

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)



ESTD-1994

**MUTHAYAMMAL
COLLEGE OF ARTS
AND SCIENCE**

(Autonomous)

A UNIT OF VANETRA GROUP

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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

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

Structure of Credit Distribution as per the TANSCH/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	4	1	4
9	INTERNSHIP	III													0	0
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

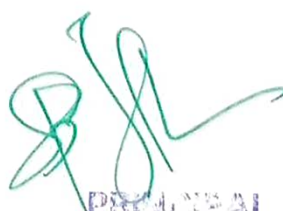
PART	No. of Credits
PART - I	12
PART - II	12
PART - III	95
PART - IV	20
PART - V	1
Grand Total	140

SEM	PART	COURSE_CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
				Lect.	Lab.		CIA	ESE	TOTAL
I	I	21M1UFTA01	TAMIL - I	5	-	3	25	75	100
I	II	21M1UCEN01	COMMUNICATIVE ENGLISH - I	5	-	3	25	75	100
I	III	21M1UCHC01	GENERAL CHEMISTRY - I	6	-	4	25	75	100
I	III	21M1UMAA01	ALGEBRA AND CALCULUS	4	-	4	25	75	100
I	III	21M1UZOA01	ALLIED ZOOLOGY - I	-	-	-			
I	III	21M2UCHP01	VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS	-	3	-	-	-	-
I	III	21M2UMAAP1/22M2UMAAP1	PRACTICAL : ALLIED MATHAMETICS - I	-	3	-	-	-	-
I	III	21M2UZOAP1	PRACTICAL : ALLIED ZOOLOGY -I	-	-	-	-	-	-
I	IV	21M1UVED01	YOGA	2	-	2	100	-	-
I	IV	21M1UPES01	PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCE - I	2	-	2	25	75	100
I			TOTAL	24	6	18	225	375	500
II	I	21M2UFTA02	TAMIL - II	5	-	3	25	75	100
II	II	21M2UCEN02	COMMUNICATIVE ENGLISH - II	5	-	3	25	75	100
II	III	21M2UCHC02	GENERAL CHEMISTRY - II	4	-	4	25	75	100
II	III	21M2UMAA02	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	4	-	4	25	75	100
II	III	21M2UZOA02	ALLIED ZOOLOGY - II	-	-	-	-	-	-
II	III	21M2UCHP01	VOLUMETRIC ESTIMATIONS AND ORGANIC PREPARATIONS	-	3	3	40	60	100
II	III	21M2UMAAP1/22M2UMAAP1	PRACTICAL : ALLIED MATHAMETICS - I	-	3	2	40	60	100
II	III	21M2UZOAP1	ZOOLOGY	-	-	-	-	-	-
II	IV	21M2UCHS01	FOOD AND NUTRITION	2	-	2	25	75	100
II	IV	21M2UEVS01	ENVIRONMENTAL STUDIES	2	-	2	100	-	-
II	IV	21M2UPES02	PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCE - II	2	-	2	25	75	100
II			TOTAL	24	6	25	330	570	800

N. Kithiya

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NAMAKKAL DISTRICT.**

III	I	21M3UFTA03	TAMIL - III	5	-	3	25	75	100
III	II	21M3UCEN03	COMMUNICATIVE ENGLISH - III	5	-	3	25	75	100
III	III	21M3UCHC03	GENERAL CHEMISTRY - III	6	-	4	25	75	100
III	III	21M3UPHA01	ALLIED PHYSICS-I	4	-	4	25	75	100
III	III	21M4UCHP02	INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS	-	3	-	-	-	-
III	III	21M4UPHAP1	PRACTICAL: ALLIED PHYSICS	-	3	-	-	-	-
III	IV	21M3UCHS02	POLYMER CHEMISTRY	2	-	2	25	75	100
III	IV	21M3UCSN02	OFFICE AUTOMATION	2	-	2	25	75	100
III			TOTAL	24	6	18	150	450	600
IV	I	21M4UFTA04	TAMIL - IV	5	-	3	25	75	100
IV	II	21M4UCEN04	COMMUNICATIVE ENGLISH - IV	5	-	3	25	75	100
IV	III	21M4UCHC04	GENERAL CHEMISTRY - IV	6	-	4	25	75	100
IV	III	21M4UPHA02	ALLIED PHYSICS-II	4	-	4	25	75	100
IV	III	21M4UCHP02	INORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS	-	3	3	40	60	100
IV	III	21M4UPHAP1	PRACTICAL: ALLIED PHYSICS	-	3	2	40	60	100
IV	IV	21M4UCHS03	CHEMPREENEUR	2	-	2	25	75	100
IV	IV	21M4UCSN03	IMAGE EDITING TOOL	2	-	2	25	75	100
IV			TOTAL	24	6	23	230	570	800
V	III	21M5UCHC05	INORGANIC CHEMISTRY-I	4	-	4	25	75	100
V	III	21M5UCHC06	ORGANIC CHEMISTRY-I	4	-	4	25	75	100
V	III	21M5UCHC07	PHYSICAL CHEMISTRY-I	4	-	4	25	75	100
V	III	21M5UCHE01	ANALYTICAL CHEMISTRY	4	-	4	25	75	100
V	III	21M5UCHE02	NANO AND GREEN CHEMISTRY	4	-	4	25	75	100
V	III	21M6UCHP03	PHYSICAL CHEMISTRY	-	3	-	-	-	-
V	III	21M6UCHP04	GRAVIMETRIC ESTIMATIONS AND ORGANIC ANALYSIS	-	5	-	-	-	-
V	IV	21M5UCHS04	AGRICULTURAL CHEMISTRY	2	-	2	25	75	100
V			TOTAL	22	8	22	150	450	600

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VI	III	21M6UCHC08	INORGANIC CHEMISTRY-II	4	-	4	25	75	100
VI	III	21M6UCHC09	ORGANIC CHEMISTRY-II	4	-	4	25	75	100
VI	III	21M6UCHC10	PHYSICAL CHEMISTRY-II	5	-	4	25	75	100
VI	III	21M6UCHE04	INDUSTRIAL CHEMISTRY	4	-	4	25	75	100
VI	III	21M6UCHE05	PHARMACEUTICAL CHEMISTRY	4	-	4	25	75	100
VI	III	21M6UCHP03	PHYSICAL CHEMISTRY	-	3	3	40	60	100
VI	III	21M6UCHP04	GRAVIMETRIC ESTIMATIONS AND ORGANIC ANALYSIS	-	6	4	40	60	100
VI	III	21M6UCHPR1	PROJECT WORK	-	-	4	40	60	100
VI	III	21M6UCHOE1	CHEMISTRY FOR COMPETITIVE EXAMINATIONS	-	-	2	100	-	-
VI	V	21M6UEXA01	EXTENSION ACTIVITY	-	-	1	100	-	-
VI			TOTAL	21	9	34	445	555	800
VI			OVERALL TOTAL	139	41	140	1530	2970	4100
VI		21M6UCHEC1	MOOC COURSES OFFERED IN SWAYAM / NPTEL	-	-	2	-	-	-

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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			CIA	
Work Diary	25	-	a) Attendance 10 Marks	40
Report	50	50	b) Review 30 Marks	
Viva-voce	25	50	/Work Diary* ¹	
Total	100	100	ESE*²	
			a)Final Report 40 Marks	60
			b)Viva-voce 20 Marks	
			Total	100

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

*²Evaluation 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.

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 Ψ^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 (B_4H_{10} and B_5H_9). 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

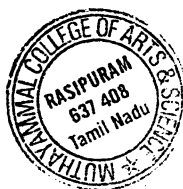
CO-PO Mapping

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, Unit -III- s & p block elements- Group discussion, Unit- 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	<i>A. h. Ganesan</i>

S. Eswari 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
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 - NaBH ₄ and LiAlH ₄ - preparation, properties, uses and structures. 2.2. Carbides - preparation, properties and technical applications.					K3	9	
III	Organic reaction Mechanism 3.1. Aliphatic nucleophilic substitution, SN ₁ , SN ₂ and SN _i 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 E ₁ and E ₂ 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	A. K. S. S.



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-
TutorialP-
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

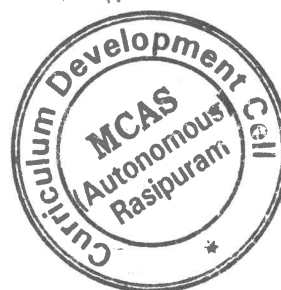
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	S
CO2	M	S	M	M	M	M	S	M	M	M
CO3	S	M	M	M	M	S	M	M	M	M
CO4	S	M	M	M	M	S	M	M	M	M
CO5	M	S	M	L	M	M	S	M	S	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

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	A. h. bany

S. Eswari

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
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 Experiments / 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,K ₃	30

2	<p>ORGANIC PREPARATIONS</p> <p>1. Preparations involving the following:</p> <p>a) Oxidation of benzaldehyde.</p> <p>b) Hydrolysis of Methyl salicylate or ethyl benzoate.</p> <p>c) Nitration - p-nitroacetanilide and m-dinitrobenzene</p> <p>d) Bromination - p- bromoacetanilide and tribromophenol (Not for examination)</p> <p>e) Benzoylation -- -naphthylbenzoate</p>	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 calculation	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	<p>1. Basics Principles of Practical Chemistry, Kulanthaivelu A. R. Veeraswamy R. Venkateswaran, Sultan Chand & Sons, 2017</p> <p>2. Practical Chemistry, Pandey D. N., Sultan Chand Publishers, 2018</p>		
Reference Books	<p>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</p> <p>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</p>		
Website Link	<p>1. https://www.youtube.com/watch?v=sFpFCPTDv2w</p> <p>2. https://www.youtube.com/watch?v=oROSQnzSdZE</p> <p>3. https://www.youtube.com/watch?v=jfzcBhr1zmE</p>		

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

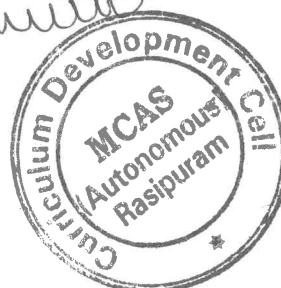
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	M	M	S	M	M	M
CO2	M	S	S	M	M	M	S	S	M	M
CO3	M	S	S	M	M	M	S	S	M	M
CO4	M	S	S	M	M	M	S	S	M	M
CO5	M	S	S	M	M	M	S	S	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

Tutorial Schedule	Preparation of solid and liquid standard solutions
Teaching and Learning Methods	Demonstration 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. L. S.

N. Nithiya

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
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 Na ₂ CO ₃ 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, NH ₂ OH, NH ₂ NH ₂ , phenyl hydrazines, semicarbazide, and Grignard reagent. Mechanism of reduction of carbonyl group by NaBH ₄ , LiAlH ₄ , 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	PO 1	PO2	PO3	PO4	PO5	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	<i>A. K. S. S.</i>

R. Jegan Mohini

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
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- P- C-Credit			

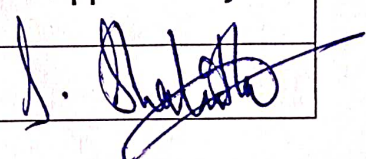
B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UCHS02	POLYMER CHEMISTRY	SEC - II	III	2	2	0	0	2

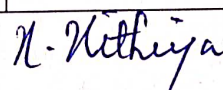
CO-PO Mapping

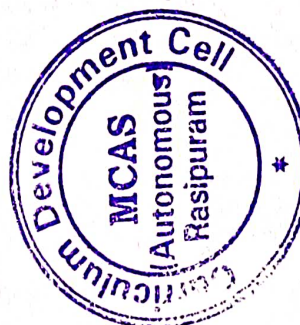
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	L	S	S	M	M	S	S
CO2	S	M	L	M	M	S	M	S	M	S
CO3	M	S	M	M	M	M	S	S	M	M
CO4	M	M	M	M	S	M	S	M	M	S
CO5	L	M	S	L	M	M	M	S	S	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG						

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	







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	A. h. b. [Signature]

[Signature]

[Signature]



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=_lITOT6pViA 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	PSO4	PSO5
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	A. h. b. a. m.

[Handwritten signatures of Mrs. R. Jeganmohini and 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
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	A. h. Sanyal

A. Dhivya

P. Sumathi



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 radioisotopes-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 resin Structure and uses of Polyolefins - polythene, PTFE, Freons, PVC, polypropylene and polystyrene Natural 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

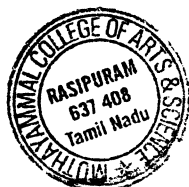
B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1UCHA01/ 21M3UCHA01	APPLIED CHEMISTRY-I	GEC THEORY - I	1	4	4	0	0	4

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 <i>T. Vadivu</i>	Dr.P.SUMATHI <i>P. Sumathi</i>	<i>A. h. Sanyal</i>



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

Course Code	Course Title	Course Type	Sem	Hou rs	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						Knowl edge Levels	Sessi ons
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's theory 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 and Alanine. 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 <i>T. Vadivu</i>	Dr. P. SUMATHI <i>P. Sumathi</i>	<i>A. h. Sanyal</i>



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 Experiments / 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								

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, Laboratory 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
21M2UCHAP1/2 1M4UCHAP1/	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 <i>T. Vadivu</i>	Dr.P.SUMATHI <i>P. Sumathi</i>	<i>A. h. Sany</i>



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	<p>Chemical Bonding</p> <p>Ionic Bond: Nature of Ionic bond, structure of NaCl, KCl and CsCl, factors influencing the formation of ionic bond</p> <p>Covalent Bond: Nature of covalent bond, structure of CH₄, NH₃, H₂O, shapes of BeCl₂, BF₃, CH₄, PCl₅, NH₃, H₂O, IF₇, based on VSEPR theory and hybridisation.</p> <p>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</p> <p>Hydrogen Bond: Theory of hydrogen bonding and types of hydrogen bonding (with examples of RCOOH, ROH, salicylaldehyde, amides and polyamides).</p> <p>Van der Waal's Forces: dipole - dipole, dipole - induced dipole interactions.</p>	K1,K2		6				
II	<p>Fundamentals of Solutions</p> <p>Normality, Molarity, Molality, Mole fraction and mole concept</p> <p>Primary and secondary standards - Preparation of standard solutions</p> <p>Principle of volumetric analysis (with simple problems)</p> <p>Strong and weak acids and bases - Ionic product of water - pH, pKa, pKb. Buffer solutions - pH of buffer solutions.</p>	K2,K3		6				
III	<p>Chemical Kinetics</p> <p>Rate, rate law, order and molecularity, derivation of rate expressions for I and II order kinetics.</p> <p>Catalysis, homogeneous and heterogeneous catalysis, enzyme catalysis, enzymes used in industry.</p>	K2,K3		6				
IV	<p>Colloids</p> <p>Colloids, lyophilic and lyophobic colloids</p> <p>Optical and Kinetic properties, electrophoresis and electro osmosis, peptisation, and coagulation</p>	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 fumaric 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

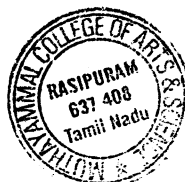
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	S
CO2	M	S	S	M	M	M	S	S	S	M
CO3	S	S	M	M	M	S	S	M	S	M
CO4	M	S	L	M	L	M	S	S	S	S
CO5	S	L	M	M	M	S	M	M	M	S
Level of Correlation between CO and PO	L-LOW		M-MEDIUM		S-STRONG					

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	A. h. Sany

T. Vadivu

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
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 – Systolic & 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=Ait7IIHBFi8 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 <i>T. Vadivu</i>	Dr.P.SUMATHI <i>P. Sumathi</i>	<i>A. h. bany</i>



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

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, physico-chemical change taking place in milk due to processing parameters-boiling, pasteurization -sterilization 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, Dairy 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 Dairy 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=eKUIADR8KXQ

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

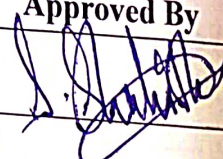
CO-PO Mapping

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

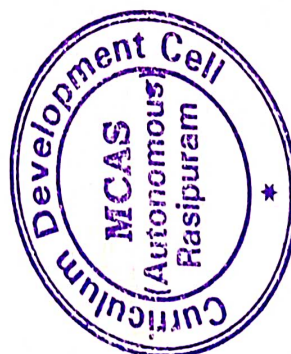
Correlation between CO and PO
 L - LOW M - MEDIUM S - STRONG

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



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. Charabarthi, 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	<i>A. h. S...</i>

R. Jegan Mohini

P. Sumathi

