). Conformational analysis of ethane, n- butane and cyclohexane - axial, equatorial bonds and cis - trans - isomers in cyclohexane (chair form only) stability of cis and trans decalins - Elementary treatment.	K2,K3	12
III	**Ureides and nucleic acids** 3.1.Ureides - Definition, classification and structure - pyrimidines - thymine, uracil and cytosine - purines-adenine and guanine - (structural elucidation not necessary) 3.2. Nucleic acids-structures of ribose and 2-deoxyribose- DNA and RNA - their components -	K3,K4	12

	Biological functions of nucleic acids-Elementary ideas on replication and protein synthesis.		
IV	**Molecular rearrangements** 4.1 Mechanism of Pinacol - Pinacolone (migratory aptitude), Beckmann, Hoffmann, Curtius, Lossen, Schmidt, Benzilic acid, Benzidine, Claisen. Difference between inter and intramolecular nature.	K4,K5	12
V	**Chemistry of natural products** 5.1 Alkaloids-classification-isolation-general methods of determination of structure of alkaloids. Structural elucidation and synthesis (any one method) of the following alkaloids - nicotine, Piperine. 5.2 Terpenes-classification-isolation-isoprene rule-synthesis and structural elucidation of citral, Geraniol, alpha pinene.	K4,K5	12
Course Outcome	**CO1:** To remember the fundamentals of Stereochemistry.	K1	
	CO2: To understand the concept of conformational analysis and also the structure of Geometrical isomers using the concepts of organic chemistry.	K2	
	CO3: Analyze the structure and biological functions of Ureides and nucleic acids.	K3	
	CO4: Comprehend about the molecular rearrangements and its synthetic applications	K4	
	CO5: Apply the concepts of GOC for structural elucidation of alkaloids & terpenoids	K5	

Learning Resources

Text Books	1. M. K. Jain, S.C.Sharma, Modern Organic Chemistry, Vishal Publishing, fourth reprint, 2009. 2. S. M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan India Ltd., third edition, 2009. 3. Arun Bahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S. Chand & Company Pvt. Ltd., Multicolour edition, 2012. 4. P. L.Soni and H. M. Chawla, Text Book of Organic Chemistry, Sultan Chand & Sons, New Delhi, twenty ninth edition, 2007. 5. C. N. Pillai, Text Book of Organic Chemistry, Universities Press (India) Private Ltd., 2009.
Reference Books	1. R. T. Morrison and R. N. Boyd, Organic Chemistry, Pearson Education, Asia, sixth edition, 2012. 2. T.W.Graham Solomons, Organic Chemistry, John Wiley & Sons, eleventh edition, 2012. 3. A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, seventh edition, 2009. 4. I. L. Finar, Organic Chemistry, Vol. (1& 2), England, Wesley Longman Ltd, sixth edition, 2006.

	5. J. A. Joule, and G. F. Smith, Heterocyclic Chemistry, Wiley, Fifth Edition, 2010.
Website Link	1. https://nptel.ac.in/courses/104/105/104105104/ 2. https://nptel.ac.in/courses/104/101/104101005/ 3. https://nptel.ac.in/courses/104/103/104103071/

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCHC07	PHYSICAL CHEMISTRY - I	DSC' THEORY - VII	V	4	4	0	0	4
Objective	Students should learn about various concepts of physical chemistry, theories and activity of reaction rates on chemical kinetics and electrochemistry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Chemical Equilibrium and adsorption** **1.1** Thermodynamic derivation of equilibrium constants-Kp, and Kc - Relations between Kp, and Kc - Standard free energy change - Derivation of Van't Hoff reaction isotherm - DeDonder's treatment of chemical equilibria - concept of chemical affinity (no derivation) - Temperature dependence of equilibrium constant - Van't Hoff isochore - Pressure dependence of equilibrium constant. **1.2** Adsorption - Physical and chemical adsorption - Types of adsorption isotherms - Freundlich adsorption isotherm - Derivation of Langmuir adsorption isotherm - BET isotherm (postulates only) BET equation (statement), Gibbs adsorption isotherm (statement only).	K1	12
II	**Chemical Kinetics-I** **2.1** Definition of terms - Order, Molecularity, Rate of the reaction, Rate constant, comparison between order and molecularity, Half life period and Pseudo first order. Derivation of rate constant of a Zero, First and second order reaction - Derivation of half-life Period **2.2** Methods of determining the order of reaction-Experimental methods in the study of kinetics volumetry and colorimetry. **2.3** Effect of temperature on reaction rates -	K2, K3	12

	Derivation of Arrhenius equation - concept of activation energy determination of Arrhenius frequency factor and energy of activation.		
III	**Chemical Kinetics-II** **3.1** Collision theory (CT) of reaction rates - Derivation of rate constant of a bimolecular reaction from collision theory - Failures of collision theory. **3.2** Lindemann theory of Unimolecular reactions. **3.3** Theory of Absolute Reaction Rates (ARRT) - Thermodynamic derivation of rate constant for a bimolecular reaction based on ARRT- comparison between ARRT and CT. Significance of free energy of activation and entropy of activation.	K3, K4	12
IV	**Electrochemistry - I** **4.1** Metallic and electrolytic conductance - Definitions of specific, equivalent and molar conductance - Relations between them - measurement of conductance and cell constant. **4.2** Variation of conductance with dilution - Qualitative explanation - Strong and weak electrolytes Migrations of ions - transport number - determination by Hittorf and moving boundary methods - Kohlrausch's law - applications - calculation of equivalent conductance for weak electrolytes and determination of transport number. **4.3** Ionic mobilities and Ionic conductance. Diffusion and ionic mobility - molar ionic conductance and viscosity - Walden rule. **4.4** Applications of conductance measurements - Degree of dissociation of weak electrolytes - Determination of ionic product of water - Determination of solubility of sparingly soluble salts - conductometric titrations.	K4	12

V	**Electrochemistry - II** **5.1** Debye - Huckel - Onsager theory - verification of Onsager equation and Ostwald's dilution law. 5.2 Activity and activity co-efficients of strong electrolytes - ionic strength. Determination of dissociation constants - Ionic product of water - pH value. **5.3** Buffer solution and its types - Henderson equations - uses of Buffers including living systems - common ion effect - solubility product principle - relation to solubility - Applications in qualitative and quantitative analysis. **5.4** Hydrolysis of salts - expression for hydrolysis constant - Degree of hydrolysis and pH of salt solutions for different types of salts - Determination of Degree of hydrolysis - conductance and distribution methods.	K5	12
Course Outcome	**CO1:** Retrieving the concepts and terms involved in chemical equilibrium	K1	
	CO2: Compare the rate of reaction for various order of the reaction	K2	
	CO3: Charting the factors influencing the rate of the reaction	K3	
	CO4: Correlate types of conductance for weak and strong electrolytes	K4	
	CO5: Validate theories of strong electrolyte	K5	

Learning Resources

Text Books	1. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing, 2016 2. Samuel Glasstone, An Introduction to Electrochemistry, East-West Press (Pvt.) Ltd. 2006 3. M. S. Yadhav, Electrochemistry, Anmol Publications Pvt Ltd, 2002
Reference Books	1. Gurdeep Raj Advanced Physical Chemistry, Krishna prakashan Media P.Ltd.- 4th edition, 2016 2. J Rajaram and Kuriacose Kinetics and mechanisms of Chemical Transformation, Macmillan India Limited, 2011 3. Laidler K J, Chemical Kinetics, Pearson; 3rd edition,1997 4. Peter Atkins, Physical Chemistry, Oxford University Press; International Eleventh edition (1 July 2018)

Website Link	1. https://archive.nptel.ac.in/courses/104/101/104101128/ 2. https://nptel.ac.in/courses/103105127 3. http://www.rnlkwc.ac.in/pdf/study-material/chemistry/Peter_Atkins__Julio_de_Paula__Physical_Chemistry__1_.pdf

B. Sc.,Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCHC07	PHYSICAL CHEMISTRY - I	DSC THEORY - VII	V	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	S	M	M	M	L	S	M
CO2	M	M	M	M	M	S	M	M	S	M
CO3	M	L	M	M	M	M	M	S	S	S
CO4	S	M	M	M	M	S	M	S	M	S
CO5	S	M	L	M	S	S	S	M	S	S
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

Tutorial Schedule	Group discussions, Self - learning
Teaching and Learning Methods	Smart-Classroom, Google meet, Demo classes
Assessment Methods	Unit test, Internal examinations, end semester examinations

Designed By	Verified By	Approved By
Mrs. M. SARANYA	Dr. N. NITHIYA	

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCHE01	ANALYTICAL CHEMISTRY	DSE - I	V	4	4	0	0	4
Objective	To learn about the basic data analysis, Chromatographic techniques, thermoanalytical methods and Various spectroscopic methods.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Data analysis and Chromatography techniques** **1.1** Data analysis- Idea of significant figures- its importance- Accuracy- Methods of expressing accuracy- Error analysis- Types of Errors- Minimizing Errors, Precision-Methods of expressing precision- Mean, Median, Mean deviation, Standard deviation and Confidence limits **1.2** Column Chromatography- principle, types of adsorbents, preparation of the column, elution, recovery of substances and applications. **1.3** TLC- principle, choice of adsorbent and solvent, Rf-values, factors affecting the Rf-values- Significance of Rf-values. **1.4** Paper Chromatography- principle, solvents used development of chromatogram.	K1,K2	12
II	**Thermoanalytical method** **2.1** Principle - Thermogravimetric analysis and differential thermal analysis-discussion of various components with block diagram- TGA & DTA curves of $CuSO4.5H_2O$, MgC_2O_4. H_2O and $Ca(OOCCH_3)_2$ .H_2O-Simultaneous DTA-TGA curves of and $CaC_2O_4.H_2O$ in air and in CO_2- factors affecting TGA & DTA curves. **2.2** Thermometric titrations-principle- apparatus- applications.	K2,K3	12
III	UV - Visible and IR Spectroscopy **3.1** UV-Visible Spectroscopy-Types of Electronic transition- Beer-Lambert's law Instrumentation- Applications of UV. **3.2** IR Spectroscopy-Principles-modes of vibration of diatomic, triatomic - linear (CO_2) and nonlinear triatomic molecules (H_2O) - Stretching and bending vibrations-selection rules. Expression for vibrational frequency (derivation not needed)- Instrumentation-Applications.	K3	12
IV	**Photoelectron spectroscopy** UPES, XPES - Koopman theorem - Binding energy - Oxide characteristics peaks of Iron series elements - Instrumentation - Applications	K3,K4	12

V	**5.1** NMR Spectroscopy- principle of nuclear magnetic resonance, instrumentation-chemical shift- shielding and deshielding-spin-spin coupling and coupling constants- Interpretation of Anisole, Benzaldehyde, Ethyl acetate, Ethylamine and Ethyl Bromide. **5.2** Mass spectroscopy- Basic principles- instrumentation- molecular ion peak, base peak, metastable peak, isotopic peak-Interpretation of Anisole, Benzaldehyde, Ethyl acetate, Ethylamine and Ethyl Bromide.	K3,K4	12
Course Outcome	**CO1:** Recall the basics and applications of data analysis and Chromatographic techniques	K1	
	CO2: Explain the principle and applications of thermal analytical methods and thermometric titrations	K2	
	CO3: Demonstrate the use of UV and IR spectroscopy in characterizing a molecule	K3	
	CO4: Analyse the different oxides of iron using PES	K4	
	CO5: Intrepret the structure of simple organic compound using NMR spectroscopy and Mass spectrometry	K4	
Learning Resources			
Text Books	1. Gopalan R, Subramaniam P S, Rengarajan K, Elements of Analytical Chemistry, Sultan Chand and Sons, 2003. 2. Gurdeep R Chatwal, Instrumental methods of Chemical Analysis, Hph Publishers, 2011. 3. Sharma Y R, Elementary Organic Spectroscopy, S. Chand, 2010. 4. Sharma B K, AnalyticalChemistry		
Reference Books	1. Mendham J., Vogel's Quantitative Chemical Analysis, Pearson Education Publishers, 6th Edition, 2009. 2. Donald West, Douglas Skoog, F. Holler, Stanley Crouch, Fundamentals of Analytical Chemistry, Books/Cole Publisher, 9th Edition, 2013. 3.B.K.Sharma, Instrumental Methods of Chemical Analysis, Goel Publications, 15th Edition,1996.		
Website Link	1.https://nptel.ac.in/courses/104105084 2.https://nptel.ac.in/courses/104106121 3. https://kanalispolban.files.wordpress.com/2012/04/analytical_chemistry.pdf		

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCHE01	ANALYTICAL CHEMISTRY	DSE - I	V	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S	M	S	S	M	S
CO2	S	M	M	M	S	M	S	S	M	S
CO3	S	M	S	M	S	M	S	S	S	S
CO4	S	M	M	M	S	M	S	S	M	S
CO5	S	M	M	M	S	M	S	S	M	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Unit-I Chromatographic techniques -Demo class, group discussion, unit-III - UV-Visible and IR Spectroscopy-Lab visit
Teaching and Learning Methods	Chalk and talk, Smart class, Demo class, Online courses
Assessment Methods	Unit test, Internal test, Assignment, End semester examination

Designed By	Verified By	Approved By
Ms. S. ESWARI	Dr. N. NITHIYA	

S. Eswari N. Nithiya (Dr. S. Shanmuga)

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B.Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCHE02	INTRODUCTORY NANOSCIENCE	DSE - II	V	4	4	0	0	4
Objective	To impart knowledge on Origin and the concept of Nanoscience and Technology and types of nanomaterials and their applications. The role of surface and interface in Nanomaterials							

Unit	Course Content	Knowledge Levels	Sessions
I	**Background to Nanoscience:** Conceptual origins of bottom-up approach: role of Eric Drexler and Maxwell - experimental advances - unusual property change at the nanoscale: influence of size and shape - brief explanation on bottom-up approaches - Prefixing Nano to disciplines	K1	12
II	**Types of nanostructure and properties of nanomaterials:** One dimensional, Two dimensional and Three-dimensional nanostructured materials, Quantum Dots shell structures, metal oxides, semiconductors, composites, mechanical-physical-chemical properties.	K2, K3, K4	12
III	**Application of Nanomaterial:** Ferroelectric materials, coating, molecular electronics and nanoelectronics, biological and environmental, membrane-based application, polymer-based application	K3, K4	12
IV	**Surface Nanoscience:** Introduction to surface active agents. Theory and applications. Types of surfactants. Classification, synthesis of surfactant - Shape, size and structure of surfactants. Micelle, Emulsions, Microemulsions & Gels. Kraft temperature, surfactant geometry and packing.	K1, K3	12
V	**Colloids and Interfaces:** Introduction to colloidal material, surface properties, origin of colloidal particles, preparation & characterization of colloidal particles. Applications of super hydrophilic hydrophobic surfaces, self-cleaning surfaces. Surface viscosity. Intermolecular Forces, Van der Waals forces (Kessorn, Debye, and London Interactions). Contact angle. Brownian motion and Brownian Flocculation. Surface free energy.	K4, K5	12
Course Outcome	**CO1:** To learn the importance of the nanoscale	K1	
	CO2: Distinguish various types of nanomaterials	K2	

	CO3: Manipulate the application of Nanomaterials	K3	
	CO4: Focus the role of surface science in nanotechnology	K4	
	CO5: Interpret the role of colloids in nanomaterials science and the role of interfaces in nanomaterials	K5	

Learning Resources	
Text Books	1. G. Ozin, A. Arsenault, Nanochemistry: A Chemical Approach to Nanomaterials, Royal Society of Chemistry, Cambridge UK 2005.
Reference Books	1. G. Schmidt, Nanoparticles: From theory to applications, Wiley Weinheim 2004. 2. E L Principe, P Gnauck and P Hoffrogge, Microscopy and Microanalysis (2005), 11: 830-831, Cambridge University Press.
Website Link	1.https://nptel.ac.in/courses/104/105/104105087/ 2.https://nptel.ac.in/courses/104/103/104103022/

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCHE02	INTRODUCTORY NANOSCIENCE	DSE - II	V	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	L	M	S	M	M	M
CO2	S	M	M	S	M	S	M	M	S	M
CO3	M	M	M	S	S	S	M	M	S	S
CO4	M	M	M	S	S	M	M	M	S	S
CO5	M	M	M	S	S	M	M	M	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG							

Tutorial Schedule	NIL
Teaching and Learning Methods	Smart board classes, Google meet,Demo class, Online courses
Assessment Methods	Unit test, Internal test, Assignment, end semester examination

Designed By	Verified By	Approved By
Mrs. M. SATHYA	Dr. N. NITHIYA	Dr. S. SATHYA

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCHS04	AGRICULTURAL CHEMISTRY	SEC-IV	V	2	2	0	0	2
Objective	To learn and understand the composition and properties of fertilizer, manures, processing Fungicides and Herbicides							

Unit	Course Content	Knowledge Levels	Sessions
I	**Fertilizers** **1.1** Fertilizers - Primary, Secondary and micronutrients on plant growth and development. Commercial method of Nitrogenous fertilizers - preparation and uses of urea, ammonium nitrate and ammonium sulphate. **1.2** Phosphate Fertilizers- Preparation and uses of mono and diammonium phosphate, super phosphate and triple superphosphate. **1.3** Potassium Fertilizers - Preparation and uses of potassium nitrate, potassium chloride and potassium sulphate. Complex fertilizers and mixed fertilizers - their manufacture and composition.	K1	6
II	**Cropping and farming systems** Manures and fertilizers (organic, in-organic, green manure) - time and method of application - Irrigation - Principles and concepts - Cropping patterns and cropping systems - Sustainable agriculture - integrated farming systems - Organic agriculture - Principles and concepts - Dry farming - Principles and concepts.	K2,K3,K4	6
III	**Pesticides And Insectides** 3.1 Pesticides: Classification of Insecticides, fungicides, herbicides as organic and inorganic -general methods of application and toxicity. Safety measures when using pesticides. 3.2 Insecticides: Plant products - Nicotine, pyrethrin - Inorganic pesticides - borates. Organic pesticides - D.D.T. and BHC.	K3,K4	6
IV	**Fungicides And Herbicides** 4.1 Fungicide: Sulphur compounds, Copper compounds, Bordeaux mixture. 4.2 Herbicides: Acaricides - Rodenticides. Attractants - Repellants. Preservation of seeds.	K1,K3	6

V	**Soils** **5.1** Soils-Composition of soil- organic and inorganic constituents-Classification- Properties of soils- physical and chemical-Important functions of water in plant growth-Biological system of the soil- Role of soil organisms. **5.2** Soil analysis - pH, Electrical conductivity, Estimation of macronutrients and micronutrients	K4	6
Course Outcome	CO1: Learn about different types of Fertilizers	K1	
	CO2:Understand the various sources of Cropping and farming systems	K2	
	CO3:Apply the use of chemistry in Pesticides and Insectides	K3	
	CO4: Analyze the relationship between Fungicides And Herbicides	K3	
	CO5: Illustrate the effects of Soils	K4	
Learning Resources			
Text Books	1. Principles of Agronomy, Yellamananda Reddy, T. and G.H. Sankara Reddi, Kalyani Publishers, New Delhi, 1995 2. Principles of Agronomy, Sankaran, S. and V.T. Subbiah Mudaliar, The Bangalore Printing and Publishing Co. Ltd., Bangalore, 1997		
Reference Books	1. A Textbook of Plant Ecology: Ethnobotany and Soil Science, R.S. Shukla and P.S.Chandel, 10th Edition, S Chand Publisher, 2005 2. Shreve's Chemical Process Industries, G.T. Austin, 5th Edition, McGraw Hill Education, 2017 3. Agricultural Chemistry, B.A.Yagodin, Imported Pubn., 1984		
Website Link	1. https://en.wikipedia.org/wiki/Fertilizer 2. https://en.wikipedia.org/wiki/Cropping_system 3. https://en.wikipedia.org/wiki/Pesticide 4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6903747/ 5. https://en.wikipedia.org/wiki/Soil		

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M5UCHS04	AGRICULTURAL CHEMISTRY	SEC-IV	V	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	L	M	S	M	M	M
CO2	S	M	M	S	M	S	M	M	S	M
CO3	M	M	M	S	S	S	M	M	S	S
CO4	M	M	M	S	S	M	M	M	S	S
CO5	M	M	M	S	S	M	M	M	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	NIL
Teaching and Learning Methods	Smart board classes, Google meet, Demo class, Online courses
Assessment Methods	Unit test, Internal test, Assignment, university examination

Designed By	Verified By	Approved By
Mrs. T. VADIVU	Dr. N. NITHIYA	

T. Vadivu

N. Nithiya

Curriculum Development Cell MCAS Autonomous Rasipuram

B. Sc., Chemistry LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCHIS1	INTERNSHIP	INTERNSHIP	V	-	-	-	-	-
Objective	To Learn academic credit and develop new skills, work habits and attitudes necessary for job success. Internship must take place outside college viz., Research Institute, Chemical industries.							

Guidelines for internship training programme		**Knowledge Levels**	**Sessions**
I.	The students are expected to have a practical training in any industry or Research institute to enable them to acquaint him / her with the procedure, practice and working of companies.	**K3-K5**	
II.	Each student should undergo industrial training for a minimum period of two weeks at the end of the Second semester vacation.		
III.	He / She shall undergo the above training in the institutions like other Institutes, R&D Lab, private limited and public limited companies, Milk, Water & soil testing labs, Microlabs, Biocon, Biosis, Global calcium & Sanmar.		
IV.	Students may make their own arrangements in fixing the companies for candidates should submit a report in not less than 25 type written pages.		
V.	Candidates should submit the attendance certificate from the institution for having attended the training for two weeks.		
VI.	Industrial training reports shall be prepared by the students under the supervision of the faculty of the department.		
VII.	Industrial training report must contain the following: Cover page Copy of training certificate Profile of the industry, Objectives, work diary, Acknowledgement, content, Aim & scope, Report about the work undertaken by them during the tenure of training Observation and conclusion about the concern Findings		
VIII.	Internship viva – voce examination will be conducted with internal & external examiners at the end of the third semester and the credits will be awarded		

Course Outcome	**CO1:** Upgrade the learning in a professional environment	**K3**	
	CO2: Gaining experience with current science & technology	**K4**	
	CO3: Contributing to significant projects	**K4**	
	CO4: Building personal skills, Developing a resume that highlights desirable skills	**K4**	
	CO5: Networking with people working in the science community	**K5**	

Learning Resources : Hands on training

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc., Chemistry LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M5UCHIS1	INTERNSHIP	INTERNSHIP	V	-	-	-	-	-

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	M	S	M	S	S	S
CO2	M	S	M	S	M	S	S	M	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	M	S	S	S	S	S	S	M	M
CO5	S	S	S	S	S	S	S	S	S	S
Level of Correlation between CO and PO	L-LOW			M-MEDIUM		S-STRONG				

Tutorial Schedule	Preparation of Work diary & Internship report preparation
Teaching and Learning Methods	Training in industries, PT Classes, Smart classroom
Assessment Methods	Attendance, Internal & external viva-voce exams

Designed By	Verified By	Approved By
Mrs. M. Saranya	Dr. N. Nithiya	

N. Nithiya

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHC08	INORGANIC CHEMISTRY-II	DSC THEORY-VIII	VI	4	4	0	0	4
Objective	To know about the basic concepts organometallic compounds,structure, properties, preparation and uses of some special compounds and Magnetic properties of molecules.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Organometallic compounds - I** **1.1** Nomenclature of organometallic compounds - classification - ionic, σ - bonded and Π - bonded Organometallic compounds - examples - nature of carbon - metal bond. **1.2** General methods of preparation and properties of organometallic compounds **1 .3** Organometallic compounds of Lithium & Boron- preparation, properties, structure and uses. **1.4** Olefin complexes -Zeise's salt - synthesis and structure.	K1, K2	12
II	**Organometallic compounds - II** **2.1** Metal carbonyls - Bonding in carbonyl - mono carbonyls and binuclear carbonyls of Ni, Fe, Cr, Co and Mn- Hybridisation and structure, preparation, properties and uses. **2.2** Cyclopentadienyl complexes -Ferrocene- preparation, properties, structure and uses. **2.**3 Uses of organometallic compounds.	K3	12
III	**Bioinorganic Chemistry** **3.**1 Essential and trace elements in Biological processes - Role of Na, K, Mg & Ca ions in biological process-Sodium and Potassium pump. **3.**2 Structure and Biological functions of Haemoglobin, Myoglobin and Chlorophyll. **3.3** Silicates - classification and structure - examples. Composition, properties and uses of asbestos and zeolite.	K3,K4	12

IV	**Some Special compounds** **4.1** Classification and structure of carboranes. **4.2** Pseudo halogen - cyanogen, thiocyanogen -preparation, properties and uses **4.3** Boron nitrides - Borazole - metal borides(elementary idea) **4.4** Interhalogen compound Types, preparation, properties, structure and uses of ICl, BrF_3,IF_7,IF_5	K4	12
V	**Magnetic properties of molecules:** **5.1** Symmetry elements - line, plane and point - point groups of simple molecules like H_2, HCl, CO_2, H_2O and NH_3. **5.2** Origin - Magnetic susceptibility. Types of magnetic behaviour- diamagnetism and paramagnetism, Temperature and magnetic behaviour, Ferromagnetism and antiferromagnetism- Temperature independent paramagnetism-determination of magnetic moment using VSM and SCID - Applications of magnetic measurements.	K5	12
Course Outcome	**CO1:** To gain knowledge about basic concept of organometallic compounds	K1	
	CO2: Understand the structure, properties and uses of organometallic compounds.	K2	
	CO3: Illustrate the biological applications of inorganic elements.	K3	
	CO4: Analyse the structure, properties and uses of some special compounds.	K4	
	CO5: To evaluate the point group simple molecules and knowledge about magnetic properties.	K5	

Learning Resources	
Text Books	1. Lee J D, (1991), Concise Inorganic Chemistry, 4th Edition., ELBS William Heinemann, London. 2. W. V Malik, G D Tuli, R D Madan, (2000), Selected Topics in Inorganic Chemistry, Schand and Company Ltd. 3. A. K. De, Text book of Inorganic Chemistry, Wiley East Ltd, seventh Edition, 1992
Reference Books	1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nd edition. S. Chand and Company, New Delhi. 2. Gopalan R, (2009) Inorganic Chemistry for Undergraduates, I st Edition, University Press (India) Private Limited, Hyderabad 3. R. W. Hay, Bio Inorganic Chemistry, Ellis Horwood, 1987.
Website Link	1. http://nptel.ac.in/courses/104108062 2. http://nptel.ac.in/courses/104105085 3. https://onlinecourses.nptel.ac.in/noc23_cy27/preview

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc.,Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHC08	INORGANIC CHEMISTRY-II	DSC THEORY-VIII	VI	4	4	0	0	4

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	M	S	S	M	M	S	S
CO2	S	M	M	M	M	S	M	S	M	S
CO3	M	S	M	M	M	M	M	S	M	M
CO4	S	M	S	M	S	M	S	M	M	S
CO5	M	M	S	M	M	M	M	S	S	M

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG

Tutorial Schedule	Nil
Teaching and Learning Methods	Chalk and talk, Smart class, Field Visit
Assessment Methods	Class test, Assignment, Internal and End Semester examinations

Designed By	Verified By	Approved By
Mr. V. SANTHOSHKUMAR	Dr. N. NITHIYA	

N. Nithiya

Curriculum Development Cell MCAS Autonomous Rasipuram

B.Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHC09	ORGANIC CHEMISTRY-II	DSC THEORY - IX	VI	4	4	0	0	4
Objective	To learn about the structure and acquire knowledge on reactions of carbohydrate, heterocyclic compounds, amino acids and proteins, vitamins, steroids & harmones.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Carbohydrates** **1.1** Classification, constitution of glucose and fructose. Reactions of glucose and fructose, Osazone formation, mutarotation and its mechanism. Cyclic structure - Pyranose and furanose forms. Determination of ring size - Haworth projection formula. Configuration of monosaccharides - Epimerisation. **1.2** Disaccharides - Chemistry and structure of Sucrose, Maltose and lactose (Structure only) **1.3** Polysaccharides - structure of starch and its properties, Structure of cellulose	K1, K2	12
II	**Amino acids and proteins** **2.1** Amino acids-classification-essential and non essential amino acids-structure of alpha amino acids - glycine, alanine, phenyl alanine, tryosine and tryptophan-General properties of amino acids-Zwitter ions, isoelectric point. **2.2** Peptides and proteins-synthesis of peptide-Bergman method. Proteins-classification based on physical and chemical properties and on physiological functions-primary and secondary structure of proteins-helical and sheet structures (elementary treatment only) - Denaturation of proteins.	K2,K3	12
III	**Important reagents and their applications in organic chemistry** $AlCl_3$, BF_3, $LiAlH_4$, $NaBH_4$, PCl_5 ,P_2O_5, Na/ethanol, alcoholic KOH, H_2/Ni, H_2/Pd-BaS04, Zn/Hg-HCl, H_2N-NH_2/C_2H_5ONa, Ag_2O, HIO_4 and Osmium tetroxide.	K3,K4	12
IV	**Steroids, Hormones and Vitamins** **4.1** Steroids- structure and biological applications of cholesterol and Ergosterol. Steroidal Harmones - Testrosterone, Progesterone and Oestrone. **4.2** Vitamin-Classification- deficiency of vitamins-Synthesis of Retinol and Ascorbic acid.	K4,K5	12
V	**Heterocyclic compounds** **5.1** Aromaticity - preparation, properties and uses of furan, Pyrrole, thiophene and pyridine.	K4,K5	

	Comparative study of basicity of pyrrole and pyridine with amines. **5.2** Synthesis and reactions of quinoline, isoquinoline and indole with special reference to Fischer Indole synthesis.		12
Course Outcome	CO1: To remember the fundamentals of carbohydrates.	K1	
	CO2: Understand the structure and synthesis of Amino acids & Proteins.	K2	
	CO3: Relate the reagents and their synthetic applications in organic chemistry.	K3	
	CO4: Categorize the structure and biological functions of Steroids, Hormones and Vitamins.	K4	
	CO5: Evaluate the concepts of GOC for synthesis of heterocyclic compounds.	K5	
Learning Resources			
Text Books	1. R. K. Bansal, Heterocyclic Chemistry; 3rd Ed., Wiley Eastern Ltd, New Delhi, 1999. 2. Jerry March Advanced Organic Chemistry - Reactions, Mechanism and Structure, Wiley-Interscience, 1992. 3. I.L.Finar, Organic Chemistry, Volume I, The fundamental principles, Sixth edition, Pearson education Ltd., 2014.		
Reference Books	1. Koji Nakanishi, Toshio Goto and Sho Ito, Natural product chemistry, vol. I, Academiespress,1974. 2. A.A.Newman, Chemistry of Terpenes and Terpenoids. Ed. Academic Press, New York,1972. 3. E. L. Eliel, Stereochemistry of carbon compounds, Mc Graw Hill, 1962. 4. P.Ramesh, Basic principles of Organic Stereochemistry, Meenu publication,2005. 5. J. A. Joule, K. Mills and G. F. Smith, Heterocyclic Chemistry,3rd Edition, Chapman & Hall, London, 1995. 6. Thomas L. Gilchrist, Heterocyclic Chemistry. Third Edition, Addison Wesley Longman: Essex. 1997.		
Website Link	1.https://nptel.ac.in/courses/104/105/104105104/ 2. https://nptel.ac.in/courses/104/101/104101005/ 3. https://nptel.ac.in/courses/104/103/104103071/ 4. https://nptel.ac.in/courses/104/105/104105034/		

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHC09	ORGANIC CHEMISTRY-II	DSC THEORY - IX	V	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	M	S	S	M	S	S
CO2	S	M	S	S	M	S	M	S	S	M
CO3	M	M	S	S	M	M	S	S	S	S
CO4	S	M	M	S	M	S	S	M	S	M
CO5	M	S	S	L	M	S	S	S	S	M
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

Tutorial Schedule	Nil
Teaching and Learning Methods	Chalk and talk, Smart class, Demo class
Assessment Methods	Unit test, Internal test, Assignments, Seminar & End semester examination

Designed By	Verified By	Approved By
Mr. S. RAMKUMAR	Dr. N. NITHIYA	

Curriculum Development Cell MCAS Autonomous Pasipuram

B. Sc.,- Chemistry Syllabus LOCF -CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHC10	PHYSICAL CHEMISTRY -II	DSC THEORY - X	VI	5	5	0	0	4
Objective	Students should learn about laws in solution, Phase diagram for one and two component system, properties of cells and batteries and mechanism of Photo chemistry							

Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**Solutions** **1.1** Solutions of gases in liquids - Henry's law- solutions of liquids in liquids - Raoult's law Binary liquid mixture- ideal solution - deviation from ideal behaviour - Thermodynamics of ideal solutions - Vapour - Pressure - temperature curves, Azeotropic distillation. **1.2** Nernst Distribution law - Thermodynamic derivations - applications, Solvent extraction. **1.3** Thermodynamic derivation of elevation of boiling point and depression of freezing point Vant Hoff factor Abnormal molecular mass-Degree of dissociation and association.	K1,K2	15
II	**Phase Rule** **2.1** Definition of terms - Derivation of phase rule - one component systems - H_2O system, Sulphur system - explanation using Clausius - Clapeyron equation - super-cooling and sublimation. **2.2** Two component systems-solid liquid equilibria-reduced phase rule - simple eutectic systems - Ag-Pb only Compound formation with congruent melting point - Mg-Zn system only. KI-H_2O system efflorescence deliquescence. **2.3** CST-phenol water system only. Effect of impurities on CST.	K2,K3	15

III	**Electro chemistry - III** **3.1** Galvanic cells - Reversible and Irreversible cells - EMF and its measurement - Weston Standard cell - types of reversible single electrodes - standard Hydrogen electrode - Calomel electrode **3.2** Derivation of Nernst equation both for emf of cells and single electrode potentials - Nernst theory for single electrode potential - standard reduction potentials - electro chemical series - significance. **3.3** Application of emf measurements - Application of Gibbs - Helmholtz equation to galvanic cells - calculation of thermodynamic quantities - pH using hydrogen, Quinhydrone and glass electrodes - Potentiometric titrations.	K3	15
IV	**Electrochemical Cells and Batteries** **4.1** Concentration cells with and without transference - LJP expression - applications of concentrations cells- valency of ions - transport number - solubility product - activity coefficient. **4.2** Storage cells - Lead storage battery - mechanism of charging and discharging fuel cells - hydrogen - oxygen cell - polarization - over voltage- decomposition voltage.	K4	15
V	**Photophysical and Photochemical process** **5.1** Photothermal and Photochemical Reactions - Photochemical Laws: Grotthus - Draper law - The Stark Einstein law of photochemical equivalence - Consequences of light absorption- Photophysical process - The Jablonski diagram - non radiative transitions- radiative transitions, fluorescence and phosphorescence - Chemiluminescence - Photosensitization - Photosynthesis in plants - lasers - uses of lasers. **5.2** Photochemical reactions - Kinetics of hydrogen-bromine reaction - decomposition of HI	K5	15
Course Outcome	**CO1:** Recall the various laws in solutions	K1	
	CO2: Compare phase diagram for one and two component systems	K2	

	CO3: Point out measurement of emf and its applications	K3	
	CO4: Summarize the properties of cells and batteries	K5	
	CO5: Design various mechanism involved in photochemical reactions	K6	
Learning Resources			
Text Books	1. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing, 2016 2. Samuel Glasstone, An Introduction to Electrochemistry, East-West Press (Pvt) Ltd. 2006) 3. Gurdeep Raj, Photochemistry, Krishna Prakashan Media (P) Ltd. 2015		
Reference Books	1. Gurdeep Raj Advanced Physical Chemistry, Krishna prakashan Media P.Ltd.- 4th edition, 2016 2. J Rajaram and Kuriacose Kinetics and mechanisms of Chemical Transformation, Macmillan India Limited, 2011 3. Laidler K J, Chemical Kinetics, Pearson; 3rd edition,1997 4. K. K. Rohatgi-Mukherjee Fundamentals of Photochemistry, John Wiley & Sons (Asia) Pte Ltd (30 August 2021)		
Website Link	1. https://nptel.ac.in/courses/104106077 2. https://nptel.ac.in/courses/103105127 3. https://archive.nptel.ac.in/courses/113/104/113104068/		

B. Sc.,-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHC10	PHYSICAL CHEMISTRY -II	DSC THEORY - X	VI	5	5	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	L	S	M	L	S	M
CO2	M	M	L	M	M	L	M	M	S	M
CO3	M	S	M	M	M	M	M	S	S	S
CO4	S	M	M	M	M	S	M	S	M	S
CO5	S	M	S	M	S	S	S	M	S	S
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

Tutorial Schedule	Group discussions, Self - Learning
Teaching and Learning Methods	Smart-Classroom, Google meet, Demo classes
Assessment Methods	Unit test, Internal examinations, end Semester examinations

Designed By	Verified By	Approved By
Mrs. M. SARANYA	Dr. N. NITHIYA	(Dr. S. SHANTHI)

Curriculum Development Cell MCAS Autonomous Rasipuram

B.Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHE04	INDUSTRIAL CHEMISTRY	DSE-III	VI	4	4	0	0	4
Objective	To acquire knowledge about the chemicals used in Industries.							

Unit	Course Content	Knowledge Levels	Session
I	**Classification of Fuels:** Definition, calorific value, requirement of a good fuel, coal gas, producer gas, water gas - composition, preparation, uses; LPG, Gobar gas - production, composition	K1	12
II	**Chemistry of sugar and fermentation:** Manufacture of sucrose from cane sugar-extraction of juice, purification, concentration, crystallization, separation and refining of crystals, recovery of sucrose from molasses, inversion sugar by polarimetry. Manufacture of alcohol from molasses and starch by fermentation process.	K1,K2	12
III	**Glass & Cement Industry:** Glass- Types of glass, composition, manufacture and uses. Cement- Manufacture wet and dry processes, analysis of major constituents, setting of cement, Concrete and RCC.	K3	12
IV	**Leather & Paper Industry:** Leather industry - Curing, preservation and tanning of hides and skins, process of dehairing and dyeing. Treatment of tannery effluents. Paper industry - Manufacture of paper production of sulphite pulp and conversion to paper (bleaching, filling, sizing and calendaring).	K4	12
V	Dairy and Sago Industry Definition and Composition of milk- Constituent of Milk- Factors affecting quality and quantity of milk - Nutritive value of milk - Physico - Chemical properties of milk. Common micro-organism found in milk. Spoilage of milk Dairy Development in India. NDDB, NDRI, Military dairy farm Sago - Sources, Types of value added products from sago and Effluent Treatment of Sago Waste Water.	K5	12

Course Outcome	CO1:Understand the various types of fuels and its uses	**K1**
	CO2: Impart the characteristics of sugar and its fermentation.	**K2**
	CO3: Relate the properties of glass and cement	**K3**
	CO4: Comprehend the process of Leather and Paper Industry	**K4**

	CO5: Formulate the various compositions of Milk and sago.	K5	
Learning Resources			
Text Books	1. K. S. Yawalkar, J. P.. Agarwal and S. Bokde, Manures and Fertilizes, Nagpur Agri-Horticulture Publishing House, 12th Edition, 1996. 2. Charles Albert Browne, A Handbook of sugar analysis - A practical and descriptive treatise for use in Research, Technical and Control Laboratories, Forgotten Book ,Publishers, 2018. 3. Jacqueline Akhavan , The Chemistry of Explosives, The Royal Society of Chemistry, 4th Edition, 2022.		
Reference Books	1. B. K. Sharma, Industrial Chemistry Including Chemical Engineering, Goel Publishing House, 2000 2. B. K. Sharma, Industrial Chemistry, 1st Edition, Goel Publication, 1983. 3. B. N. Charabarthy, Industrial Chemistry, 1st Edition, Oxford and IBh Publishing, 1981.		
Website Link	1. https://nptel.ac.in/courses/105107207 2. https://www.embibe.com/exams/fuel/		

L-Lecture T-Tutorial P-Practic C-Credit

B.Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHE04	INDUSTRIAL CHEMISTRY	DSE-III	VI	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	M	S	M	S
CO3	M	S	S	M	S	S	S	S	S	M
CO4	S	S	M	M	S	M	S	M	M	S
CO5	M	M	S	M	M	M	M	S	S	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Nil
Teaching and Learning Methods .	Chalk and talk, Smart class, Field Visit
Assessment Methods	Class test, Assignment, Internal & End Semester examinations

Designed By	Verified By	Approved By
Mrs. R.JEGANMOHINI	Dr. N. NITHYA	

N. Nithya

Curriculum Development Cell MCAS Autonomous Rasipuram

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHE05	PHARMACEUTICAL CHEMISTRY	DSE THEORY - IV	VI	4	4	0	0	4
Objective	To learn about the basics of drugs and types of antibiotics, anticancer drugs, Cardiovascular drugs and statins and blood groups.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction of Drugs** Definition of the terms-drug, pharmacophore, pharmacodynamics, pharmacopoea, pharmacology, pharmacokinetics, metabolites, antimetabolites, IC50, LD50, ED50, Therapeutic index and its significance. Nomenclature of drugs: Chemical name, Generic name and trade names with examples. Classification: Classification based on structures and therapeutic activity with one example each, Administration of drugs	K1	12
II	Antibiotics Definition, classification - broad and narrow spectrum, Antibiotics - penicillin, ampicillin - structure, mode of action only (no structural elucidation) and uses.	K2,K3	12
III	**Anti cancer and Anti Diabetics** Causes of cancer, classification,Precautions, structure and mode of action of Melphalan. Causes of diabetes, classification, Structure and mode of action of Insulin, Tolbutamide. Thyroid drugs- Mode of action of thyroid hormones.	K1,K2,	12
IV	Cardiovascular drugs and statins Cardiac glycosides- Antiarrhythmic Drugs-preparation, dosage and therapeutic uses. Statins definition, low-density lipoprotein (LDL) Mode of action.	K2,K3	12
V	**Blood** - blood grouping- Rh factor- buffers in blood, maintenance of pH of blood- composition of blood- clotting mechanism- blood pressure (normal, high and low and Control of B.P.)	K3,K4	12
Course Outcome	**CO1:** Learn about the basics of drug terms and significance.	K1	
	CO2: Understand the types and mechanism of sulpha drugs and antibiotics.	K2	
	CO3: Gain knowledge about Anti cancer, Hypoglycemic agents.	K3	
	CO4: Acquire brief knowledge about Cardiovascular drugs and statins	K3	

	CO5: To brief knowledge about blood group.	K4
Learning Resources		
Text Books	1. Dr. S. Lakshmi, Pharmaceutical Chemistry, Sultan Chand & Sons, 3rd edition, 2004 2. Delgado and Remers, Wilson and Gisvold, Textbook of Organic Medicinal and Pharmaceutical Chemistry, Eleventh Edition; Lippincott Williams and Wilkins: Philadelphia, 2004	
Reference Books	1. D. J. Abraham, Ed., Burger Medicinal Chemistry, Sixth Edition, Vol 1-6. 2. Daniel Lednicer and Lester A. Mitscher Organic Chemistry of Drug Synthesis, Vol.1-6. 3. Joel G. Hardman and Lee L. Limbird, Edition; Goodman and Gilman the Pharmacological Basis of Therapeutics, Tenth edition, Alfred Gilman, 200.	
Website Link	1. https://nptel.ac.in/courses/104/106/104106106/	

L-Lecture T-Tutorial P-Practical C-Credit

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHE05	PHARMACEUTICAL CHEMISTRY	DSE THEORY - IV	VI	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	S	M
CO2	S	M	S	M	L	S	M	S	S	M
CO3	S	M	S	S	M	S	M	M	S	M
CO4	S	S	M	S	S	M	M	M	S	S
CO5	M	S	M	M	S	M	S	M	S	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	NIL
Teaching and Learning Methods	Chalk and talk, Online courses, Smart class room
Assessment Methods	Unit test, Internal assessment, End Semester examination

Designed By	Verified By	Approved By
Mrs. M. SATHYA	Dr. N. NITHIYA	

Curriculum Development Cell MCAS Autonomous Rasipuram

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHE06	FORENSIC CHEMISTRY	DSE - IV	VI	4	4	0	0	4
Objective								

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction** History and introduction to forensic science - crime - types of crimes - The crime scene - physical evidence - definition - types of physical evidences - identification and comparison of physical evidences - Method of analysis in forensic science - spectrometry - microscopy.	K1, K2	6
II	**Traces at Crime Scene** Fiber - collection of fiber evidence -comparison of man - made fibres - forensic examination of paint - collection and preservation of paint evidence - collection and preservation of glass evidence - comparison of glass fragments - forensic characteristics of soil - comparison of soil specimens - density gradient tube techniques - collection and preservation of soil evidence. Firearms - types - mechanism of operation - traces at crime scene - bullet comparison - cartridge cases - Gun powder residues - serial number restoration - Tool marks - other impressions - impact of fire arms on victim's body.	K1, K2	6
III	**Human Specific Physical Evidences and analysis - I** Hair - collection of hair evidence - morphology of hair - identification and comparison of hair - Finger prints - classifications - methods of detecting - preserving developed finger prints - foot prints and lifting - foot wear and tire impressions. Hand writing comparison - genuine and forged writing - collection of samples - detection.	K3, K4	6
IV	**Human Specific Physical Evidences and Analysis - II** Blood group - forensic characterization of blood stains - paternity testing - forensic characterization of semen - collection of rape evidences - DNA analysis. Toxicology of alcohol- breath test instruments (breath analyzer) techniques used in toxicology heavy metal poisoning - CO - poisoning - classification of drugs - drug identification - collection and preservation of drug evidence - snake poisoning.	K3, K4	6

V	**Cyber Crimes** The emergence of internet or cyber crime - common types of cyber crimes - Hacking, steeling of data, damage to personal data - abusing of personal data. Forensic investigation of cyber crime - Recovery and protection of computer crime evidences.	K3, K4	6
Course Outcome	**CO1:** Understand the basics of forensic science	K1	
	CO2: Gain knowledge about the evidences to be collected from the crime scenes	K2	
	CO3: Comprehend the methods of human specific physical evidences and analysis	K3	
	CO4: Apply the high end methods to collect evidences and analyse them	K3	
	CO5: Analyze the various cyber crimes and methods to investigate them	K4	
Learning Resources			
Text Books	1. Criminalistics: The introduction of forensic science, Richard Saferstein, Pearson Publishers, 12th edition , 1991 2. Forensic Science: An Introduction to Scientific and Investigate Techniques, Suzanne Bell, CRC Press, Fifth edition, 2019		
Reference Books	1. Henry Lee's Crime Scene Hand Book, Hendry C. Lee, Marilyn T. Miller, Timothy Palmbach, 1st edition, Academic Press Inc., 2001. 2. Criminalistics: Forensic Science, Crime and Terrorism, James E. Girard, 4th edition, Jones and Bartlett Publishers, Inc., 2017		
Website Link	https://www.acs.org/education/students/highschool/chemistryclubs/activities/forensics.html https://www.internetchemistry.com/chemistry/forensic-chemistry.php		

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHE06	FORENSIC CHEMISTRY	DSE - IV	VI	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	S	S	M	M	S	L
CO2	S	M	M	M	S	S	M	S	M	M
CO3	M	M	S	L	S	S	M	M	M	L
CO4	L	S	M	M	S	S	M	M	M	M
CO5	S	M	M	L	S	S	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	NIL
Teaching and Learning Methods	Powerpoint presentation, Case studies, Assisgnment
Assessment Methods	Assignment, CIA - I and II and End-semester examinations

Designed By	Verified By	Approved By
Dr. N. NITHIYA	Dr. N. NITHIYA	

N. Nithiya N. Nithiya

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHP03	PRACTICAL: PHYSICAL CHEMISTRY	DSC PRACTICAL-III	VI	3	0	0	3	3
Objective	To provide practical knowledge and methodology of ester hydrolysis, K_f value, the cell constant and conductometric titration.							

Unit	Course Content	Knowledge Levels	Sessions
I	1. Determine the rate constant of the acid catalyzed hydrolysis of the given ester at room temperature. 2. Determine the molecular weight of the given solute - Rast method 3. Determine the transition temperature of the hydrated salt by the thermometric method. 4. Find out the concentration of the given sodium chloride solution. 5. Determine the molar depression constant K_f of the given solvent. 6. Find out the cell constant of the given conductivity cell using 0.1 N and 0.01 N potassium chloride solutions, whose specific conductivities are given. 7. Determine the strength of the given Hydrochloric acid solution conductometrically using a standard Sodium Hydroxide solution.	K1,K2,K3	7
Course Outcome	**CO1:** To study the rate constant of the acid catalyzed hydrolysis.	K1	
	CO2: Predict the transition temperature of the hydrated salt by the thermometric method	K2	
	CO3: Apply the Rast method to obtain the K_f value of solvent and molecular weight of the solute	K3	
	CO4: Report the cell constant of the given conductivity cell.	K3	
	CO5: Evaluate the strength of the given acid using conductometric methods.	K4	

Learning Resources	
Text Books	J. P. Yadav, Advanced Practical Physical Chemistry, Krishna Prakashan Media, 2016. B. Vishwanathan and P. S. Raghavan, Practical Physical Chemistry, Viva Books, 2015.
Reference Books	V. Venkateswaran, R. Veerasamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, ISBN:9788180547768,8180547760, Edition: 2012

Website Link	https://www.studocu.com/in/document/tezpur-university/chemistry/physical-chemistry-manual/7882747 https://vlab.amrita.edu/?sub=2

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHP03	PRACTICAL: PHYSICAL CHEMISTRY	DSC - PRACTICAL	VI	3	0	0	3	3

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	L	M	S	M	M	M
CO2	S	M	M	S	M	S	M	M	S	M
CO3	L	M	M	S	S	S	M	M	S	S
CO4	M	M	M	S	S	M	M	M	S	S
CO5	M	M	M	S	S	M	M	M	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Nil
Teaching and Learning Methods	Demo classes
Assessment Methods	Observation, Record, Class Praticals, End semester practicals

Designed By	Verified By	Approved By
Mrs. M. SATHYA	Dr. N. NITHIYA	

N. Nithiya

Curriculum Development Cell MCAS Autonomous Pasipuram

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHP04	PRACTICAL: GRAVIMETRIC ESTIMATIONS & ORGANIC ANALYSIS	DSC PRACTICAL-IV	VI	6	0	0	6	4
Objective	To provide practical knowledge and methodology for Gravimetric estimation and Organic Qualitative analysis							

Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**GRAVIMETRIC ESTIMATIONS** 1. Estimations of Barium as Barium sulphate 2. Estimation of Barium as Barium chromate 3. Estimation of Lead as Lead chromate 4. Estimation of Calcium as Calcium oxalate monohydrate 5. Estimation of Sulphate as Barium sulphate 6. Estimation of Nickel as Nickel DMG	K1,K2,K3	7
II	ORGANIC QUALITATIVE ANALYSIS 1. Analysis of organic compounds. Characterization of organic compounds by their functional groups and confirmation by preparation of derivative. The following functional groups may be studied. 2. Aldehydes, Ketone, Carboxylic acids, Aromatic primary amines, Phenol, Aromatic ester, Amide, Diamide, Nitro compounds and monosaccharids.	K1, K2, K3, K4	12
Course Outcome	**CO1:** To recall the basics of gravimetric estimations and Organic Analysis	K1	
	CO2: Explain the methods involved in quantitative estimations other than gravimetric method	K2	
	CO3: Apply the gravimetric estimation to find the amount of any metal ions present in the given solution	K3	
	CO4: Apply the procedure for identifying the given organic compound	K3	
	CO5: Analysis the Given organic compound and report the observation	K4	

Learning Resources	
Text Books	1. V. Venkateswaran, R. Veerasamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons,ISBN:9788180547768, 8180547760,Edition: 2012
Reference Books	1. Dr. N. S. Gnanapragasam, Prof. G. Ramamurthy, Organic Chemistry - Laboratorary Manual, Viswanathan, S., Printers & Publishers Pvt Ltd., 2009 2. Raj K Bansal, Laboratorary Manual of Organic Chemistry, New Age International Pvt. Ltd., 2008.

Website Link	https://edu.rsc.org/practical/qualitative-tests-for-organic-functional-groups-practical-videos-16-18-students/4014327.article https://vlab.amrita.edu/?sub=2

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc.,- Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHP04	PRACTICAL: GRAVIMETRIC ESTIMATION & ORGANIC ANALYSIS	DSC - PRACTICAL	VI	6	0	0	6	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	L	M	S	M	M	M
CO2	S	M	S	S	M	S	S	M	S	M
CO3	L	M	M	S	S	S	M	M	S	S
CO4	M	S	M	S	S	M	M	M	S	S
CO5	M	M	S	S	S	S	M	M	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Nil
Teaching and Learning Methods	Demo classes
Assessment Methods	Observation, Record, Class Praticals, End semester practicals

Designed By	Verified By	Approved By
Mrs. M. SATHYA	Dr. N. NITHIYA	

N. Nithiya

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHPR1	PROJECT WORK	PROJECT WORK	VI	0	0	0	0	4
Objective	To Identify Problem related to their area of interest in Chemistry and Chemical industry and enhance problem solving skills and research knowledge.							
Details	**Course Content**			**Knowledge Levels**			**Sessions**	
PROJECT PREPARATION FORMAT								
Cover Page & Title Page	**Cover Page & Title Page:** The fonts and locations of various items on this page should be exactly as shown in a specimen copy.							
Inside cover page	Inside cover page Same as cover page.							
Bonafide Certificate	**Bonafide Certificate**: The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 14.							
Acknowledgement	**Acknowledgement:** This should not exceed one page. The candidate should convey his appreciation to all whom have played a role for completion of his B.Sc Project work.							
Abstract	**Abstract:** An abstract should provide a concise summary of your research project. It should include the principal objectives of the study, methods employed, a summary of the results and primary conclusions. It should contain approximately 250 words written in the past tense and should not include references.							
Contents	**Table of Contents:** The table of contents should list all headings, sub headings after the table of contents page, as well as any titles preceding it. The title page and Bonafide Certificate will not find a place among the items listed in the Table of Contents. One and a half spacing should be adopted for typing the matter under this head.							
Tables	**List of Tables**: The list should use exactly the same captions as they appear above the tables in the text. 1.5 spacing should be adopted for typing the matter under this head.							
Figures	**List of Figures**: The list should use exactly the same captions as they appear below the figures in the body of the text. One and a half spacing should be adopted for typing the matter under this head. All charts, graphs, maps, photographs and diagrams should be designated as figures. X and Y axes titles are mandatory for all the graphs.							

Symbols	**List of Symbols, Abbreviations and Nomenclature:** 1.5 spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.		
Chapters	**Chapter I - Introduction:** Statement of the Problem, Significance, Need for the study, Objectives		
	Chapter II- Aim & Scope		
	Chapter III- Experimental methods: Procedures, Hypothesis.		
	Chapter IV- Results and Discussion: Tables and Figures, Statistical Presentations, Hypothesis Testing.		
	Chapter V- Conclusion		
	Chapter VI- References		
	References		
GUIDELINES FOR PROJECT PREPARATION			
Numbering	• Every page in the project report, except the project report title page, must be accounted for and numbered. • The page numbering, starting from acknowledgements and till the beginning of the introductory chapter, should be printed in small Roman numbers, i.e, i, ii, iii, iv..... • The page number of the first page of each chapter should not be printed (but must be accounted for). All page numbers from the second page of each chapter should be printed using Arabic numerals, i.e. 2,3,4,5... • All printed page numbers should be located at the right corner at the bottom of the page.	K4-K6	
Chapters	• Use only Arabic numerals. Chapter numbering should be centered on the top of the page using large bold print. <Size 14><Times New Roman>	K4-K6	
TEXT			
Regular Text	**Regular Text**: Times Roman 12 pts and normal print.	K4-K6	
Chapter Heading	**Chapter Heading** - Times Roman 14 pts. Bold and capital.	K4-K6	
Section Headings	**Section Headings** - Times roman 12 pts. Bold and capital.	K4-K6	
Subsection Headings	**Subsection Headings** - times roman 12 pts. bold print and Leading capitals i.e, only first letter in each word should be in capital.	K4-K6	
Special Text	**Special Text-** Italics/Superscript /Subscript/Special symbols, etc., as per necessity. Special text may include footnotes, endnotes, physical or chemical symbols, mathematical notations, etc.	K4-K6	
Sections	**Sections:** Use only Arabic numerals with decimals. Section numbering should be left justified using bold print. Example: 1.1, 1.2, 1.3, etc.	K4-K6	
Sub Sections	**Sub Sections:** Use only Arabic numerals with two decimals.	K4-	

	Subsection numbering should be left Justified using bold print. Example: 1.1.1, 1.1.2, 1.1.3, etc.	K6	
References	Use only Arabic numerals. Serial numbering should be carried out based on Alphabetical order of surname or last name of first author. The format is written like, author name followed by year followed by title of the work followed by details of the journal. Same font as regular text, serial number and all authors names to be in bold print. Title and Journal names should be in italic. 1. **Alvarez LH and Cervantes FJ**, 2011. "(Bio) nanotechnologies to enhance environmental quality and energy production". *J ChemTechnolBiot*86 (1354–1363). 2. **Banjong B, Rattanai B, Zongporn J, Naratip V**, 2010. "Grass blade-like microparticle $MnPO_4 \cdot H_2O$ prepared by a simple precipitation at room temperature".*Power Techno.* 203 (310 - 314).	K4-K6	
Typing Instructions	**Typing Instructions:** The impression on the typed copies should be black in color. One and a half spacing should be used for typing the general text. The general text shall be typed in the Font style 'Times New Roman' and Font size 12. Use A4 (210 mm X 297 mm) bond un-ruled paper (80 gsm) for all copies submitted. Use one side of the paper for all printed/typed matter.	K4-K6	
Justification	**Justification:** The text should be fully justified	K4-K6	
Margins	**Margins:** The margins for the regular text are as follows LEFT - 1.5" RIGHT - 1" TOP - 1" BOTTOM - 1"	K4-K6	
Paragraph Spacing	Use 6 pts before & 6 pts after paragraphs. All paragraphs in the seminar/project report should be left justified completely, from the first line to the last line. Use 1.5 spacing between the regular text and quotations. Provide double spaces between: (a) From top of page to chapter title, (a) Chapter title and first sentence of a chapter, Use single spacing (a) In footnotes and endnotes for text. (b) In explanatory notes for tables and figures. (c) In text corresponding to bullets, listings, and quotations in the main body of seminar/project report. Use single space in references and double space between references.	K4-K6	
Tables	All tables should have sharp lines, drawn in black ink, to separate rows/columns as and when necessary.	K4-K6	

	Tables should follow immediately after they are referred to for the first time in the text. Splitting of paragraphs, for including tables on a page, should be avoided. Provide double spaces on the top and the bottom of all tables to separate them from the regular text, wherever applicable. The title of the table etc. should be placed on the top of the table. The title should be centered with respect to the table. The titles must be in the same font as the regular text and should be single spaced.		
Figures	All figures, drawings, and graphs should be drawn in black ink with sharp lines and adequate contrast between different plots if more than one plot is present in the same graph. The title of the figure etc. should be placed on the bottom of the figure. Figures should follow immediately after they are referred to for the first time in the text. Splitting of paragraphs, for including figures on a page, should be avoided. Provide double spaces on the top and the bottom of all figures to separate them from the regular text, wherever applicable. Figures should be centered with respect to the figure. The titles must be in the same font as the regular text and should be single spaced. The title format is given below: Fig. <blank><chapter number>.<serial number><left indent><figure	K4-K6	
Page Dimension & Binding Specifications	The project report should be prepared in A4 size. The dissertation shall be properly bound; The bound front cover should indicate in Silver and embossed letter.		
Course Outcome	**CO1:** Identification of research idea	K2	
	CO2: Analyze of problem solving skills	K4	
	CO3: Analyze sources for conduct of Research	K4	
	CO4: Evaluate the research report	K5	
	CO5: Create the research report	K6	

Learning Resources	
Text Books	1. Research Methodology: Methods and Techniques, by C.R. Kothari, New Age Publications, 2009.
Reference Books	1. Research Methodology: Methods and Techniques by C.R. Kothari, New Age Publications, 1985. 2. Essentials of Research Design and Methodology by: Geoffrey R. Marczyk, David DeMatteo, David Festinger, 2005.
Website Link	1. http://gen.lib.rus.ec/

B. Sc., Chemistry LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHPR1	PROJECT WORK	PROJECT WORK	VI	0	0	0	0	4

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	S	M	M	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	M
CO4	S	S	S	M	S	S	S	S	M	M
CO5	M	M	M	S	S	M	M	S	M	S
Level of Correlation between CO and PO	L-LOW			M-MEDIUM		S-STRONG				

Tutorial Schedule	-
Teaching and Learning Methods	-
Assessment Methods	**EA - 100%** 1. Project Report - 60 Marks 2. Viva-Voce - 40 Marks 3. Total - 100 Marks

Designed By	Verified By	Approved By
Mrs. M. Saranya	Dr. N. Nithiya	

N. Nithiya

Curriculum Development Cell MCAS Autonomous Rasipuram

B. Sc., Chemistry – Chemistry for Competitive Examination Syllabus - LOCF - CBCS - Pattern with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHOE1	Chemistry for Competitive Examination	**Self study** Online -Competitive Examination	VI	-	-	-	-	2
Objective	To Identify Problem related to their area of interest in Chemistry and Chemical industry and enhance problem solving skills and research knowledge.							

Details	**Course Content**	**Knowledge Levels**	**Sessions**
	Assemblage of different topics related to Chemistry in particular, Organic, Inorganic, Physical, Pharmaceutical, Spectroscopy, Analytical, Forensic, Food Chemistry etc. Major emphasis has been put forth to include recent developments in the subjects. This course aims to give a holistic view of all the topics which comprised of some factual text points, multiple choice questions (MCQ), it is extremely suitable for students pursuing their higher degree in University/institute for their entrance exams, students preparing for various national and state level competitive entrance exams such as JAM, IISc, TIFR, JNU, BHU, Pondicherry University, CUET, etc. to get admission in M. Sc., or Integrated Ph. D., in Chemistry. In addition, it is also useful for UPSC and states PSC. **Rules for creating MCQ pattern.** 1. Objective type online examination will be conducted at the end of 6th semester. 2. Questions must be taken from all previous question papers of JAM, CUET and Common Entrance Test for M. Sc. 3. **Test critical thinking**. Multiple choice questions to test the superficial knowledge. Learners to interpret facts, evaluate situations, explain cause and effect, make inferences, and predict results. 4. **Emphasize Higher-Level Thinking** Use memory-plus application oriented questions. These questions require students to recall principles, rules or facts		

	in a real life context. Eg.1 Ability to Justify Methods and Procedures The shape of SF_4 is a. Tetrahedral b. Trigonal bi pyramidal c. Square planar d. Octahedral Eg.2 Ability to Interpret Cause-and-Effect Relationships The degree of hydration is expected to be maximum for a. Mg^{2+} b. Ba^{2+} c. Na^{2+} d. K^{2+} 5. Mix up the order of the correct answers Keep correct answers in random positions and don't let them fall into a pattern that can be detected 6. **Use a Question Format** Multiple-choice items to be prepared as questions (rather than incomplete statements) Incomplete Statement Format: The capital of California is in Direct Question Format------ Less effective. In which of the following cities is the capital of California? -		

	This is Best format. 7. **Keep Option Lengths Similar** Avoid making your correct answer the long or short answer 8. **Avoid the "All the Above" and "None of the Above" Options** Students merely need to recognize two correct options to get the answer correct 9. HOD's instruct to the faculty to prepare minimum 500 questions booklet (cumulatively for each programme) with solutions and circulate among the students. 10. Each Department to prepare the Questions (MCQ pattern with four answers) and submit to ICT.		
Course Outcome	**CO1:** Identification of pattern of questions asked in competitive exams	K2	
	CO2: Analyze the topics that are repeated in competitive exams	K4	
	CO3: Able to categorize the topics and select the topics of their interest	K4	
	CO4: Ability to solve problems related to each topic	K5	
	CO5: Get confidence about appearing for competitive exams	K6	

Learning Resources	
Text Books	1. IIT-JAM: MSc (Chemistry) Previous Papers & Practice Test Papers (Solved), R Gupta
Reference Books	1. Solved Papers & Practice Sets IIT JAM (Joint Admission Test for MSc From IITs) – Chemistry, Arihant Publication
Website Link	1. https://jam.iitr.ac.in/assets/JAMPreviousYearsQuestionPapers/JAM2021/QPs/CY2021.pdf

B. Sc., Chemistry LOCF - CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHOE1	Chemistry for Competitive Examination	**Self study** Online - Competitive Examination	VI	-	-	-	-	2

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	M	S	L	S	S	S
CO2	S	S	M	M	M	S	L	M	S	S
CO3	S	M	S	S	S	S	M	M	S	S
CO4	S	M	M	S	M	S	L	S	S	S
CO5	S	S	M	S	S	S	M	S	M	S
Level of Correlation between CO and PO	L-LOW			M-MEDIUM		S-STRONG				

Tutorial Schedule	JAM, IISc, TIFR, JNU, BHU, Pondicherry University, CUET, etc Old question papers – solutions – online mock test
Teaching and Learning Methods	Self study, Group discussion, Chalk and Talk, Audio-Video Learning, learning through mock test
Assessment Methods	100 multiple choice questions through computer based online examinations passing minimum is 50%

Designed By	Verified By	Approved By
Mrs. M. Saranya	Dr. N. Nithiya	

N. Nithiya

Curriculum Development Cell MCAS Autonomous Rasipuram

Allied Course for any Degree offered by the Department of B. Sc. - CHEMISTRY
LOCF - CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2021-2022 Onwards
LIST OF GEC - ALLIED COURSES

S.No.	Sem	COURSE_CODE	TITLE OF THE COURSE
1	I/III	21M1UCHA01/ 21M3UCHA01	ALLIED CHEMISTRY - I
2	II/IV	21M2UCHA02/ 21M4UCHA02	ALLIED CHEMISTRY - II
3	II/IV	21M2UCHAP1/ 21M4UCHAP1	PRACTICAL : ALLIED CHEMISTRY

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCHA01/ 21M3UCHA01	ALLIED CHEMISTRY - I	GEC THEORY - I	I / III	4	4	0	0	4
Objective	To gain knowledge about the theories of chemical bonding, hydrides. Study the concepts of nuclear chemistry, hybridization and stereo isomerism of organic reactions and concepts of natural and synthetic polymers.							

Unit	Course Content	Knowledge Levels	Sessions
I	Chemical Bonding Types of Bonding- Ionic Bond, covalent Bond and coordinate bond Molecular Orbital Theory-bonding, anti-bonding and nonbonding orbitals. MO diagrams of Hydrogen, Helium, Nitrogen molecules, discussion of bond order and magnetic properties. Hydrides-classification and characteristics - preparation, properties and uses of Borazole, $NaBH_4$ and $LiAlH_4$.	K1,K3	9
II	Nuclear Chemistry Natural radioactivity-radioactive series including Neptunium series-Group displacement law. Nuclear Binding energy, mass defect-Calculations. Nuclear Fission and Nuclear Fusion-differences – Stellar energy. Nuclear reactors, Applications of radioistopes-C-14 dating, rock dating.	K2,K3	9
III	Basic Concepts of Organic Chemistry Covalent Bond - Orbital Overlap - Hybridisation – Geometry of Organic molecules - Methane, Ethylene and Acetylene. Electron displacement Effects: Inductive, Resonance, Hyperconjugative & steric effects - Their effect on the properties of compounds. Stereoisomerism: Symmetry - elements of symmetry - conditions of optical activity, Tartaric acid. Racemisation, Resolution. Geometrical isomerism of Maleic and Fumaric acids.	K1,K3	9
IV	Aromatic compounds Aromatic compounds – Aromaticity - Huckel's rule Electrophilic substitution in Benzene - Mechanism of Nitration, Halogenation - Alkylation, Acylation preparation, properties and structure of Naphthalene Haworth synthesis Heterocyclic compounds - Preparation, properties and uses of Furan, Thiophene and Pyrrole.	K3 & K4	9
V	Polymer Chemistry Basic concepts: Monomer, polymerization, degree of polymerization, repeat units. Classification of Polymers-addition and condensation polymers, natural and synthetic, based on structure, inorganic and organic, thermoplastic and thermosetting resinStructure and uses of Polyolefins - polythene, PTFE, Freons, PVC, polypropylene and polystyreneNatural and synthetic rubbers - Constitution of natural	K2,K3	9

	rubber, Buna-N, Buna -S, Neoprene, Polyurethane and silicone rubbers, Biodegradable polymers		
Course Outcome	**CO1**:Remember the bonding in molecules and ions by applying MO theory and revise the basic introduction of hydrogen and the Hydrides.	K1	
	CO2: Understand the fundamentals of nuclear chemistry and its applications.	K2	
	CO3: To know the concepts of Stereochemistry and analyse the reactivity of organic molecules by electronic effects	K3	
	CO4: To know about the basic concepts and preparation of polymers and classification of Rubbers.	K3	
	CO5: Acquire the knowledge on reactions and identify the structures of aromatic compounds.	K4	

Learning Resources

Text Books	1. R. D. Madan, Modern Inorganic Chemistry,3rd edition, S Chand & Co Ltd., Reprint 2014. 2. B. S. Bhal, and Arun Bhal, A Text book of Organic Chemistry, Sultan Chand and Sons, 1992. 3. V. R. Gowrikar, N. V. Viswanathan: Polymer Science - Wiley Eastern Limited, New Delhi. 1986.
Reference Books	1. S. M. Mukerji, S. P. Singh, R. P. Kapoor and R. Dass, Organic Chemistry, New Age International Publishers, 2017 2. Gurdeep Raj, Advanced Physical Chemistry, Barrow 5th edition Tata Mc Graw Hill 1992 3. R.T. Morrison and R. N. Boyd, Organic Chemistry, 6th Edition Prentice- Hall, 2016.
Website Link	1.https://nptel.ac.in/content/storage2/courses/104101005/downloads/LectureNotes/chapter %207.pdf 2. https://www.youtube.com/watch?v=4LQ8jdKZTEo 3. https://www.khanacademy.org/science/organic-chemistry/bond-line-structures

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M1UCHA01/ 21M3UCHA01	A LLIED CHEMISTRY-I	GEC THEORY - I	1	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	L	M	M	M	S	M	M	M	S
CO2	S	M	M	M	M	S	M	M	S	M
CO3	M	M	M	M	S	M	S	M	M	S
CO4	M	M	M	S	L	M	M	M	S	M
CO5	M	S	L	L	M	M	S	M	M	M
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

Tutorial Schedule	Group discussion, Discuss relevant examples.
Teaching and Learning Methods	Chalk and talk, use of Working model, PPT
Assesment Methods	Class test, Assignment, Internal & Semester examinations

Designed By	Verified By	Approved By
Mrs. T.VADIVU	Dr.P.SUMATHI	

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHA02/ 21M4UCHA02	ALLIED CHEMISTRY - II	GEC HEORY - II	II/IV	4	4	0	0	4
Objective	To study about various theories of coordination chemistry, properties, applications of carbohydrates and role of synthetic drugs. Provide students with basics of phase rule, photochemical and electrochemical processes.							

Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**Co-ordination Chemistry** Definition of terms - classification of ligands – Nomenclature Chelation - Examples. Chelate effect - explanation. Werner's theory - conductivity and precipitation studies, Sidgwick's theory – Effective Atomic Number concept. Pauling's theory – postulates - Application to octahedral, square planar and tetrahedral complexes. Pauling's theory and magnetic properties of complexes. Merits and demerits of Pauling'stheory Biological role of Haemoglobin and Chlorophyll (Elementary idea of structure and functions).	K1,K2	12
II	**Carbohydrates & Aminoacids** Carbohydrates: Classification, preparation and properties of Glucose and Fructose- Properties of Starch, Cellulose and derivatives of Cellulose. Inter conversion of Glucose to Fructose and vice versa. Amino Acids - classification, preparation and properties of Glycine andAlanine.Milk vitamins-water and fat soluble vitamins, effect of heat and light on vitamins and minerals of milk.	K2,K3	12
III	**Pharmaceutical Chemistry** Chemotherapy: Preparation, uses and mode of action of sulpha drugs-prontosil, sulphadiazine and sulphafurazole. Uses of penicillin, chloramphenicol and streptomycin, Definition and one example each for-analgesics, antipyretics, tranquilizers, sedatives, hypnotics, local anaesthetics and general anaesthetics . Cause and treatment of diabetes, cancer and AIDS.	K3	12

IV	**Photochemistry & Phase rule** Photochemistry: Grotthus - Draper law and Stark - Einstien's law of photochemical equivalence. Quantum yield. Example for photochemical reactions - Hydrogen-Chlorine reaction (elementary idea only) Photosynthesis. Phosphorescence and Fluorescence. **Phase Rule:** Phase rule and the definition of terms in it. Application of phase rule to water system. Reduced phase rule and its application to a simple eutectic system (Pb-Ag) Freezing mixtures, Application in Industry	K3,K4	12
V	**Electrochemistry** Electro Chemistry - Kohlrausch law -measurement of conductance, pH determination. Conductometric titrations. Galvanic cells – EMF - standard electrode potentials, reference electrodes	K4	12
Course Outcome	CO1: Outline the basics of coordination chemistry and predict the structure and stability of a complex.	K1	
	CO2: Understand the classification, chemical reactions and structures of sugars and synthesis of amino acids	K2	
	CO3: Apply the knowledge of nutrition and drugs in curing diseases	K3	
	CO4: Describe the kinetics of photochemical reactions and understand the concept of Phase rule	K4	
	CO1: Outline the basics of coordination chemistry and predict the structure and stability of a complex.	K4	

Learning Resources	
Text Books	1. R. D. Madan, Modern Inorganic Chemistry,3rd edn, S Chand & Co Ltd., Reprint 2014. 2. P. L. Soni, Textbook of Inorganic Chemistry, 20th edn, Sultan Chand & sons, 2000 3. B. S. Bhal, and Arun Bhal, A Text book of Organic Chemistry, Sultan Chand and Sons, First published January 1st 1992
Reference Books	1. S. M. Mukerji, S. P. Singh, R. P. Kapoor and R. Dass, Organic Chemistry, New Age International Publishers, 2017 2. Gurdeep Raj, Advanced Physical Chemistry, Barrow 5th edition Tata Mc Graw Hill 1992 3. R.T. Morrison and R. N. Boyd, Organic Chemistry, 6th Edition Prentice- Hall, 2016.
Website Link	1 https://nptel.ac.in/courses/112/108/112108148/ 2 https://www.youtube.com/watch?v=2LywAiZBQW4 3.https://nptel.ac.in/courses/104106129

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHA02/ 21M4UCHA02	ALLIED CHEMISTRY-II	GEC THEORY - II	2/4	4	4	0	0	4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	M
CO2	S	M	M	M	M	S	M	M	M	M
CO3	M	S	M	M	M	M	S	M	M	M
CO4	S	M	M	M	M	S	S	S	M	M
CO5	S	M	S	M	M	S	M	S	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion,Discuss relevant examples.
Teaching and Learning Methods	Chalk and talk, use of Working model,PPT
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Mrs. T.VADIVU	Dr. P. SUMATHI	

Curriculum Development Cell MCAS Autonomous Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHAP1	ALLIED CHEMISTRY PRACTICAL-I	GEC PRACTICAL - I	II/IV	3	0	0	3	3
Objective	To provide a practical knowledge on estimation, identification of functional groups in organic molecules							

S.No.	**List of Expriments / Programmes**	**Knowledge Levels**	**Sessions**
1	TITRIMETRY a) Estimation of Sodium hydroxide - Standard sodium carbonate. b) Estimation of Hydrochloric acid - Standard Oxalic acid. c) Estimation of Ferrous iron –Standard Mohr's salt. d) Estimation of Oxalic Acid – Standard Ferrous Sulphate. e) Estimation of Ferrous iron using diphenyl amine as indicator (Not for examination)	K2,K3	30
2	ORGANIC ANALYSIS a) Detection of elements- nitrogen, sulphur and halogens. b) Detection of aliphatic or aromatic. c) Detection of whether saturated or unsaturated compounds. Preliminary tests and detection of functional groups - phenol, aromatic amine, aromatic acid, Urea & carbohydrate.	K3,K4	30
Course Outcome	**CO1**:To obtain knowledge involved in estimation of an analyte using volumetric analysis	K1	
	CO2:To Gain practical skills in identifying the organic functional groups	K2	
	CO3: Detection of any special elements	K3	
	CO4: Detection of whether saturated or unsaturated compounds	K4	
	CO5: Detect the various functional groups of organic molecules	K4	
Learning Resources			

Text Books	1. V. Venkateswaran, R. Veerasamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, Edition: 2012 2. A O. Thomas, Practical Chemistry, Scientific Book Centre, Kannur, 7th edition, 1999 3. Raj K Bansal, Laboratorary Manual of Organic Chemistry, New Age International Publishers, 2008
Reference Books	1. Vogel's Textbook of Quantitative Chemical Analysis, G. H Jeffery, J. Bassett, J. Mendham, R C Denney 5th Edition, Bath press, Great Britain, 1989
Website Link	1.https://www.youtube.com/watch?v=NFqMt1TKsp4 2.https://www.youtube.com/watch?v=lKMSCRTOgHI 3.https://www.youtube.com/watch?v=csHwalWXG2M

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M2UCHAP1/21M4UCHAP1/	ALLIED CHEMISTRY PRACTICAL-I	GEC PRACTICAL - I	II/IV	3	0	0	3	3

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO 1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	M	S	M	M	S
CO2	M	S	M	M	S	M	S	M	S	M
CO3	M	S	M	M	S	S	S	M	S	M
CO4	M	S	M	S	M	S	S	M	S	S
CO5	M	S	S	S	L	S	S	M	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion
Teaching and Learning Methods	Demonstrate practical techniques,Practical
Assesment Methods	Class Practical, Observation,Record, Model & Semester Practical examinations

Designed By	Verified By	Approved By
Mrs.T.VADIVU	Dr.P.SUMATHI	

Curriculum Development Cell MCAS (Autonomous) Rasipuram

List of Non-major Elective Course offered by B. Sc. Chemistry
SYLLABUS - LOCF-CBCS PATTERN
EFFECTIVE FROM THE ACADEMIC YEAR 2021-2022 Onwards

S.No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	III	21M3UCHN01	CHEMISTRY FOR BIOLOGISTS
2	IV	21M4UCHN02	MEDICINAL CHEMISTRY
3	III	21M3UCHN03	DAIRY CHEMISTRY
4	IV	21M4UCHN04	INDUSTRIAL CHEMISTRY

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCHN01	CHEMISTRY FOR BIOLOGISTS	NMEC - I	II	2	2	0	0	2
Objective	To understand the concepts in physical and chemical processes in living systems & know the applications of physical, inorganic and organic chemistry towards biological systems.							

Unit	Course Content	Knowledge Levels	Sessions
I	Chemical Bonding Ionic Bond: Nature of Ionic bond, structure of NaCl, KCl and CsCl, factors influencing the formation of ionic bond Covalent Bond: Nature of covalent bond, structure of CH_4, NH_3, H2O, shapes of $BeCl_2$, BF_3, CH_4, PCl_5, NH_3, H_2O, IF_7, based on VSEPR theory and hybridisation. Coordinate Bond: Nature of coordinate bond, coordination complexes, Werner's theory, geometrical and optical isomerism in square planar and octahedral complexes, mention of structure and functions of chlorophyll and hemoglobin Hydrogen Bond: Theory of hydrogen bonding and types of hydrogen bonding (with examples of RCOOH, ROH, salicyladehyde, amides and polyamides). Van der Waal's Forces: dipole - dipole, dipole - induced dipole interactions.	K1,K2	6
II	Fundamentals of Solutions Normality, Molarity, Molality, Mole fraction and mole concept Primary and secondary standards - Preparation of standard solutions Principle of volumetric analysis (with simple problems) Strong and weak acids and bases - Ionic product of water - pH, pKa, pKb. Buffer solutions - pH of buffer solutions.	K2,K3	6
III	Chemical Kinetics Rate, rate law, order and molecularity, derivation of rate expressions for I and II order kinetics. Catalysis, homogeneous and heterogeneous catalysis, enzyme catalysis, enzymes used in industry.	K2,K3	6
IV	Colloids Colloids, lyophilic and lyophobic colloids Optical and Kinetic properties, electrophoresis and electro osmosis, peptisation, and coagulation	K3,K4	6

V	Basic Organic Chemistry Electronic displacement effects: inductive, resonance and steric effects, Concepts of organic acids and bases. Isomerism - Molecules with one chiral carbon and two adjacent chiral carbons - Enantiomers - Diastereomers - Separation of racemic mixture - Geometrical isomerism (maleic and fumeric acids).	K2,K3	6
Course Outcome	CO1: To know the nature of ionic, covalent chemical bonding and Molecular orbital diagram	K1	
	CO2: Understand methods of preparation of solutions with different concentration	K2	
	CO3: To know about rate, order and molecularity of reactions and catalysis	K3	
	CO4: Apply the concepts of stereochemistry and their effects in various reactions	K3	
	CO5: To identify the different types of colloidal systems	K4	

Learning Resources

Text Books	1. R. Gopalan, S. Sundaram, Allied Chemistry, Sultan Chand and Sons, 1995. 2. Veeraiyan, Allied Chemistry, Highmount Publishing House, 2003.
Reference Books	1. M. J. Sienko and R.A. Plane, Chemistry - Principles and properties, International Student Edition, 1995. 2. G.C. Hill, J.S. Holman, Chemistry in Context, ELBS, 1998 3. W.R. Kneen, M.J.W. Rogers, P. Simpson, Chemistry – Facts, patterns and principles, ELBS. 1999.
Website Link	1.https://chem.libretexts.org/14%3A_Chemical_Kinetics 2.https://www.cprime.com/resources/blog/the-four-fundamentals-of-solution-innovation 3.https://nptel.ac.in/courses/104106096

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M3UCHN01	CHEMISTRY FOR BIOLOGISTS	NMEC - I	III	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	S
CO2	M	S	S	M	M	M	S	S	S	M
CO3	S	S	M	M	M	S	S	M	S	M
CO4	M	S	L	M	L	M	S	S	S	S
CO5	S	L	M	M	M	S	M	M	M	S
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

Tutorial Schedule	NIL
Teaching and Learning Methods	Chalk and talk, use of Working model,PPT
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Mrs. T.VADIVU	Dr.P.SUMATHI	

MUTHAYAMMAL COLLEGE OF ARTS & SCIENCE
RASIPURAM
637 408
Tamil Nadu

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UCHN03	DAIRY CHEMISTRY	NMEC - III	III	2	2	0	0	2
Objective	To learn and understand the composition and properties of milk, milk processing and dairy detergents							

Unit	Course Content	Knowledge Levels	Sessions
I	**The processing of milk** Milk: General composition of milk. Factors affecting the gross composition of milk, physic -Chemical change taking place in milk due to processing parameters-boiling, pasteurization -sterlilzation and homogenization	K1, K2, K3	6
II	**Composition of milk** Milk lipids - terminology and definitions Milk proteins: Physical properties of milk proteins - Electrical properties and hydration, solubility. Reaction of milk proteins with formaldehyde and ninhydrin Milk carbohydrate – Lactose - Estimation of lactose in milk Milk vitamins-water and fat soluble vitamins, effect of heat and light on vitamins and minerals of milk.	K1, K2	6
III	**Dairy Products in Human Nutrients** Creams: Composition - chemistry of creaming process-gravitational and centrifugal methods of separation of cream - Factors influencing cream separation (Mention the factors only) - Cream neutralization. Estimation of fat in cream Butter: Percentage composition – manufacture - Estimation of fat, acidity, salt and moisture content - Desi butter	K3, K4	6
IV	**Drying of Milk** Milk powder: Need for making powder-drying process-spraying, drum drying, jet drying and foam drying - principles involved in each. Manufacture of whole milk powder by spray drying process - keeping quality of milk powder. Ice cream: Percentage composition – types - ingredients needed - manufacture of ice - cream stabilizers - emulsifiers and their role.	K3	6

V	**Dairy detergents** Dairy Detergents: Definition-characteristics - classification-washing procedure (modern method) sterilization – chloramin -T and hypochlorite solution.	K2, K3	6
Course Outcome	**CO1:** Gain knowledge about the processing of milk, manufacture and storage of milk products	**K1**	
	CO2: Impart basic knowledge about the composition of milk and the estimation of the components	**K2**	
	CO3: Understand the basic composition and percentage of creams & butter	**K3**	
	CO4: Know about the preparation of milk powder and ice cream from milk	**K4**	
	CO5: Understand the dairy detergents and its classifications	**K5**	

Learning Resources

Text Books	1. P. Walstra, Pieter Walstra, Jan T. M. Wouters, Tom J. Geurts, Diary Science and Technology, CRC Press, 2nd Edition, 2005. 2. M. P. Mathur, Textbook of Dairy Chemistry, ICAR Publishers, 2005. 3. Geoffrey W. Smithers and Mary Ann Augustin, Advances in Dairy Ingredients, John Wiley and Sons Pvt. Ltd., 2013.
Reference Books	1. Sukumar De, Outlines of Dairy Technology, Oxford Publishers, 2001 2. K. S. Rangappa and K. T. Achaya, The Chemistry and Manufacture of Indian Diary products, The Bangalore Printing and Publishing Co. Ltd., 1948. 3. Noble P. Wong, Fundamentals of Dairy chemistry, Springer, 3rd Edition, 1995.
Website Link	1.https://www.youtube.com/watch?v=oQJI0MTlm6s 2.https://www.youtube.com/watch?v=PBMzw1_clXg 3.https://www.youtube.com/watch?v=eKUlADR8KXQ

L-Lecture T-Tutorial P-Practical C-Credit

B. Sc. - Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UCHN03	DAIRY CHEMISTRY	NMEC - III	III	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	S	S	M	M	M	S
CO2	S	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	M	M	M
CO4	M	S	M	M	S	M	S	M	M	S
CO5	S	M	M	M	M	S	M	M	S	M

Level of Correlation between CO and PO: L - LOW M - MEDIUM S - STRONG

Tutorial Schedule	Group discussion, Discuss relevant examples
Teaching and Learning Methods	Chalk and talk, use of Working model, PPT
Assessment Methods	Class test, Assignment, Internal & Semester examinations

Designed By	Verified By	Approved By
Mr. V. Santhoshkumar	Dr. N. Nithiya	

L-Lecture T-Tutorial P-Practical C-Credit

N. Nithiya

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHN02	MEDICINAL CHEMISTRY	NMEC - II	IV	2	2	0	0	2
Objective	To know about the concept of health promoting drugs, Common diseases,various source of drugs,anesthetics and antibiotics							

Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**Introduction** Common diseases – infective diseases – insect – borne, air – borne and water-borne – hereditary diseases – Terminology – drug, pharmacology, anti-metabolites, absorption of drugs – factors affecting absorption – therapeutic index (Basic concepts only)	K1,K2	6
II	**Source of Drugs** Various sources of drugs, pharmacologically active constituents in plants, Indian medicinal plants – tulsi, neem, keezhanelli – their importance – Classification of drugs– biological chemical (Structure not required) Drug receptors and biological responses– factors affecting metabolism of drugs. (Basic concepts only)	K2,K3	6
III	**Chemotherapy** Drugs based on physiological action, definition and two examples each of anesthetics-General and local – analgesics – narcotic and synthetic – Antipyretics and anti inflammatory agents – antibiotics – Penicillin, Streptomycin, Antivirals, AIDS – symptoms, prevention, treatment – Cancer (Structure not required)	K3	6
IV	**Diabetes and heart diseases** Diabetes – Causes, hyper and hypoglycemic drugs – Blood pressure – Sistolic & Diastolic Hypertensive drugs – Cardiovascular drugs – depressants and stimulants – Lipid profile – HDL, LDL cholesterol lipid lowering drugs. (Structure not required)	K3	6
V	**Health promoting drugs** Vitamins A, B, C, D, E and K micronutrients – Na, K, Ca, Cu, Zn and I, Medicinally important inorganic compounds of Al, P, As, Hg and Fe, Examples and applications, Agents for kidney function (Aminohippuric acid). Agents for liver function (Sulfo bromophthalein), antioxidants, treatment of ulcer and skin diseases (Structure not required).	K2,K3	6

Course Outcome	CO1:Understand the different types of diseases that affect humans	K1	
	CO2:Gain knowledge about the various sources of drugs from plants	K2	
	CO3: Uses of chemistry in chemotherapy	K3	
	CO4: Examine the effects of diabetes and heart disease and ways to cure	K4	
	CO5:Evaluate the relationship between vitamins, micronutrients and health promoting drugs	K5	

Learning Resources

Text Books	1. S. Lakshmi Pharmaceutical Chemistry, S. Chand & Sons, New Delhi, 2004 2. V. K. Ahluwalia and Madhu Chopra, Medicinal Chemistry, Ane Books, New Delhi, 2008 3. P. Parimoo, A Text Book of Medicinal Chemistry, CBS publishers, New Delhi, 2006
Reference Books	1. Ashutosh Kar, —Medicinal Chemistry, Wiley Eastern Ltd., New Delhi, 1993. 2. David William and Thomas Lemke, Foyes Principles of Medicinal Chemistry, BI Publishers, 7th Edition. 3. J. M. Beale, Jr, J. H. Block, Organic Medicinal and Pharmaceutical Chemistry, Walters Kuwer Publishers, 12th Edition, 2004
Website Link	1.https://www.youtube.com/watch?v=Ait7lIHBFI8 2.https://www.youtube.com/watch?v=WHs2rWH95mE 3.https://www.youtube.com/watch?v=vKIRWY-LMYc

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHN02	MEDICINAL CHEMISTRY	NMEC-II	IV	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	M
CO2	S	S	M	M	M	S	S	M	M	M
CO3	M	S	S	M	M	M	S	S	M	M
CO4	S	S	M	M	M	S	S	M	M	M
CO5	S	M	S	M	M	S	M	S	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion,Discuss relevant examples.
Teaching and Learning Methods	Chalk and talk, use of Working model,PPT
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By	Approved By
Mrs.T.VADIVU	Dr.P.SUMATHI	

Curriculum Development Cell MCAS Autonomous Rasipuram

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHN04	INDUSTRIAL CHEMISTRY	NMEC - IV	IV	2	2	0	0	2
Objective	To acquire knowledge about the chemicals used in day to day life							

Unit	**Course Content**	**Knowledge Levels**	**Sessions**
I	**Fertilizers:** Fertilizer industries in India, Manufacture of ammonia, ammonium salts, urea, superphosphate, triple superphosphate and nitrate salts.	K1,K3	6
II	**Sugar:** Cane sugar manufacture, recovery of sugar from molasses, sugar estimation-sugar industries in India.	K2,K3	6
III	**Explosives** Chemical Explosives: Preparation and chemistry of lead azide, nitroglycerine, nitrocellulose, TNT, RDX, Dynamite, cordite, picric acid, gunpowder, introduction to rocket propellants.	K3	6
IV	**Leather Industry:** Curing, preservation and tanning of hides and skins, process of dehairing and dyeing. Treatment of tannery effluents.	K3	6
V	**Water Industry:** Pollution of water by fertilizers, detergents, pesticides and industrial wastes, BOD, COD, thermal pollution. Water Treatment – Ion exchange, electro dialysis, reverse osmosis, softening of hard water	K3	6
Course Outcome	CO1:Understand the various fertilizers and its uses	K1,K2	
	CO2:Impart knowledge on sugar preparation	K3	
	CO3: Describe the characteristics of explosions and describe the main causes of the destructive power of chemical explosives.	K3	
	CO4:Identification of hides and skins of different species from their anatomical structure	K2	
	CO5:Describe the main sources of water pollution, the main types of pollutant and how each type may be controlled.	K1	

Learning Resources	
Text Books	1. K. S. Yawalkar, J. P.. Agarwal and S. Bokde, Manures and Fertilizes, Nagpur Agri-Horticulture Publishing House, 12th Edition, 1996. 2. Charles Albert Browne, A Handbook of sugar analysis – A practical and descriptive treatise for use in Research, Technical and Control Laboratories, Forgotten Book Publishers, 2018 3. Jacqueline Akhavan , The Chemistry of Explosives, The Royal Society of Chemistry, 4th Edition, 2022.
Reference Books	1. B. K. Sharma, Industrial Chemistry Including Chemical Engineering, Goel Publishing House, 2000 2. B. K. Sharma, Industrial Chemistry, 1st Edition, Goel Publication, 1983. 3. B. N. Charabarthy, Industrial Chemistry, 1st Edition, Oxford and IBh Publishing, 1981.
Website Link	1.https://nptel.ac.in/courses/126105024 2.https://nptel.ac.in/courses/105107207 3.https://www.youtube.com/watch?v=4PBRW-g01Ag

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M4UCHN04	INDUSTRIAL CHEMISTRY	NMEC - IV	IV	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	S	M	M	M
CO2	S	M	M	M	M	S	M	M	M	M
CO3	M	S	M	M	S	M	S	M	M	S
CO4	M	M	M	S	M	M	M	M	S	M
CO5	M	S	M	M	S	M	S	M	M	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Group discussion,Discuss relevant examples.
Teaching and Learning Methods	Chalk and talk, use of Working model,PPT
Assesment Methods	Class test,Assignment,Internal & Semester examinations

Designed By	Verified By		Approved By	
Mrs. R.JEGANMOHINI	Dr.P.SUMATHI			

Curriculum Development Cell MCAS (Autonomous) Rasipuram

B. Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
21M6UCHVE1	WATER ANALYSIS	VALUE ADDED COURSE	V	2	2	0	0	2
Objective	To learn the pollutants present in water, its identification and methods to treat. To understand the photodegradation of dyes.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Water Sources and Pollution** Sources of water: Meaning of pure water. Impurities in water. Meaning of the terms: portability, sewage, affluent, sample, contamination, eutrophication, pollutants, pollution. Sources of water pollution: major water pollutants. Types of water pollution: ground water pollution. Fresh water pollution, surface water pollution (river pollution, pond and lake pollution), marine pollution (oil spills).	K1	6
II	**Types of water pollutants** Types of water pollutants-organic including biocides, surfactants, detergents, and volatile compounds, inorganic pollutants including nutrients, salts and heavy metals; biological pollution; thermal pollution. Effects of pollution on water quality and aquatic life in surface water bodies, oxygen economy, eutrophication in lakes and reservoirs.	K2	6
III	**Water analysis and parameters** Theory: Water quality parameters: Physical and chemical properties of water, methods of determination of various water quality parameters. Introduction to Water analysis, Types of Water, Water pollutants, role of water testing for environment, Uses of water analysis. Water Analysis 1) To determine hardness of water. 2) To determine pH of given water sample. 3) To determine alkalinity of water. 4) To determine TDS of given sample of water.	K3	6
IV	**Water treatment** Treatment of water for domestic purposes: pre-treatment, removal of suspended impurities, method of disinfection of water. Waste water: introduction, characteristics of wastewater, need for wastewater treatment. Preliminary treatment: grit chamber, flotation, skimming tank, screening. Primary treatment: sedimentation, coagulation. Secondary treatment:	K3	6

	aerobic (trickling filter, activated sludge, oxidation ponds and lagoons), anaerobic (septic tank, sludge digestion and disposal). Tertiary treatment: aim, need for chlorination, dose of chlorine, ozonisation.		
V	**Photo degradation of dyes** Mechanism of Photo degradation - Photo catalysis - Photo-fenton process - Advanced Oxidation process - Solar photo catalysis - Fabrication of photo catalyst - Impacts of Photo catalysis on Industrial effluents.	K4	6
Course Outcome	CO1:Understand the different types of pollution in water	K1	
	CO2:Gain knowledge about the various water pollutants	K2	
	CO3:Comprehend the methods of water analysis and the parameters therein	K3	
	CO4: Demonstrate the various forms of water treatment	K3	
	CO5: Analyze the various application of dyes used for photodegradation	K4	
Learning Resources			
Text Books	1.Environmental Sciences: S.C. Santra, New Central Book Agency, 2011. 2. A Text Book of Environmental Studies: Dr. D. K. Asthana and Meera Asthana, S. Chand & Camp Ltd., 2006.		
Reference Books	1. Soil and Water Chemistry, Anu Gopinath, Vishal Publishing Company, 2019 2. Environmental Chemistry, Anil Kumar De, New Age International Publishers, 2018		
Website Link	https://www.bruker.com/en/applications/detection-and-environmental/environmental/water-analysis-environmental.html https://svalbardi.com/blogs/water/quality		

L-Lecture T-Tutorial P-Practical C-Credit

B.Sc., Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M6UCHVE1	WATER ANALYSIS	VALUE ADDED COURSE	V	2	2	0	0	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	S	S	M	M	S	L
CO2	S	M	M	M	S	S	M	S	M	M
CO3	M	M	S	L	S	S	M	M	M	L
CO4	L	S	M	M	S	S	M	M	M	M
CO5	S	M	M	L	S	S	M	S	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	NIL
Teaching and Learning Methods	Power point presentation, Field visit, Assignment
Assessment Methods	Assignment, Final Test

Designed By	Verified By	Approved By
Dr. J. SANGEETHA	Dr. N. NITHIYA	

J. Sangeetha N. Nithiya

Curriculum Development Cell MCAS Autonomous Rasipuram