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

Learn. Lead

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 2023-2024 and onwards)

Regulation and Syllabus for

B.Sc., Chemistry

(With effect from the Academic Year 2023-24)

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 enterprise

*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

PREAMBLE

The Central Science that connects biology, geology, physics, and electronics is Chemistry. It covers the characteristics, make-up, and structure of substances as well as the changes they go through and the energy required. The characteristics of atoms and the rules regulating their combinations are the focus of chemistry. The creation of a logical explanation for the intricate behavior of materials is the great task facing chemistry. Chemistry is the study of substances' atomic makeup and structural makeup as well as the various interactions between them that can result in abrupt, frequently violent reactions. The use of natural materials and the synthesis of artificial ones are further topics covered by Chemistry. Chemical processes have been used for cooking, fermentation, glassmaking, and metallurgy since the dawn of civilization. Chemical technology has produced materials such as Teflon, vinyl, liquid crystals, semiconductors, and superconductors today. Understanding the amazing and intricate chemistry of living things has advanced dramatically in the 20th century, and a molecular explanation of health and illness has enormous potential. With the use of ever-more-advanced tools, modern chemistry examines substances ranging in size from single atoms to millions of atoms, such as deoxyribonucleic acid (DNA). It is also possible to design new compounds with the necessary properties and then synthesize them. The intellectual challenges of industry are closely linked to the challenges of chemistry. All highly developed countries produce, distribute, and use a broad range of chemical products. Such is the application of Chemistry. Chemists find themselves in various fields like QC, Scientists, Forensic specialists, Food, Environmental, Agricultural and Pharmaceutical industries. The course aims at providing the basics of various concepts and applications of Chemistry to students so as to create them socially responsible citizens.

PROGRAMME LEARNING OUTCOME NATURE AND EXTENT OF THE PROGRAMME

The undergraduate programme in Chemistry is the first level of college degree in the country as in several other parts of the world. After obtaining this degree, a Chemist may enter into the job market or opt for undertaking further higher studies in the subject. After graduation the students may join industry, academia, or public health departments and play their role as Chemists in a useful manner contributing their knowledge to the welfare of the society. Thus the undergraduate level degree in Chemistry must prepare the students for all these objectives. The LOCF curriculum has been developed encompassing all the diversified aspects of Chemistry with

reasonable depth of knowledge and skills as to specialize them in the various aspects of the subject. It also equips them with the expected professional expertise.

AIM OF THE PROGRAMME

The undergraduate Chemistry program aims to equip students with the information and abilities necessary to use their understanding of chemistry in a variety of contexts. They must gain a full understanding of Chemistry through classroom instruction, practical laboratory skills, exposure to industry, and interaction with industry professionals in order to increase their knowledge, understanding, and articulation abilities.

GRADUATE ATTRIBUTES

Graduates of this program are expected to possess a thorough understanding of Chemistry principles that can be applied in a variety of settings. To carry out their responsibilities as Chemists, they need to possess the necessary Chemistry knowledge and abilities. They must possess the analytical skills necessary to identify the best solutions for Chemistry-related challenges. Since Chemistry is an interdisciplinary subject, students may need to consult with experts in other fields. As a result, students need to cultivate a teamwork mindset. Because Chemistry is such a dynamic science, practitioners may encounter a number of novel issues. In order to tackle these more contemporary issues, the Chemists need to be taught to be creative thinkers. There are a few more recent advancements in Chemistry. The students receive training on how to identify leads and recognize the potential for turning them into products through business ventures. In order to help the students realize the prospect of becoming entrepreneurs, they are also required to connect with professionals in the field. They are also made aware of the prerequisites for creating a successful Chemistry firm, including understanding of patents, copyrights, and different regulatory procedures. In addition to acquiring the skills necessary for the Chemistry profession, graduates in this field should cultivate an ethical consciousness, as this is a prerequisite for engaging in any scientific endeavor. This includes adhering to laboratory ethics and publishing research findings in a scientific manner. In order to continue their education at some of the greatest and most globally recognized

universities and research institutes in the world, Chemistry graduates must also have outstanding communication skills in both spoken and written languages.

GA1 Analytical Reasoning

GA 2 Critical Thinking

GA 3 Problem Solving Skills

GA 4 Communication Skills

GA 5 Leadership Quality

GA 6 Teamwork

GA 7 Lifelong Learning

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.

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):

PSO-1:	Understand the fundamental concepts, processes and applications of Chemistry and its sub-disciplines
PSO-2:	Gain procedural knowledge and analytical skills in designing and carrying out chemical experiments in Chemistry and related fields like pharmaceuticals, teaching, cosmetics and product quality.
PSO-3:	Use critical thinking to Identify and analyze problems and the capability to interpret chemical information, which finds application in industry, medicine, and research.
PSO-4:	Communicate concepts of Chemistry effectively which will enable the students to get jobs and competency to clear competitive examinations, be prepared to go for higher studies and industrial entrepreneurship
PSO-5:	Create awareness on the impact of Chemistry to environment and society

REGULATIONS (2023-2024)

1. DURATION OF THE PROGRAME

1.1. Three years (six semesters)

1.2. Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to May of each year.

1.3. There shall be not less than 90 working days for each semester.

2. ELIGIBILITY FOR ADMISSION

2.1. Candidate for admission to the first year of B.Sc. Degree Course in Chemistry shall be required to have passed the Higher Secondary Examination with Mathematics, Botany, Zoology or Biology and Computer Science as per norms set by the Government of Tamilnadu or an Examination Accepted as equivalent thereto by the syndicate.

3. CREDIT REQUIRMENTS AND ELIGIBILITY FOR AWARD OF DEGREE

3.1. A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years and passed the examinations of all the Six Semesters prescribed earning a minimum of 140 credits as per the distribution given in Regulation for Part I, II, III, IV & V and also fulfilled such other conditions as have been prescribed thereof.

4. COURSE OF STUDY, CREDITS AND SCHEME OF EXAMINATION

4.1. The Course Components and Credit Distribution shall consist of the following:

(Minimum Number of Credits to be obtained)

Part Wise Distribution	Study Components	Credit Distribution
PART I	Tamil or Other Languages	12
PART II	English	12
PART III	Core, Allied, Elective and Project Courses	91
PART IV	i. Basic Tamil / Advanced Tamil / NME	04
	ii. Soft Skill Courses/SBEC	10
	iii. Environmental Studies	02
	iv. Value Education	02
	v. Internship	02
	vi. Foundation Course	02
	vii. Professional Competency Skills	02
PART V	Extension Activity	01
Total Credits		140

4.2 DETAILS OF COURSE O FSTUDY OF PARTS I-V

4.2.1 PART I: Tamil and Other Languages Hindi or French at the option of candidates and according to the syllabus and text-books prescribed from time to time.

4.2.2 PART II: English: According to the syllabus and text-books prescribed from time to time

4.2.3 PART III: Core, Allied Project and Elective Courses: As prescribed by the concerned Board of Studies

4.2.4 PART IV:

i. Basic Tamil / Advanced Tamil / NME:

a. Students who have not studied Tamil upto XII STD and have taken any Language other than Tamil in Part I shall take Basic Tamil comprising of Two Courses

(level will be at 6th Standard).

b. Students who have studied Tamil up to XII STD and have taken any Language other than Tamil in Part – I shall take Advanced Tamil comprising of Two Courses.
c. Students who have studied Tamil up to XII STD and also have taken Tamil in Part–I shall take Non-Major Elective comprising of Two Courses.

i. Soft Skill Courses/SBEC
ii. Environmental Studies
iii. Value Education
iv. Internship
v. Foundation Course
vi. Professional Competency Skills(Online)

4.2.5 PART V: Extension Activity:

Students shall be awarded a maximum of 1 Credit for Compulsory Extension Service. All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games) Retract / Youth Red Cross or any other Service Organizations in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the College before 31st March in a year. If a student lacks 40 hours attendance in the first year, he or she shall have to compensate the same during the subsequent years.

Those students who complete minimum attendance of 40 hours in one year will get 'half-a- credit and those who complete the attendance of 80 or more hours in Two Years will get 'one credit'. Literacy and Population Education and Field Work shall be compulsory components in the above extension service activities.

4.3. Inclusion of the Massive Open Online Courses (MOOCs)available on SWAYAM and NPTEL

4.3.1 Students can choose the MOOC Course Available on SWAYAM and NPTEL under Core, Elective or Soft skill category. He/ she will be awarded degree only after producing valid certificate of the MOOC course for credit Mobility

5. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

5.1 Eligibility: Students shall be eligible to go to subsequent semester only if they earn sufficient attendance as prescribed by the Periyar University.

5.2. Attendance: All Students must earn 75% and above of attendance for appearing for the End Semester Examination.(Theory/Practical)

5.3. Condonation of shortage of attendance: If a Student fails to earn the minimum attendance (Percentage stipulated), the Principals shall condone the shortage of attendance up to a maximum limit of 10% (i.e. between 65% and above and less than 75%) after collecting the prescribed fee for Theory/Practical examination separately, towards the condonation of shortage of attendance. Such fees collected and should be remitted to the University.

5.4. Non-eligibility for condonation of shortage of attendance: Students who have secured less than 65% but more than 50% of attendance are NOT ELIGIBLE for condonation of shortage of attendance and such Students will not be permitted to appear for the regular examination, but will be allowed to proceed to the next year/next semester of the program and they may be permitted to taken ext University examination by paying the prescribed condonation fee

5.5. Detained students for want of attendance: Students who have earned less than 50% of attendance shall not be permitted to proceed to the next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion of final semester of the course, by paying the fee for the break of study as prescribed by the College from time to time.

5.6. Condonation of shortage of attendance for married women students: In respect to married women students undergoing UG programs, the minimum attendance for condonation (Theory/Practical) shall be relaxed and prescribed as 55% instead of 65% if they conceive during their academic career. Medical certificate from the Doctor (D.G.O) from the Government Hospital and the prescribed fee along with attendance details shall be forwarded to the college to consider the condonation of attendance mentioning the category

5.7. Zero Percent (0%) Attendance: The Students, who have earned 0% of attendance, have to repeat the program (by rejoining) without proceeding to succeeding semester and they have to obtain prior permission from the College/University immediately to rejoin the program.

5.8 Transfer of Students and Credits: The strength of the credits system is that it permits interinstitutional transfer of students. By providing mobility, it enables individual students to develop their capabilities fully by permitting them to move from one Institution to another in accordance with their aptitude and abilities by obtaining necessary permission from the university.

5.8.1 Transfer of Students is permitted from one Institution to another Institution for the same program with same nomenclature.

Provided, there is a vacancy in the respective program of Study in the Institution

where the transfer is requested.

Provided the Student should have passed all the courses in the Institution from where the transfer is requested.

5.8.2 The marks obtained in the courses will be converted and grades will be assigned as per the College norms.

5.8.3 The transfer students are eligible for classification.

5.8.4 The transfer students are not eligible for Ranking, Prizes and Medals.

5.8.5 Students who want to go to foreign Universities up to two semesters or Project Work with the prior approval of the Departmental/College Committee are allowed to get transfer of credits and marks which will be converted in to Grades as per the University norms and are eligible to get CGPA and Classification; they are not eligible for Ranking, Prizes and Medals.

5.9 Students are exempted from attendance requirements for online courses of the College and MOOC's.

6. EXAMINATION AND EVALUATION

6.1. Register for all subjects: Students shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

6.2. Marks for Internal and End Semester Examinations for PART I, II, III and IV

Category	Theory	Practical
Internal Assessment	25	**40**
End semester Examination	**75**	**60**

6.3. Procedure for Awarding Internal

Marks Internal Examination Marks – Theory

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

6.4 Awarding Marks for Attendance (out of 5)

Percentage of Attendance	Marks
Below60%	0 marks
60%to 75%	3 marks
75%to 90%	4 marks
Above90%	5 marks

6.5 Components for Practical CIA.

Components	Marks
CIA-I	15
CIA- II	15
Observation Note	05
Attendance	5
Total	40

6.6 Components for Practical ESE.

Components	Marks
Completion of Experiments	50
Record	05
Viva voce	05
Total	60

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

6.7.1. The Course Value Education Yoga is to be treated as 100% CIA course which is offered in V Semester for I year UG students.

6.7.2. The Course Environmental Studies is to be treated as 100% CIA course which is offered in IV Semester for I year UG students.

6.7.3 Total Marks for the Course =100

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

The passing minimum for this course is 40%

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

6.8 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** a) Attendance **b)** Review /Work Diary*[1]	10 Marks 30 Marks	**40**
Work Diary	25	-			
Report	50	50			
Viva-voce Examination	25	50			
Total	**100**	**100**	**ESE***[2] a) Final Report 40 Marks b)Viva-voce 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

6.9 Guidelines for Professional Competency Skill – Online Mode (Part IV)- 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.

QUESTION PAPER PATTERN FOR CIA I, II AND ESE	
(3 HOURS)	**MAXIMUM: 75 Marks**
SECTION-A **(Objective Type)** **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(10 x 1 = 10 marks)
SECTION-B**(Either or Type)** **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(5 x 5 = 25 marks)
SECTION-C **(Either or Type)** **Answer ALL Questions** ALL Questions Carry EQUAL Marks	(5 x 8 = 40 marks)
(Syllabus for CIA-I 2.5 Unit, Syllabus for CIA-II All 5 Unit)	

6.10 PASSING MINIMUM

6.10.1 There shall be no passing minimum for Internal.

6.10.2 For external examination, passing minimum shall be 40% [Forty Percentage] of the maximum marks prescribed for the course for each Course/Practical/Project and Viva-Voce.

6.10.3 In the aggregate [External/Internal] the passing minimum shall be of 40%.

6.10.4 He/She shall be declared to have passed the whole examination, if he / she passes in all the Courses and Practical wherever prescribed as per the scheme of the examinations by earning 140 CREDITS in Part I, II, III, IV& V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 credit to qualify for the Degree.

6.11. SUPPLIMENTARY EXAMINATION:

Supplementary Examinations is conducted for the students who appeared in the final semester examinations. Eligible criteria for appearing in the Supplementary Examinations are as follows:

6.11.1. Eligibility: A Student who is having arrear of only one theory course in any

of the semester or two theory course in the Final semester of the UG degree programme alone is eligible for Supplementary Examinations.

6.11.2 Non-eligibility for those completed the program: Students who have completed their Program duration but having arrears are not eligible to appear for Supplementary Examinations.

6.12. RETOTALLING, REVALUATION AND PHOTOCOPY OF THE ANSWER SCRIPTS:

6.12.1. Re-totaling: All UG Students who appeared for their Semester Examinations are eligible for applying for re-totaling of their answer scripts.

6.12.2. Revaluation: All current batch Students who have appeared for their SemesterExaminationsareeligibleforRevaluationoftheiranswerscripts.Passedoutcandidatesarenot eligible for Revaluation.

6.12.3. Photo copy of the answer scripts: Students who have applied for revaluation can apply for the Photocopy of answer scripts by paying prescribed fee.

7. CLASSIFICATION OF SUCCESSFUL STUDENTS

7

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
40-49	4.0-4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	**ABSENT**

7.1 Computation of Grade Point Average (GPA) in a Semester, Cumulative Grade Point Average(CGPA)and Classification

GPA for a Semester = $\frac{\sum_i C_i G_i}{\sum_i C_i}$

That is, GPA is the sum of the multiplication of grade points by the credits of the courses divided by the sum of the credits of the courses in a semester.

CGPA for the entire programme = $\sum_n \sum_i C_{n_i} G_{n_i} \Big/ \sum_n \sum_i C_{ni}$

That is, CGPA is the sum of the multiplication of grade points by the credits of the entire programme divided by the sum of the credits of the courses of the entire programme,

Where, C_i=Credits earned for course in any semester, G_i=Grade Points obtained for course in any semester = Semester in which such courses were credited.

7.2 Letter Grade and Classification

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5-10.0	O+	**First Class-Exemplary***
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	**First Class with Distinction***
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	**First Class**
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	**Second Class**
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	**Third Class**
4.0 and above but below 4.5	C	
0.0 and above but below 4.0	**U**	**Re-appear**

*The Students who have passed in the first appearance and within the prescribed

semester of the UG Programme (Major, Allied and Elective courses only) are eligible.

8. RANKING

Students who pass all the examinations prescribed for the Program in the FIRSTAPPEARANCEITSELF ALONE are eligible for Ranking I, II and III.

9. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAM TO QUALIFY FOR ADEGREE

9.1. A Student who for whatever reasons is not able to complete the program within the normal period (N) or the Minimum duration prescribed for the programme, may be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree.(Time Span = N+2 years for the completion of programme.)

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MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (Autonomous)

B.Sc., CHEMISTRY abstract under LOCF-CBCS Pattern with effect from 2023-2024 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	5	1	5	1	4	1	4	2	12	2	12	8	42
4	DSC - PRACTICAL	III	I	3	1	3	1	3	1	3	1	3	1	3	6	18
5	GENERIC ELECTIVE COURSES (GEC)- THEORY	III	1	3	1	3	1	3	1	3					4	12
6	GEC PRACTICAL	III			1	2			1	2					2	4
7	DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE)	III									2	6	2	6	4	12
8	PROJECT WORK	III											1	3	1	3
9	INTERNSHIP	IV									1	2			1	2
10	Professional competency skill	IV											1	2	1	2
11	SKILL ENHANCEMENT COURSES (SEC)	IV			1	2	2	4	2	4					5	10

12	NON MAJOR ELECTIVE COURSES (NMEC)	IV	1	2	1	2									2	4
13	FOUNDATION COURSE (FC)	IV	1	2											1	2
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		**7**	**21**	**8**	**23**	**7**	**20**	**9**	**24**	**7**	**25**	**8**	**27**	**46**	**140**

Total No. of Subjects	46
Marks	**4700**

PART	No. of Credits
PART - I	12
PART - II	12
PART - III	91
PART - IV	24
PART - V	1
Grand Total	**140**

Extra Credit	4
	144

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (Autonomous) - Rasipuram - 637 408
Scheme of Examinations LOCF-CBCS Pattern
(for the Students Admitted from the Academic Year:2023-2024 Onwards)
Programme : B. Sc. CHEMISTRY

S. No.	PART	STUDY COMPONENTS	COURSE_CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
					Lect.	Lab.		CIA	ESE	TOTAL
SEMESTER - I										
1	I	LANGUAGE - I	23M1UFTA01	TAMIL - I	6	-	3	25	75	100
2	II	LANGUAGE - II	23M1UFEN01	ENGLISH - I	6	-	3	25	75	100
3	III	DSC THEORY - I	23M1UCHC01	GENERAL CHEMISTRY - I	5	-	5	25	75	100
4	III	DSC PRACTICAL - I	23M1UCHP01	PRACTICAL: QUANTITATIVE INORGANIC ESTIMATIONS AND PREPARATIONS	-	3	3	40	60	100
5	III	GEC THEORY - I	23M1UMAA01 / 23M1UZOA01	ALLIED MATHEMATICS - I / ALLIED ZOOLOGY - I	4	-	3	25	75	100
6	III	GEC PRACTICAL - I	23M2UMAAP1 / 23M2UZOAP1	PRACTICAL : ALLIED MATHEMATICS / ALLIED ZOOLOGY	-	2	-	-	-	-
7	III	NMEC - I		NMEC THEORY - I	2	-	2	25	75	100
8	IV	FC THEORY - I	23M1UCHFC1	FOUNDATION COURSE IN CHEMISTRY	2	-	2	25	75	100
				TOTAL	**25**	**5**	**21**	**190**	**510**	**700**
SEMESTER - II										
1	I	LANGUAGE - I	23M2UFTA02	TAMIL - II	6	-	3	25	75	100

2	II	LANGUAGE - II	23M2UFEN02	ENGLISH - II	6	-	3	25	75	100
3	III	DSC THEORY - II	23M2UCHC02	GENERAL CHEMISTRY - II	5	-	5	25	75	100
4	III	DSC PRACTICAL - II	23M2UCHP02	PRACTICAL: QUALITATIVE ORGANIC ANALYSIS AND PREPARATIONS	-	3	3	40	60	100
5	III	GEC THEORY - II	23M2UMAA02 / 23M2UZOA02	ALLIED MATHEMATICS - II / ALLIED ZOOLOGY - II	4	-	3	25	75	100
6	III	GEC PRACTICAL - I	23M2UMAAP1 / 23M2UZOAP1	PRACTICAL: ALLIED MATHEMATICS / ALLIED ZOOLOGY	-	2	2	40	60	100
7	III	NMEC - II		NMEC THEORY - II	2	-	2	25	75	100
8	IV	SEC THEORY - I	23M2UCHS01	COSMETICS AND PERSONAL CARE PRODUCTS	2	-	2	25	75	100
				TOTAL	**25**	**5**	**23**	**230**	**570**	**800**
SEMESTER - III										
1	I	LANGUAGE - I	23M3UFTA03	TAMIL - III	6	-	3	25	75	100
2	II	LANGUAGE - II	23M3UFEN03	ENGLISH - III	6	-	3	25	75	100
3	III	DSC THEORY - III	23M3UCHC03	GENERAL CHEMISTRY - III	5	-	4	25	75	100
4	III	DSC PRACTICAL - III	23M3UCHP03	PRACTICAL: QUALITATIVE INORGANIC ANALYSIS	-	3	3	40	60	100
5	III	GEC THEORY - III	23M3UPHA01	ALLIED PHYSICS - I	4	-	3	25	75	100
6	III	GEC PRACTICAL - II	23M4UPHAP1	PRACTICAL: ALLIED PHYSICS	-	2	-	-	-	-
7	IV	SEC PRACTICAL - I	23M3UCHSP1	ENTREPRENEURIAL SKILLS IN CHEMISTRY	-	2	2	100	-	100

8	IV	SEC THEORY - II	23M3UCHS02	PESTICIDE CHEMISTRY	2	-	2	25	75	100
				TOTAL	**23**	**7**	**20**	**265**	**435**	**700**
SEMESTER - IV										
1	I	LANGUAGE - I	23M4UFTA04	TAMIL - IV	6	-	3	25	75	100
2	II	LANGUAGE - II	23M4UFEN04	ENGLISH - IV	6	-	3	25	75	100
3	III	DSC THEORY - IV	23M4UCHC04	GENERAL CHEMISTRY - IV	5	-	4	25	75	100
4	III	DSC PRACTICAL - IV	23M4UCHP04	PRACTICAL: PHYSICAL CHEMISTRY - I	-	3	3	40	60	100
5	III	GEC THEORY - IV	23M4UPHA02	ALLIED PHYSICS - II	4	-	3	25	75	100
6	III	GEC PRACTICAL - II	23M4UPHAP1	PRACTICAL: ALLIED PHYSICS	-	2	2	40	60	100
7	IV	SEC THEORY - III	23M4UCHS03	INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS	2	-	2	25	75	100
8	IV	SEC THEORY - IV	23M4UCHS04	FORENSIC SCIENCE	2	-	2	25	75	100
9	IV	AECC - ENVIRONMENTAL STUDIES *	23M4UEVS01	ENVIRONMENTAL STUDIES	-	-	2	100	-	100
		* Self Study		**TOTAL**	**25**	**5**	**24**	**330**	**570**	**900**
SEMESTER - V										
1	III	DSC THEORY - V	23M5UCHC05	ORGANIC CHEMISTRY - I	5	-	4	25	75	100
2	III	DSC THEORY - VI	23M5UCHC06	INORGANIC CHEMISTRY - I	5	-	4	25	75	100

3	III	DSC THEORY - VII	23M5UCHC07	PHYSICAL CHEMISTRY - I	5	-	4	25	75	100
4	III	DSC PRACTICAL - V	23M5UCHP05	PRACTICAL: PHYSICAL CHEMISTRY - II	-	3	3	40	60	100
5	III	DSE THEORY - I		ELECTIVE - I	5	-	3	25	75	100
6	III	DSE THEORY - II		ELECTIVE - II	5	-	3	25	75	100
7	IV	AECC - VALUE EDUCATION	23M5UVED01	YOGA	2	-	2	100	-	100
8	IV	INTERNSHIP	23M5UCHIS1	INTERNSHIP	-	-	2	100	-	100
				TOTAL	**27**	**3**	**25**	**365**	**435**	**800**
SEMESTER - VI										
1	III	DSC THEORY - VIII	23M6UCHC08	ORGANIC CHEMISTRY - II	5	-	4	25	75	100
2	III	DSC THEORY - IX	23M6UCHC09	INORGANIC CHEMISTRY - II	5	-	4	25	75	100
3	III	DSC THEORY - X	23M6UCHC10	PHYSICAL CHEMISTRY - II	5	-	4	25	75	100
4	III	DSC PRACTICAL -VI	23M6UCHP06	PRACTICAL: GRAVIMETRIC ESTIMATIONS	-	3	3	40	60	100
5	III	DSE THEORY - III		ELECTIVE - III	5	-	3	25	75	100
6	III	DSE THEORY - IV		ELECTIVE - IV	4	-	3	25	75	100
7	III	PROJECT WORK	23M6UCHPR1	PROJECT WORK	-	3	3	40	60	100
8	IV	PROFESSIONAL COMPETENCY SKILL	23M6UCHOE1	CHEMISTRY FOR COMPETITIVE EXAMINATIONS	-	-	2	100	-	100

9	IV	EXTENSION ACTIVITY	23M6UEXA01	EXTENSION ACTIVITY	-	-	1	-	-	-
				TOTAL	**24**	**6**	**27**	**305**	**495**	**800**
				OVER ALL TOTAL	**149**	**31**	**140**	**1495**	**2805**	**4700**
1	V	EXTRA CREDIT COURSE - ONLINE		MOOC Courses offered in SWAYAM/NPTEL	-	-	2	-	-	-
2	V	VALUE ADDED COURSE		VALUE ADDED COURSE	-	-	2	-	-	-

HoD Member Secretary of Academic Council Principal

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHC01	**GENERAL CHEMISTRY- I**	**DSC THEORY - I**	**I**	**5**	**5**	**-**	**-**	**5**
Objective	Students will understand the basic concepts of atomic structure, chemical bonding and General Organic Chemistry.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Atomic structure and Periodic trends:** History of atom (J.J.Thomson, Rutherford); Moseley's Experiment and Atomic number, Atomic Spectra; Black-Body Radiation and Planck's quantum theory - Bohr's model of atom; The Franck-Hertz Experiment; Interpretation of H spectrum; Photoelectric effect, Compton effect; Dual nature of Matter- De Broglie wavelength-Davisson and Germer experiment Heisenberg's Uncertainty Principle; Electronic Configuration of Atoms and ions - Hund's rule, Pauli exclusion principle and Aufbau's principle; Numerical problems involving the core concepts.	K2	12
II	**Introduction to Quantum mechanics:** Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics; probability interpretation of wave functions, Formulation of Schrodinger wave equation - Probability and electron density-visualizing the orbitals -Probability density and significance of Ψ and Ψ^2 **Modern Periodic Table:** Cause of periodicity; Features of the periodic table; classification of elements - Periodic trends for atomic size-Atomic radii, Ionic, crystal and Covalent radii; ionization energy, electron affinity, electronegativity - electronegativity scales, applications of electronegativity. Problems involving the core concepts.	K3	12

III	**Structure and bonding – I:** **Ionic bond** Lewis dot structure of ionic compounds; properties of ionic compounds; Energy involved in ionic compounds; Born Haber cycle – lattice energies, Made lung constant; relative effect of lattice energy and solvation energy; Ion polarisation – polarising power and polarizability; Fajans' rules - effects of polarisation on properties of compounds; problems involving the core concepts. **Covalent bond** Shapes of orbitals, overlap of orbitals – σ and Π bonds; directed valency - hybridization; VSEPR theory - shapes of molecules of the type AB_2, AB_3, AB_4, AB_5, AB_6 and AB_7 Partial ionic character of covalent bond-dipole moment, application to molecules of the type A_2, AB, AB_2, AB_3, AB_4; percentage ionic character numerical problems based on calculation of percentage ionic character	K4	12
IV	**Structure and bonding – II:** **VB theory** – application to hydrogen molecule; concept of resonance - resonance structures of some inorganic species – CO_2, NO_2, CO_3^{2-}, NO_3^-; limitations of VBT; MO theory - bonding, antibonding and nonbonding orbitals, bond order; MO diagrams of H_2, C_2, O_2, O_2^+, O^{2-}, O_2^{2-}, N_2, NO, HF, CO; magnetic characteristics, comparison of VB and MO theories. Coordinate bond: Definition, Formation of BF_3, NH_3, NH_4^+, H_3O^+ properties Metallic bond-electron sea model, VB model; Band theory-mechanism of conduction in solids; conductors, insulator, semiconductor – types, applications of semiconductors Weak Chemical Forces - Vander Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces; Hydrogen bonding – Types, special properties of water, ice, stability of DNA; Effects of chemical force, melting and boiling points.	K5	12
V	**Basic concepts in Organic Chemistry and Electronic effects:** Types of bond cleavage – heterolytic and homolytic; arrow pushing in organic reactions; reagents and substrates; types of reagents - electrophiles, nucleophiles, free radicals; reaction intermediates – carbanions, carbocations, carbenes, arynes and nitrynes. Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects. Resonance – resonance energy, conditions for resonance - acidity of phenols, basicity of aromatic amines, stability of carbonium ions, carbanions and free radicals, reactivity of vinyl chloride, dipole moment of vinyl chloride and nitrobenzene, bond lengths; steric inhibition to resonance. Hyperconjugation - stability of alkenes, bond length, orienting effect of methyl group, dipole moment of aldehydes and nitromethane. Types of organic reactions- addition, substitution, elimination and rearrangement	K5	12

Course Outcome	**CO1:** Explain the atomic structure, wave particle duality of matter, periodic properties, bonding and properties of compounds.	K2	
	CO2: Classify the elements in the periodic table, types of bonds, reaction intermediates, electronic effects in organic compounds and types of reagents	K3	
	CO3: Apply the theories of atomic structure and bonding to calculate energy of a spectral transition, Δx, Δp, electronegativity, percentage ionic character and bond order.	K4	
	CO4: Evaluate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions; structure reactivity and electronic effects	K5	
	CO5: Construct MO diagrams, predict trends in periodic properties, assess the properties of elements, and explain hybridization in molecules, nature of H – bonding and organic reaction mechanisms.	K5	

Learning Resources				
Text Books	1. Madan, R. D. and Sathya Prakash, Modern Inorganic Chemistry, 2 nd ed.; S. Chand and Company: New Delhi, 2003. 2. Rao, C.N. R. University General Chemistry, Macmillan Publication: New Delhi, 2000. 3. Puri, B. R. and Sharma, L. R. Principles of Physical Chemistry, 38th ed.;Vishal Publishing Company: Jalandhar, 2002.			
Reference Books	1. Maron, S. H. and Prutton C. P. Principles of Physical Chemistry,4 th ed.; The Macmillan Company: Newyork,1972. 2. Lee, J. D. Concise Inorganic Chemistry, 4th ed.; ELBS William Heinemann: London,1991. 3. Gurudeep Raj, Advanced Inorganic Chemistry, 26th ed.; Goel Publishing House: Meerut, 2001.			
Website Link	1) https://onlinecourses.nptel.ac.in 2) http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm 3) http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHC01	**GENERAL CHEMISTRY- I**		**DSC THEORY - I**		**I**	**5**	**5**	**-**	**-**	**5**

CO-PO Mapping

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

Tutorial Schedule	-	
Teaching and Learning Methods	Chalk and Board class and PPT Presentation	
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations	
Designed By	**Verified By HoD**	**Approved By Member Secretary**
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHP01	**PRACTICAL: QUANTITATIVE INORGANIC ESTIMATIONS AND PREPARATIONS**	**DSC PRACTICAL - I**	**I**	**3**	**-**	**-**	**3**	**3**
Objective	Students will gain knowledge on laboratory safety, handling glasswares, Quantitative estimations and preparation of inorganic compounds							

S. No.	Course Content	Knowledge Levels	Sessions
1	**Chemical Laboratory Safety in Academic Institutions** Introduction - importance of safety education for students, common laboratory hazards, assessment and minimization of the risk of the hazards, prepare for emergencies from uncontrolled hazards; concept of MSDS; importance and care of PPE; proper use and operation of chemical hoods and ventilation system; fire extinguishers-types and uses of fire extinguishers, demonstration of operation; chemical waste and safe disposal.	K2	3
2	**Common Apparatus Used in Quantitative Estimation (Volumetric)** Description and use of burette, pipette, standard flask, measuring cylinder, conical flask, beaker, funnel, dropper, clamp, stand, wash bottle, watch glass, wire gauge and tripod stand.	K2	3
3	**Principle of Quantitative Estimation (Volumetric)** Equivalent weight of an acid, base, salt, reducing agent, oxidizing agent; concept of mole, molality, molarity, normality; primary and secondary standards, preparation of standard solutions; theories of acid-base, redox, complexometric, iodimetric and iodometric titrations**;** indicators – types, theory of acid–base, redox, metal ion and adsorption indicators, choice of indicators.	K3	9
4	**Quantitative Estimation (Volumetric)** Preparation of standard solution, dilution from stock solution	K5	3
5	**Permanganometry** Estimation of oxalic acid using standard ferrous ammonium sulphate	K5	6
6	**Dichrometry** Estimation of ferric alum using standard dichromate (external indicator) Estimation of ferric alum using standard dichromate (internal indicator)	K5	6
7	**Iodometry** Estimation of copper in copper sulphate using standard dichromate	K5	6
8	**Argentimetry (Not for Examination)** Estimation of chloride in barium chloride using standard sodium	K5	3

	chloride/ Estimation of chloride in sodium chloride (Volhard's method)		
9	**Complexometry (not for examination)** Estimation of hardness of water using EDTA	K5	3
10	**Estimations (not for examination)** Estimation of iron in iron tablets Estimation of ascorbic acid	K5	9
11	**Preparation of Inorganic compounds** Potash alum Tetramminecopper(II) sulphate Hexamminecobalt (III) chloride Mohr's salt	K6	3
Course Outcome	**CO1:** Explain the basic principles involved in titrimetric analysis and inorganic preparations	K2	
	CO2: Compare the methodologies of different titrimetric analysis	K3	
	CO3: Calculate the concentrations of unknown solutions in different ways and develop the skillto estimate the amount of a substance present in a given solution	K4	
	CO4: Identify the end point of various titrations	K5	
	CO5: Assess the yield of different inorganic preparations and identify the end point of various titrations	K6	
Learning Resources			
Text Books	1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. *Basic Principles ofPractical Chemistry,* 2nd ed.; Sultan Chand &Sons: New Delhi, 1997. 2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; *An advanced course in PracticalChemistry,* 3rd ed.; New Central Book Agency: Kolkata, 2007.		
Reference Books	1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, Pearson Educaton Ltd., New Delhi, 2000		
Website Link	1) http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis 2) https://chemdictionary.org/titration-indicator/		

B.Sc - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHP01	**PRACTICAL: QUANTITATIVE INORGANIC ESTIMATIONS AND PREPARATIONS**		**DSC PRACTICAL - I**		**I**	**3**	**-**	**-**	**3**	**3**

CO-PO Mapping

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

Tutorial Schedule	NIL		
Teaching and Learning Methods	Chalk and Board class, Demo class and Practical class		
Assessment Methods	CIA-I, CIA-II and End Semester Examination		
Designed By	**Verified By HoD**	**Approved By Member Secretary**	
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha	

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHC02	**GENERAL CHEMISTRY-II**	**DSC THEORY - II**	**II**	**5**	**5**	**-**	**-**	**5**
Objective	Students will learn about the chemistry of acids, bases and ionic equilibrium, properties of s and p-block elements, chemistry of hydrocarbons, applications of acids and bases, compounds of main block elements and hydrocarbons.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Acids, bases and Ionic equilibria:** Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept, Lewis concept; Relative strengths of acids, bases and dissociation constant; dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions; Degree of dissociation, common ion effect, factors affecting degree of dissociation; acid base indicators, theory of acid base indicators – action of phenolphthalein and methyl orange, titration curves - use of acid base indicators; Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson-Hasselbalch equation; Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis; Solubility product - determination and applications; numerical problems involving the core concepts	K2	12
II	**Chemistry of s - Block Elements:** Hydrogen: Position of hydrogen in the periodic table. Alkali metals: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates. Diagonal relationship of Li with Mg. Preparation, properties and uses of NaOH, Na_2CO_3, KBr, $KClO_3$ alkaline earth metals. Anomalous behaviour of Be. **Chemistry of p- Block Elements (Group 13 & 14)** preparation and structure of diborane and borazine. Chemistry of borax. Extraction of Al and its uses. Alloys of Al. comparison of carbon with silicon. Carbon-di-sulphide – Preparation, properties, structure and uses. Percarbonates, per mono carbonates and per dicarbonates.	K3	12

III	**Chemistry of p- Block Elements (Group 15-18)** General characteristics of elementsof Group 15; chemistry of H_2N-NH_2, NH_2OH, H_3N and HNO_3. Chemistry of PH_3, PCl_3, PCl_5, $POCl_3$, P_2O_5 and oxy acids of phosphorous (H_3PO_3 and H_3PO_4). General properties of elements of group 16 - Structure and allotropy of elements - chemistry of ozone - Classification and properties of oxides - oxides of sulphur and selenium – Oxy acids of sulphur (Caro's and Marshall's acids). Chemistry of Halogens: General characteristics of halogen with reference to electro-negativity, electron affinity, oxidation states and oxidizing power. Peculiarities of fluorine. Halogen acids (HF, HCl, HBr and HI), oxides and oxy acids ($HClO_4$). Inter-halogen compounds (ICl, ClF_3, BrF_5 and IF_7), pseudo halogens [$(CN)_2$ and $(SCN)_2$] and basic nature of Iodine. Noble gases: Position in the periodic table. Preparation, properties and structure of XeF_2, XeF_4, XeF_6 and $XeOF_4$; uses of noble gases – clathrate compounds	K4	12
IV	**Hydrocarbon Chemistry-I** **Petroproducts:** Fractional distillation of petroleum; cracking, isomerisation, alkylation, reforming and uses **Alkenes**-Nomenclature, general methods of preparation – Mechanism of β elimination reactions – E1 and E2 mechanism - factors influencing – stereochemistry – orientation – Hofmann and Saytzeff rules. Reactions of alkenes – addition reactions – mechanisms – Markownikoff's rule, Kharasch effect, oxidation reactions – hydroxylation, oxidative degradation, epoxidation, ozonolysis; polymerization. **Alkadienes** Nomenclature - classification – isolated, conjugated and cumulated dienes; stability of conjugated dienes; mechanism of electrophilic addition to conjugated dienes - 1, 2 and 1, 4 additions; free radical addition to conjugated dienes– Diels–Alder reactions – polymerisation – polybutadiene, polyisoprene (natural rubber), vulcanisation, polychloroprene. **Alkynes** Nomenclature; general methods of preparation, properties and reactions; acidic nature of terminal alkynes and acetylene, polymerisation and isomerisation. **Cycloalkanes:** Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations. Conformational analysis of cyclohexane, mono and di substituted cyclohexanes. Geometrical isomerism in cyclohexanes.	K4	12
V	**Hydrocarbon Chemistry – II** **Benzene**: Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, Huckel's (4n+2) rule and its applications. Electrophilic substitution reactions - General mechanism of aromatic electrophilic substitution - nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and disubstituted benzene - Effect of substituent – orientation and reactivity. **Polynuclear Aromatic hydrocarbons:** Naphthalene – nomenclature, Haworth synthesis; physical properties, reactions – electrophilic	K5	12

	substitution reaction, nitration, sulphonation, halogenation, Friedel – Crafts acylation & alkylation, preferential substitution at - position – reduction, oxidation – uses. Anthracene – synthesis by Elbs reaction, Diels – Alder reaction and Haworth synthesis; physical properties; reactions - Diels-Alder reaction, preferential substitution at C-9 and C-10; uses.		
Course Outcome	**CO1:** Explain the concept of acids, bases and ionic equilibria; periodic properties of s and p block elements, preparation and properties of aliphatic and aromatic hydrocarbons.	K1	
	CO2: Discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids	K2	
	CO3: Classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons	K3	
	CO4: Demonstrate the theories of acids, bases and indicators, buffer action and important compounds of s-block elements.	K3	
	CO5: Assess the application of hard and soft acids indicators, buffers, compounds of s and p-block elements.	K4	

Learning Resources

Text Books	1. Madan R D, Sathya Prakash, Modern Inorganic Chemistry, 2 nded, S. Chand and Company, New Delhi, 2003. 2. Sathya Prakash, Tuli G D, Basu S K and Madan R D, Advanced Inorganic Chemistry, 17th ed., S.Chand and Company, New Delhi, 2003. 3. Bahl B S, Arul Bhal, Advanced Organic Chemistry, 22nd ed., S. Chand and Company, New Delhi, 2016.
Reference Books	1.Maron S H and Prutton C P, Principles of Physical Chemistry, Kindle edition, CBS Publishers and Distributors, 2017. 2. Barrow G M, Physical Chemistry, 6th ed., Tata McGraw Hill, New Delhi, 1996 3. Lee J D, Concise Inorganic Chemistry, 5thed., ELBS William Heinemann, London, 2008
Website Link	1.https://onlinecourses.nptel.ac.inhttp://cactus.dixie.edu/smblack/chem1010/lecture_notes/4B.html 2.http://www.auburn.edu/~deruija/pdareson.pdfhttps://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding 3. Classification of elements and periodic properties http://nptel.ac.in/courses/104101090

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

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHC02	**GENERAL CHEMISTRY-II**		**DSC THEORY - II**		**II**	**5**	**5**	**-**	**-**	**5**

CO-PO Mapping

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

Tutorial Schedule	-
Teaching and Learning Methods	Chalk and Board class and PPT Presentation
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations

Designed By	**Verified By HoD**	**Approved By Member Secretary**
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHP02	**PRACTICAL: QUALITATIVE ORGANIC ANALYSIS AND PREPARATIONS**	**DSC PRACTICAL - II**	**II**	**3**	**-**	**-**	**3**	**3**
Objective	This course aims at providing knowledge on laboratory safety, handling glass wares, analysis of organic compounds, preparation of organic compound.							

S. No.	Course Content	Knowledge Levels	Sessions
1	Safety rules, symbols and first-aid in chemistry laboratory Basic ideas about Bunsen burner, its operation and parts of the flame. Chemistry laboratory glassware –basis information and uses	K2	30
2	**Qualitative Organic Analysis Preliminary examination**, detection of special elements - nitrogen, sulphur and halogens Aromatic and aliphatic nature, Test for saturation and unsaturation, identification of functional groups using solubility tests Confirmation of functional groups 1.Monocarboxylic acid, dicarboxylic acid 2. Monohydric phenol, polyhydric phenol 3.Aldehyde, ketone, ester 4.Carbohydrate (reducing and non-reducing sugars) 5.Primary, secondary, tertiary amine 6.Monoamide, diamide, thioamide 7.Anilide, nitro compound Preparation of derivatives for functional groups	K4	
3	**Preparation of Organic Compounds** i. Nitration - picric acid from Phenol ii. Halogenation - p-bromo acetanilide from acetanilide iii. Oxidation - benzoic acid from Benzaldehyde iv. Microwave assisted reactions in water: v. Methyl benzoate to Benzoic acid vi. Salicylic acid from Methyl Salicylate vii. Rearrangement - Benzil to Benzilic Acid viii. Hydrolysis of benzamide to Benzoic Acid	K5	
4	**Separation and Purification Techniques (Not for Examination)** 1. Purificationof organic compounds by crystallization (from water / alcohol) and distillation 2. Determination of melting and boiling points of organic compounds. 3. Steam distillation - Extraction of essential oil from citrus fruits/eucalyptus leaves.	K5	
5	**Chromatography (any one) (Group experiment)** (i) Separation of amino acids by Paper Chromatography	K5	

	(ii) Thin Layer Chromatography - mixture of sugars / plant pigments /permanganate dichromate. (iii) Column Chromatography - extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene - anthracene picrate.		
6	**Electrophoresis** – Separation of amino acids and proteins. **(Demonstration)**	K5	
7	Isolation of casein from milk/Determination of saponification value of oil or fat/Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4,5& 6–not for ESE)	K5	
Course Outcome	**CO1:** Explain the basic knowledge on laboratory safety	K1	
	CO2: Compare the methodologies of different types of glass wares handling	K2	
	CO3: Analyse the given organic compounds.	K3	
	CO4: Differentiate the extraction and separation methods.	K4	
	CO5: Formulate the separation of amino acids and proteins by electrophoresis.	K5	

Learning Resources	
Text Books	1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand: New Delhi, 2012. 2. Manna, A.K. Practical Organic Chemistry, Books and Allied: India, 2018. 3. Gurtu, J. N; Kapoor, R. Advanced Experimental Chemistry (Organic), Sultan Chand: New Delhi, 1987.
Reference Books	1. Furniss,B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. Vogel's Textbook of Practical Organic Chemistry, 5th ed.; Pearson: India,1989.
Website Link	1) https://www.vlab.co.in/broad-area-chemical-sciences 2) https://www.youtube.com/watch?v=jJzWt3keHms

B.Sc - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHP02	**PRACTICAL: QUALITATIVE ORGANIC ANALYSIS AND PREPARATIONS**			**DSC PRACTICAL - II**		**II**	**3**	**-**	**-**	**3**	**3**

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

Tutorial Schedule	NIL		
Teaching and Learning Methods	Chalk and Board class, Demo class and Practical class		
Assessment Methods	CIA-I, CIA-II and End Semester Examination		
Designed By	**Verified By HoD**	**Approved By Member Secretary**	
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha	

B.Sc.-Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHC03	**GENERAL CHEMISTRY - III**	**DSC THEORY-III**	**III**	**5**	**3**	**2**	**-**	**4**
Objective	Students will imbibe a comprehensive knowledge on the fundamentals of nuclear chemistry and halo-organic compounds, alcohols and phenols.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Gaseous state** **Kinetic molecular model of a gas:** Postulates and derivation from the kinetic gas equation; The Maxwell - Boltzmann distribution of speed of molecules - average, root mean square and most probable velocity and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Collision frequency; collision diameter; mean free path. **Real gases:** Deviations from ideal gas behaviour, compressibility factor (Z) and its variation with pressure for different gases. Equations of states for real gases van der Waal's equation; Boyle temperature; law of corresponding states - liquefaction of gases; numerical problems involving the core concepts**.**	K2	12
II	**Liquid and Solid State** Properties of Liquids - Surface tension, viscosity and their applications. Crystalline and amorphous - differences - geometry, isotropy and anisotropy, melting point; isomorphism, polymorphism. Symmetry elements - plane, centre and axis; Miller indices, unit cells and space lattices; classification of crystal systems; Bravais lattices; X - ray diffraction - Bragg's equation Packing in atomic solids - simple cubic, body centred cubic, face centred and hexagonal close packing; Coordination number in typical structures - NaCl, CsCl, ZnS, TiO_2; comparison of structure and properties of diamond and graphite;. numerical problems involving core concepts Defects in solids - stoichiometric and non-stoichiometric defects. Liquid crystals - classification and applications	K3	12
III	**Nuclear Chemistry** Natural radioactivity α, β and γ rays; - half-life period; Natural radioactivity - displacement law; Geiger-Nattal rule; isotopes, isobars, isotones, isodiaphers; nuclear isomerism; radioactive decay series; magic numbers; units - Curie, Rutherford, Roentgen; nuclear stability – neutron proton ratio; binding energy; packing fraction; mass defect. Simple calculations involving mass defect and B.E., decay constant and $t_{1/2}$ and	K3	12

	radioactive series. Isotopes - uses - tracers - determination of age of rocks by radiocarbon dating. (Problems to be worked out) Nuclear energy; nuclear fission and fusion - major nuclear reactors in India; radiation hazards, disposal of radioactive waste and safety measures		
IV	**Halogen derivatives** **Aliphatic halogen derivatives** Classes of alkyl halides - physical properties, Chemical reactions. Nucleophilic substitution reactions - S_N1 , S_N2 and S_Ni mechanisms. **Di and Tri Halogen derivatives** Classification, preparation, properties and applications. **Aromatic halogen compounds** Preparation, properties and uses Mechanism of nucleophilic aromatic substitution - benzyne intermediate. **Aryl alkyl halides** Benzyl chloride - preparation - preparation properties and uses **Alcohols** Classification, preparation, properties, use; test for hydroxyl groups. Oxidation of diols by periodic acid and lead tetraacetate	K4	12
V	**Phenols** Classification, Preparation from diazonium salts, cumene, Dow's process, Reaching process; properties - acidic character and effect of substitution on acidity. Reactions - Fries, Claisen rearrangement, Electrophilic substitution reactions, Reimer - Teimenn, Kolbe, Schmidt, Gattermann synthesis, Libermann reaction. Resorcinol and picric acid – preparation, properties and uses. **Aromatic alcohols** Benzyl alcohol - methods of preparation - hydrolysis, reduction of benzaldehyde, Cannizzaro reaction, Grignard synthesis, physical properties - Reactions with sodium, phosphorus pentachloride, thionyl chloride, acetic anhydride and hydrogen iodide ***Current Trends - Aromatic Hydrocarbons and its uses***	K4	12
	.... Self-study		
Course Outcome	**CO1:** Explain the kinetic properties of gases by using mathematical concepts.	K1	
	CO2: Describe the physical properties of liquid and solids; identify various types of crystals with respect to its packing and XRD method for crystal structure determinations.	K2	
	CO3: Investigate the radioactivity, nuclear energy and it's production, also the nuclear waste management.	K3	
	CO4: Write the nomenclature, physical & chemical properties and basic mechanisms of halo organic compounds and alcohols.	K4	
	CO5: Assess the named organic reactions related to phenol and aromatic alcohol including thionyl chloride.	K5	
Learning Resources			

Text Books	1. B.R. Puri, L.R. Sharma, M.S. Pathania; Principles of Physical Chemistry, Vishal Publishing, 46th edition, 2020. 2. P.L. Soni and Mohan Katyal, Textbook of Inorganic Chemistry, Sultan Chand & amp; Sons, twentieth edition, 2016.			
Reference Books	1 A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt., Ltd.,New Delhi, seventh edition, 2019. 2. I. L. Finar, Organic Chemistry, Wesley Longman Ltd, England, 2014.			
Website Link	1.https://nptel.ac.in/courses/104104101 2.https://nptel.ac.in/courses/103106071 3.https://nptel.ac.in/courses/104106119s			
Self-Study Material	https://rb.gy/5kuy2c			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHC03	**GENERAL CHEMISTRY - III**			**DSC THEORY- III**		**III**	**5**	**3**	**2**	**-**	**4**
CO-PO Mapping											
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	S	S	M	S	S	S	M	S	M	S	
CO2	S	M	M	S	S	S	M	S	M	S	
CO3	S	S	M	S	S	S	M	S	M	S	
CO4	S	S	S	M	S	S	M	M	M	S	
CO5	S	S	M	S	S	S	M	S	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 Board class and PPT Presentation										
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations										
Designed By	**Verified By HoD**					**Approved By Member Secretary**					
Mr. V. Santhoshkumar	Dr. N. Nithiya					Dr. S. Shahitha					

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637408

B.Sc - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHP03	**PRACTICAL: QUALITATIVE INORGANIC ANALYSIS**	**DSC PRACTICAL-III**	**III**	**3**	**-**	**-**	**3**	**3**
Objective	Students will develop the skill on systematic analysis of simple inorganic salts and mixture of salts and semi micro analysis.							

S. No.	Course Content	Knowledge Levels	Sessions
1	**Semi - Micro Qualitative Analysis** Analysis of simple acid radicals: Carbonate, Sulphide, Sulphate, Thiosulphite, Chloride, Bromide, Iodide, Nitrate	K4	2
2	Analysis of interfering acid radicals: Fluoride, Oxalate, Borate, Phosphate, Arsenate, Arsenite.	K4	2
3	Elimination of interfering acid radicals and Identifying the group of basic radicals	K4	2
4	Analysis of basic radicals (group wise): Lead, Copper, Bismuth, Cadmium, Tin, Antimony, Iron, Aluminium, Arsenic, Zinc, Manganese, Nickel, Cobalt, Calcium, Strontium, Barium, Magnesium, Ammonium	K6	12
5	Analysis of a mixture - I to VI containing two cations and two anions (of which one is interfering type)	K6	12
Course Outcome	**CO1: A**cquire knowledge on the systematic analysis of Mixture of salts	K5	
	CO2: Identify the cations and anions in the given mixture	K5	
	CO3: Impart practical Skills in identifying the interfering acid radicals and eliminating it to identify the cations	K6	
	CO4: Adapt the role of common ion effect and solubility product in analyzing the salt mixtures.	K6	
	CO5: Apply this practical to analyse the soil and water samples	K6	

Learning Resources	
Text Books	1. V. Venkateswaran, R. Veeraswamy and A. R. Kulandivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, second edition, 1997.
Reference Books	1. A Textbook of Qualitative Analysis including Semi-micro methods,A.I.Vogel.
Website Link	https://www.vlab.co.in/broad-area-chemical-sciences

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards											
Course Code	**Course Title**			**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHP03	**PRACTICAL: QUALITATIVE INORGANIC ANALYSIS**			**DSC PRACTICAL-III**			**III**	**3**	**-**	**-**	**3**	**3**
CO-PO Mapping												
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**		
CO1	S	S	S	S	S	M	S	M	M	S		
CO2	M	S	S	S	M	M	S	S	M	S		
CO3	S	S	S	M	S	S	S	S	S	S		
CO4	S	S	S	S	S	S	S	M	S	M		
CO5	S	M	S	S	L	S	S	S	S	S		
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG			
Tutorial Schedule	-											
Teaching and Learning Methods	Demonstrate Class, Class practical											
Assessment Methods	Observation, Record, Model & End Semester Practical Examinations											
Designed By	**Verified By HoD**								**Approved By Member Secretary**			
Mrs. S. Eswari	Dr. N. Nithiya								Dr. S. Shahitha			

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHC04	**GENERAL CHEMISTRY - IV**	**DSC THEORY-IV**	**IV**	**5**	**3**	**2**	**-**	**4**
Objective	Students will gain knowledge on thermodynamics, transition elements and the organic chemistry of ethers, aldehydes, ketones and carboxylic acids.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Thermodynamics I** Terminology – Intensive and extensive properties, state and path functions; isolated, closed and open systems; isothermal, adiabatic, isobaric, isochoric, cyclic, reversible and irreversible processes; First law of thermodynamics - Concept and significance of heat (q), work (w), internal energy (E), enthalpy (H); calculations of q, w, E and H for reversible expansion of ideal gases under isothermal conditions; relation between heat capacities (Cp & Cv); Joule Thomson effect- inversion temperature. Thermochemistry - heats of reactions, standard states; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions; Hess's law and its applications; Measurement of heat of reaction - Zeroth law of thermodynamics-Absolute Temperature scale.	K2	12
II	**Thermodynamics II** Second Law of thermodynamics - Limitations of first law, spontaneity and randomness; Carnot's cycle; Concept of entropy, entropy change for reversible and irreversible processes, entropy of mixing. Calculation of entropy changes of an ideal gas with changes in temperature, volume and pressure. Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs-Helmholtz equation – derivations and applications; Maxwell relationships, thermodynamic equations of state; Thermodynamics of mixing of ideal gases, Ellingham Diagram-application.Third law of thermodynamics - Nernst heat theorem; Applications of third law - evaluation of absolute entropies from heat capacity measurements, exceptions to third law.	K3	12

III	**General Characteristics of d-block elements** **Transition Elements**- Electronic configuration - General periodic trends in variable valency, oxidation states, stability of oxidation states, colour, magnetic properties, catalytic properties and tendency to form complexes. Comparative study of transition elements and non transition elements – comparison of II and III transition series with I transition series. Group study of Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel and Zinc groups	K3	12
IV	**Ethers and Epoxides** Nomenclature, isomerism, general methods of preparations, reactions involving cleavage of C-O linkages, alkyl group and ethereal oxygen. Zeisel's method of estimation of methoxy group. Reactions of epoxides with alcohols, ammonia derivatives and $LiAH_4$ **Aldehydes and Ketones** Nomenclature, structure and reactivity of aliphatic and aromatic aldehydes and ketones; general methods of preparation and physical properties. Nucleophilic addition reactions, base catalyzed reactions with mechanism Aldol, Cannizzaro's reaction, Perkin reaction, Benzoin condensation, Haloform reaction, Knoevenagel reaction. Oxidation of aldehydes. Reduction: Clemmensen reduction, Wolf - Kishner reduction, Meerwein - Pondorf Verley reduction, reduction with $LiAlH_4$ and $NaBH_4$. Addition reactions of unsaturated carbonyl compounds: Michael addition	K4	12
V	**Carboxylic Acids**: Nomenclature, structure, preparation and reactions of aliphatic and aromatic monocarboxylic acids. Physical properties,acidic nature, effect of substituent on acidic strength. Claisen ester condensation, decarboxylation, Huns-diecker reaction. Formic acid-reducing property. **Carboxylic acid Derivatives:** Preparations of aliphatic and aromatic acid chlorides, esters, amides and anhydrides. Nucleophilic substitution reaction at the acyl carbon of acyl halide and anhydride. Schotten - Baumann reaction, Claisen condensation, Dieckmann and Reformatsky reactions **Active methylene compounds:** Keto - enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate **Halogen substituted acids** - nomenclature; preparation by direct halogenation, iodination from unsaturated acids, alkyl malonic acids ***Current Trends - Carboxylic acid derivatives and its uses***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recite the thermodynamic concepts on chemical processes and applied aspects.	K2	
	CO2: Understand the second law of thermodynamics and third law of thermodynamics	K3	
	CO3: Articulate the transition elements with reference to periodic properties.	K3	

	CO4: Identify the organic chemistry of ethers, aldehydes and ketones	K4	
	CO5: Evaluate the organic chemistry of carboxylic acids and derivatives.	K5	

Learning Resources	
Text Books	1. B.R. Puri and L.R. Sharma, *Principles of Physical Chemistry*, Shoban Lal Nagin Chand and Co., thirty three edition, 2017. 2. S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan India Ltd., third edition, 2011. 3. R. T. Morrison, R. N. Boyd, Saibal Kanti Bhattacharjee, Organic Chemistry, 7th edition, Pearson Education India, 2010.
Reference Books	1. Maron, S. H. and Prutton C. P. Principles of Physical Chemistry,4; The Macmillan Company: New York, 2012. 2. Huheey, J. E. Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed; Addison Wesley Publishing Company: India,2013.
Website Link	1.https://nptel.ac.in/courses/112102255 2.://nptel.ac.in/courses/104101136
Self-Study Material	https://rb.gy/cc0vpx

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

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHC04	**GENERAL CHEMISTRY - IV**			**DSC THEORY-IV**		**IV**	**5**	**3**	**2**	**-**	**4**

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

Tutorial Schedule	Group discussion, Google classroom
Teaching and Learning Methods	Chalk and Board class and PPT Presentation
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations

Designed By	**Verified By**	**Approved By Member Secretary**
Mr. V. Santhoshkumar	Dr. N. Nithiya	Dr. S. Shahitha

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHP04	**PRACTICAL: PHYSICAL CHEMISTRY – I**	**DSC PRACTICAL-IV**	**IV**	**3**	**-**	**-**	**3**	**3**
Objective	The course aims at providing an understanding of the laboratory experiments in order to understand the concepts of physical changes in chemistry , the rates of chemical reactions and colligative properties and adsorption isotherm							

S. No.	Course Content	Knowledge Levels	Sessions
1	Determination of rate constant of acid catalysed hydrolysis of an ester (methyl acetate (or) ethyl acetate).	K5	30
2	Determination of order of reaction between iodide and persulphate (initial rate method).	K5	
3	Polarimetry: Determination of rate constant of acid catalysed inversion of cane sugar	K5	
4	Determination of heat of neutralisation of a strong acid by a strong base.	K5	
5	Determination of heat of hydration of copper sulphate.	K5	
6	Determination of cell constant	K5	
7	Determination of equivalent conductance of strong electrolyte	K5	
8	Determination of dissociation constant of acetic acid Potentiometry	K5	
9	Potentiometric titration of HCl against NaOH	K5	
10	Determination of molecular weight of an organic compound by Rast method using naphthalene or diphenyl as solvent	K5	
11	Determination of molar depression constant Kf of the given solvent	K5	
Course Outcome	**CO1:** Describe the principles and methodology for the practical work	K4	
	CO2: Explain the procedure, data and methodology for the practical work	K3	
	CO3: Predict the principles of electrochemistry, kinetics for carrying out the practical work	K5	
	CO4: Demonstrate laboratory skills for safe handling of the equipments	K5	
	CO5: Reflect the laboratory skills for safe handling of the chemicals	K5	

Learning Resources	
Text Books	1. Sindhu, P.S.Practicals in Physical Chemistry, Macmillan India : New Delhi, 2005. 2. Khosla, B. D.Garg,V. C.; Gulati, A.; Senior Practical Physical Chemistry, R.Chand : New Delhi, 2011.
Reference Books	1. Gupta, Renu, Practical Physical Chemistry, 1st Ed.; New Age International: New Delhi, 2017.

Website Link	https://www.vlab.co.in/broad-area-chemical-sciences

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards													
Course Code	**Course Title**				**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHP04	**PRACTICAL: PHYSICAL CHEMISTRY – I**				**DSC PRACTICAL-IV**			**IV**	**3**	**-**	**-**	**3**	**3**
CO-PO Mapping													
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**			
CO1	S	S	S	S	S	S	S	M	S	M			
CO2	M	S	M	S	S	S	S	M	M	S			
CO3	S	S	S	M	S	S	S	M	S	M			
CO4	S	S	S	S	S	S	S	M	M	S			
CO5	S	S	S	M	S	S	S	S	S	S			
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG				
Tutorial Schedule	-												
Teaching and Learning Methods	Demonstrate Class, Class practical												
Assessment Methods	Observation, Record, Model & End Semester Practical Examinations												
Designed By	**Verified By**							**Approved By** Member Secretary					
Dr. N. Nithiya	Dr. N. Nithiya							Dr. S. Shahitha					

B.Sc -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHC05	**ORGANIC CHEMISTRY - I**	**DSC THEORY-V**	**V**	**5**	**3**	**2**	**-**	**4**
Objective	Students will study the stereochemistry, conformational analysis, and heterocyclic compound, Preparation, properties and composition of food additives, dyes, aminesand Nitro compounds.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Stereochemistry** Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions. Geometrical isomerism:cis–trans, syn-anti isomerism, E/Z notations. **Optical Isomerism:** Optical activity, specific rotation, asymmetry, enantiomers, distereoisomers, meso structures - molecules with one and two chiral centres, racemisation- resolution- methods of resolution. C.I.P rules. R and S notations for one and two chirality (stereogenic) centres. Molecules with no asymmetric carbon atoms – biphenyls. Conformational analysis of ethane, 1, 2-dichloroethane and butane.	K1	12
II	**Chemistry of Nitrogen Compounds-I** **Nitroalkanes** Nomenclature, isomerism, preparation from alkyl halides, halo acids, alkanes; physical properties; reactions – reduction, halogenations, Grignard reagent, Pseudo acid character. **Aromatic nitro compounds** Nomenclature, preparation – nitration, from diazonium salts, physical properties; reactions - reduction of nitrobenzene in different medium, Electrophilic substitution reactions, TNT. **Amines: Aliphatic amines** Nomenclature, isomerism, preparation – Hofmanns' degradation reaction, Gabriel's phthalimide synthesis, Curtius, Lossen, Schmidt rearrangement. Physical properties, reactions – alkylation, acylation, carbylamine reaction, Mannich reaction, oxidation, basicity of amines.	K2	12
III	**Chemistry of Nitrogen Compounds – II** Aromatic amines - Nomenclature, preparation - from nitro compounds, Hofmann's method; Schmidt reaction, properties - basic nature, ortho effect; reactions - alkylation, acylation, carbylamine reaction, reaction with nitrous acid, aldehydes, oxidation, Electrophilic substitution reactions, diazotization and coupling reactions; sulphanilic acid - zwitter ion formation. Distinction	K3	12

	between primary, secondary and tertiary amines - aliphatic and aromatic Diazonium compounds Diazomethane, Benzene diazonium chloride - preparations and synthetic applications. Structure of Azo dyes.		
IV	**Heterocyclic compounds** Nomenclature and classification. General characteristics - aromatic character and reactivity. Five - membered heterocyclic compounds Pyrrole - preparation - from Succinimide, reactions - reduction, basic character, acidic character, electrophilic substitution reactions, ring opening. Furan - preparation from Mucic acid; reactions - hydrogenation, reaction with oxygen, Diels Alder reactions, formation of thiophene and pyrrole; Electrophilic substitution reaction. Thiophene synthesis - from acetylene; reactions - reduction; oxidation; electrophilic substitution reactions.	K4	12
V	**Six-membered heterocyclic compounds** Pyridine - synthesis - from acetylene, Physical properties; reactions - basic character, oxidation, reduction, electrophilic substitution reactions; nucleophilic substitution- uses Condensed ring systems Quinoline - preparation - Skraup synthesis and Friedlander's synthesis; reactions - basic nature, reduction, oxidation; electrophilic substitutions; nucleophilic substitutions - Chichibabin reaction Isoquinoline - preparation by the Bischler - Napieralski reaction, reduction, oxidation; electrophilic substitution. ***Current Trends: Development of heterocyclic compounds in drug discovery ***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Recall the E Z notations for organic compounds and the R S notations for chirals.	K1	
	CO2: Recognize the characteristics of amines and aromatic and aliphatic nitro compounds.	K2	
	CO3: Analyse the coloring and composition of food additives and colors.	K3	
	CO4: Discuss the synthesis and characteristics of five membered heterocycles, such as thiophene, furan, and pyrrole.	K4	
	CO5: Investigate the six membered heterocycles, including isoquinoline, quinoline, and pyridine.	K5	

Learning Resources	
Text Books	1. M. K. Jain, S.C.Sharma, Modern Organic Chemistry, Vishal Publishing, fourth reprint, 2019. 2. ArunBahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S. Chand & Company Pvt. Ltd., Multicolour edition, 2016. 3. C.N.Pillai, Text Book of Organic Chemistry, Universities Press (India) Private Ltd., 2009.
Reference Books	1. Gita Rani General Organic Chemistry 2022 2. R. T. Morrison and R. N. Boyd, Organic Chemistry, Pearson Education, Asia, sixth edition, 2012. 3. T.W.Graham Solomon's, Organic Chemistry, John Wiley & Sons, eleventh edition, 2012 4. A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, seventh edition,2009. 5. J. A. Joule, and G. F. Smith, Heterocyclic Chemistry, Wiley, Fifth Edition, 2010.

Website Link	1. https://onlinecourses.nptel.ac.in/noc23_cy36/preview 2. https://onlinecourses.nptel.ac.in/noc20_cy30/preview 3. https://nptel.ac.in/courses/104103071 4. https://archive.nptel.ac.in/courses/104/101/104101115/			
Self-Study Material	https://www.digimat.in/nptel/courses/video/104105127/L01.html			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHC05	**ORGANIC CHEMISTRY - I**			**DSC THEORY-V**		**V**	**5**	**3**	**2**	**-**	**4**
CO-PO Mapping											
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	S	S	S	S	S	S	S	S	M	L	
CO2	S	M	S	S	S	S	S	S	M	S	
CO3	S	S	S	S	S	S	M	S	M	S	
CO4	S	S	S	M	S	S	S	S	M	S	
CO5	S	S	M	S	S	S	M	S	S	S	
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG		
Tutorial Schedule	Group discussion, Studying through models										
Teaching and Learning Methods	Chalk and Board class and PPT Presentation										
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations										
Designed By	**Verified By HoD**					**Approved By Member Secretary**					
Mr. S. Ramkumar	Dr. N. Nithiya					Dr. S. Shahitha					

B.Sc.-Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHC06	**INORGANIC CHEMISTRY-I**	**DSC THEORY-VI**	**V**	**5**	**3**	**2**	**-**	**4**
Objective	Students will learn about the theories of Co-ordination compounds and reaction mechanism, basic concepts of Organometallic compounds, structure, properties, preparation of inner transition elements and inorganic polymers.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Co-ordination Chemistry - I** IUPAC Nomenclature of coordination compounds, Isomerism in coordination compounds. Werner's coordination theory - effective atomic number -interpretation of geometry and magnetic properties by Pauling's theory - geometry of coordination compounds with co-ordination number 4 & 6. Chelates - types of ligands forming chelates - stability of chelates, applications of chelates in qualitative and quantitative analysis - application of DMG and oxine in gravimetric analysis - estimation of hardness of water using EDTA, metal ion indicators. Role of metal chelates in living systems - haemoglobin and chlorophyll.	K2	12
II	**Co-ordination Chemistry - II** Crystal field theory - Crystal field splitting of energy levels in octahedral and tetrahedral complexes, Crystal field stabilization energy (CFSE), spectrochemical series - calculation of CFSE in octahedral and tetrahedral complexes - factors influencing the magnitude of crystal field splitting, crystal field effect on ionic radii, lattice energies, heats of ligation with water as a ligand (heat of hydration), interpretation of magnetic properties, spectra of $[Ti(H_2O)_6]^{3+}$ - Jahn - Teller effect. Stability of complexes in aqueous solution, stability constants- factors affecting the stability of a complex ion, thermodynamic and kinetic stability (elementary idea). Comparison of VBT and CFT.	K3	12

III	**Organometallic compounds Metal Carbonyls** Mono and polynuclear carbonyls, General methods of preparation of carbonyls - general properties of binary carbonyls - bonding in carbonyls - structure and bonding in carbonyls of Ni, Fe, Cr, Co, Mn, Ru and Os. EAN rule as applied to metal carbonyls. Ferrocene-Methods of preparation, physical and chemical properties	K4	12
IV	**Inner transition elements** General characteristics of f-block elements - Comparative account of lanthanides and actinides - Occurrence, Oxidation states, Magnetic properties, Colour and spectra - Lanthanides and Actinides, Separation by ion-Exchange and Solvent extraction methods - Lanthanides contraction Occurrence, Electronic configuration of lanthanides. Magnetism of Gadolinium	K4	12
V	**Inorganic polymers** General properties - classification of inorganic polymers based on element in the backbone (Si, S, B and P) - preparation and properties of silicones (polydimethylsiloxane and polymethylhydrosiloxane) phosphorous based polymer (polyphosphazines and polyphophonitrilicchloride), sulphur based polymer (polysulfide and polymeric sulphurnitride), boron based polymers (borazine polymers) - industrial applications of inorganic polymers. ***Current Trends - Uses of Organometallic compounds as catalyst and medicinal drugs***	K5	12
	***....* Self-study**		
Course Outcome	**CO1**: Explain the isomerism, Werner's Theory and stability of chelate complexes.	K1	
	CO2: Discuss crystal field theory, magnetic properties and spectral properties of complexes.	K2	
	CO3: Understand the structure, properties and uses of preparation and properties of metal carbonyls.	K3	
	CO4: Compare the characteristics of lanthanides and actinides.	K4	
	CO5: Evaluate the structure, Preparation, properties and uses of inorganic polymers of silicon, sulphur, boron and phosphorous.	K5	

Learning Resources

Text Books	1. Puri B R, Sharma L R, Kalia K C, Principles of Inorganic Chemistry, 31thEdition, Milestone Publishers & Distributors, Delhi, 2011. 2. Satya Prakash, Tuli G. D., Basu S. K., Madan R. D., Advanced Inorganic Chemistry, 18th Edition, S. Chand & Co., New Delhi, 2009. 3. Lee J D, Concise Inorganic Chemistry, 4 th Edition, ELBS William Heinemann, London, 1991. 4. W V Malik, G D Tuli, R D Madan, Selected Topics in Inorganic Chemistry, S. Chand and Company Ltd., 2000. 5. A. K. De, Text book of Inorganic Chemistry, Wiley East Ltd, seventh edition, 1992.

Reference Books	1. Madan R D, Sathya Prakash, Modern Inorganic Chemistry, 2 nd ed ., S.Chand and Company, New Delhi, 2003. 2. Gopalan R, Inorganic Chemistry for Undergraduates, Ist Edition, University Press (India) Private Limited, Hyderabad, 2009. 3. Sivasankar B, Inorganic Chemistry, Ist Edition, Pearson, Chennai, 2013. 4. Alan G. Sharp, Inorganic Chemistry, 3 rd Edition, AdditionWesley, England, 1992. 5. Peter Atkins, Tina Overton, Jonathan Rourke and Mark Weller, Inorganic Chemistry, Oxford University Press, sixth edition, 2014.
Website Link	1.www.epgpathshala.nic.in 2. www.nptel.ac.in 3. http:/swayam.gov.in
Self-Study Material	https://shorturl.at/jlAPW

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

B.Sc -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHC06	**INORGANIC CHEMISTRY-I**			**DSC THEORY-VI**		**V**	**5**	**3**	**2**	**-**	**4**

CO-PO Mapping

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

Tutorial Schedule	Group discussions and Learning through videos	
Teaching and Learning Methods	Chalk and Board class and PPT Presentation	
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations	
Designed By	**Verified By HoD**	**Approved By Member Secretary**
Mrs. S. Eswari	Dr. N. Nithiya	Dr. S. Shahitha

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B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHC07	**PHYSICAL CHEMISTRY - I**	**DSC THEORY-VII**	**V**	**5**	**3**	**2**	**-**	**4**
Objective	Students will acquire knowledge in various concepts and applications of thermodynamics, chemical kinetics, surface chemistry and photochemistry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Thermodynamics - III** Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs-Helmholtz equation - derivations and applications; Maxwell relationships, thermodynamic equations of state; Thermodynamics of mixing of ideal gases. Partial molar properties - chemical potential, Gibbs-Duhem equation, variation of chemical potential with temperature and pressure, Duhem-Margules equation.	K2	12
II	**Chemical Kinetics** Rate of reaction - Average and instantaneous rates, factors influencing rate of reaction - molecularity of a reaction - rate equation - order of reaction. order and molecularity of simple reactions, Rate laws - Rate constants - derivation of rate constants for zero, first and second order - Derivation of time for half change with examples. Methods of determination of order by Volumetry. Effect of temperature on reaction rate - temperature coefficient - concept of activation energy - Arrhenius equation. Theories of reaction rates - Collision theory - derivation of rate constant of bimolecular gaseous reaction - Failure of collision theory. Lindemann's theory of unimolecular reaction. Theory of absolute reaction rates - Derivation of rate constant for a bimolecular reaction - significance of entropy and free energy of activation. Complex reactions - reversible and parallel reactions (no derivation and only examples)	K3	12
III	**Adsorption** Chemical and physical adsorption and their general characteristics-distinction between them Different types of isotherms - Freundlich and Langmuir. Adsorption isotherms and their limitations - BET theory (derivation not required), kinetics of enzyme catalysed reaction - Michaelis-Menten and Line weaver Burk plot - inhibition - reversible -	K3	12

	competitive, noncompetitive and uncompetitive (no derivation of rate equations) Catalysis - general characteristics of catalytic reactions, auto catalysis, promoters, negative catalysis, poisoning of a catalyst - theories of homogenous and heterogeneous catalysis.		
IV	**Colloids and Surface Chemistry Colloids:** Types of Colloids, Characteristics Colloids (Lyophilic and Lyophobic sols), Preparation of Sols - Dispersion methods, aggregation methods, Properties of Sols - Optical properties, Electrical properties - Electrical double layer, Electro Kinetic properties- Electro-osmosis, Electrophoresis, Coagulation or precipitation, Stability of sols, Emulsions, Gels - preparation of Gels, Applications of colloids. Macromolecules: Molecular weight of Macromolecules - Number average molecular weight and weight average molecular weight.	K4	12
V	**Photochemistry** Laws of photochemistry - Lambert - Beer, Grotthus - Draper and Stark - Einstein. Quantum efficiency. Photochemical reactions - rate law - comparison between thermal and photochemical reactions. Photophysical process - Jablonski diagram, Fluorescence - applications including fluorimetry - sensitised fluorescence, phosphorescence - applications - chemiluminescence and photosensitisation - examples Chemistry of Vision - 11 cis retinal - colour perception of vision. **Current trends - *Photophysical processes, and applications in photobiology and materials science. Emerging photonic technologies***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Explain Gibbs and Helmholtz free energy functions and partial molar quantities	K1	
	CO2: Apply the concepts of chemical kinetics to study the factors governing the rate of a reaction.	K2	
	CO3: Compare chemical and physical adsorption, Freundlich and Langmuir adsorption isotherms, and differentiate between homogeneous and heterogeneous catalysis.	K3	
	CO4: Demonstrate the types and characteristics of colloids, preparation of sols and emulsions, and determine the molecular weights of macromolecules.	K4	
	CO5: Utilize the concepts of photochemistry in fluorescence, phosphorescence, chemiluminescence and color perception of vision.	K5	
Learning Resources			
Text Books	1. B.R. Puri and L.R. Sharma, Principles of Physical Chemistry, Shoban Lal Nagin Chand and Co., forty eighth edition, 2021. 2. Peter Atkins, and Julio de Paula, James Keeler, Physical Chemistry, Oxford University press, International eleventh edition, 2018. 3. Arun Bahl, B.S. Bahl, G. D. Tuli Essentials of physical chemistry, 28th edition, S, Chand & Co., 2019. 4. S. K. Dogra and S. Dogra, Physical Chemistry through Problems: New Age International, fourth edition, 1996.		

Reference Books	1. J. Rajaram and J.C. Kuriacose, Chemical Thermodynamics, Pearson, 1 st edition, 2013. 2. Keith J. Laidler, Chemical kinetics, third edition, Pearson, 2003. 3. P. W. Atkins, and Julio de Paula, Physical Chemistry, Oxford University press, seventh edition, 2002. 4. L. Kapoor, A Textbook of Physical Chemistry, Macmillan India Ltd, third edition, 2009.
Website Link	1. https://nptel.ac.in 2. https://swayam.gov.in 3. www.epgpathshala.nic.in
Self-Study Material	1 https://www3.nd.edu/~powers/ame.20231/notes. 2. https://unacademy.com/content/jee/study-material/chemistry/adsorption/ 3. https://digital-strategy.ec.europa.eu/en/policies/photonics

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

B. Sc. -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHC07	**PHYSICAL CHEMISTRY - I**			**DSC THEORY-VII**		**V**	**5**	**3**	**2**	**-**	**4**
CO-PO Mapping											
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	S	S	S	S	S	S	S	M	S	S	
CO2	S	S	M	S	S	S	S	S	S	S	
CO3	M	S	M	S	S	S	S	S	S	S	
CO4	S	S	S	S	S	S	S	M	M	S	
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	Group discussion										
Teaching and Learning Methods	Chalk and Board class and PPT Presentation										
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations										
Designed By	**Verified By HoD**					**Approved By Member Secretary**					
Dr. N. Nithiya	Dr. N. Nithiya					Dr. S. Shahitha					

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B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHP05	**PRACTICAL: PHYSICAL CHEMISTRY – II**	**DSC PRACTICAL-V**	**V**	**3**	**-**	**-**	**3**	**3**
Objective	This course aims at providing the basic principles of physical chemistry experiments and hands on experience in carrying out the experiments.							

S. No.	Course Content	Knowledge Levels	Sessions
1	Simple eutectic - determination of eutectic temperature and composition of naphthalene - diphenyl amine or naphthalene - diphenyl system	K5	30
2	Determination of transition temperature of a salt hydrate.	K6	
3	Determination of upper and lower- critical solution temperature - phenol - water system	K6	
4	Determination of concentration of sodium chloride using phenol-sodium chloride system	K6	
5	Determination of the distribution coefficient of iodine between carbon tetrachloride (or) benzene and water.	K6	
6	Determination of equilibrium constant of the reaction $I_2 + KI_3$	K6	
7	Determination of concentration of the given potassium iodide solution using the above equilibrium constant.	K6	
8	Conductometric titration of hydrochloric acid against sodium hydroxide	K6	
9	Conductometric titration of mixture of acids against sodium hydroxide	K6	
10	Potentiometric titration of ferrous ion against potassium dichromate	K6	
Course Outcome	**CO1:** Describe the principles and methodology for the practical work	K5	
	CO2: Explain the procedure, data and methodology for the practical work.	K5	
	CO3: Apply the principles of electrochemistry, kinetics for carrying out the practical work.	K6	
	CO4: Demonstrate laboratory skills for handling of the equipments	K6	
	CO5: Demonstrate laboratory skills for safe handling of the chemicals	K6	

Learning Resources	
Text Books	1. Sindhu, P.S. Practicals in Physical Chemistry, Macmillan India, New Delhi, 2005. 2. Gupta, Renu, Practical Physical Chemistry, 1 st Ed.; New Age International, New Delhi, 2017.

Reference Books	1. Khosla, B. D. Garg,V. C.; Gulati, A. Senior Practical Physical Chemistry, R. Chand : New Delhi, 2011.			
Website Link	https://www.vlab.co.in/broad-area-chemical-sciences			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHP05	**PRACTICAL: PHYSICAL CHEMISTRY – II**		**DSC PRACTICAL-V**		**V**	**3**	**-**	**-**	**3**	**3**

CO-PO Mapping

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

Tutorial Schedule	-		
Teaching and Learning Methods	Demonstrate Class, Class practical		
Assessment Methods	Observation, Record, Model & End Semester Practical Examinations		
Designed By	**Verified By HoD**	**Approved By Member Secretary**	
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B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHC08	**ORGANIC CHEMISTRY - II**	**DSC THEORY-VIII**	**VI**	**5**	**3**	**2**	**-**	**4**
Objective	Students will learn about the steps for classify, isolate, properties of biomolecules, terpenoids, alkaloids, and various molecular rearrangements.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Alkaloids** Classification, isolation, general properties - Hofmann Exhaustive Methylation; Structure elucidation - Coniine, piperine. Terpenes: Classification, Isoprene rule, isolation and structural elucidation of Citral, alpha terpineol, Menthol, Geraniol	K1	12
II	**Carbohydrates** Definition and Classification of Carbohydrates with examples. Relative configuration of sugars. Definition of enantiomers, diastereomers, epimers and anomers with suitable examples. Monosaccharides - configuration - D and L hexoses - aldohexoses and ketohexoses. Glucose, Fructose - Occurrence, preparation, properties, reactions, structural elucidation, uses. Disaccharides Configuration of sucrose, lactose, maltose - Polysaccharides - Source, constituents and biological importance of homo polysaccharides – starch, hetero polysaccharides - hyaluronic acid	K2	12
III	**Molecular rearrangements:** Molecular Rearrangement: Type of rearrangements, Mechanism for Benzidine, Favorskii, Clasien, Fries, Hofmann, Curtius, Schmidt and LossenBeckmann, Pinacol-pinacolone rearrangement	K3	12
IV	**Special reagents in organic synthesis** AIBN, 9-BBN, BINAP/BINOL, BOC, DABCO, DCC, DIBAL, DMAP, NBS/NCS, NMP, PCC, TBHP, TEMPO. Organometallic compounds in Organic Synthesis Preparation, Properties and applications: Grignard Reagents, Organo Lithium Compounds, Ziegler -Natta, Wilkinson, Metal Carbonyl, Zeiss's Salt	K4	12
V	**Green Chemistry:** Principles, chemistry behind each principle and applications in chemical synthesis. Green reaction media - green solvents, green reagents and catalysts; tools used like microwave and ultra-sound in chemical synthesis. ***Current trends: Green Sustainable Energy Technology for future***	K5	12

	…… Self Study.		
Course Outcome	**CO1:** Recalling the characteristics of terpenes and alkaloids and their separation	K1	
	CO2: Illustrate how mono and disaccharides preparation and reactions occur.	K2	
	CO3: Divide natural products and biomolecules according to their composition, characteristics, actions, and applications.	K3	
	CO4: Investigating rearrangements as well as their migration behaviour of the organic compounds.	K4	
	CO5: Design green synthesis tools used like microwave and ultra-sound in chemical synthesis.	K5	

Learning Resources				
Text Books	1. S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan India Ltd., 3 rd edition,2009 2. Arun Bahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S. Chand & Company Pvt. Ltd., Multicolour edition, 2019. 3. P. L.Soni and H. M. Chawla, Text Book of Organic Chemistry, Sultan Chand & Sons, New Delhi, 29th edition, 2016. 4. C Bandyopadhya; An Insight into Green Chemistry; Published on 2020			
Reference Books	1. R. T. Morrison and R. N. Boyd, Organic Chemistry, Pearson Education, Asia,6th edition, 2016. 2. T.W.Graham Solomons and Craig B. Fryhle , Organic Chemistry, John Wiley & Sons, 11th edition, 2017. 3. A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt. Ltd., New Delhi,7th edition,2009. 4. I. L. Finar, Organic Chemistry, Vol. (1& 2), England, Wesley Longman Ltd, 6 th edition, 2006.			
Website Link	1.https://onlinecourses.nptel.ac.in/noc22_ce55/preview 2. https://onlinecourses.nptel.ac.in/noc20_ce57/preview 3. https://onlinecourses.nptel.ac.in/noc23_cy36/preview 4. https://onlinecourses.nptel.ac.in/noc20_cy30/preview 5. https://nptel.ac.in/courses/104103071			
Self-Study Material	https://onlinecourses.nptel.ac.in/noc23_me138/preview			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHC08	**ORGANIC CHEMISTRY - II**		**DSC THEORY-VIII**		**VI**	**5**	**3**	**2**	**-**	**4**

CO-PO Mapping

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

Tutorial Schedule	Group discussions and Learning through molecular models	
Teaching and Learning Methods	Chalk and Board class and PPT Presentation	
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations	
Designed By	**Verified By HoD**	**Approved By Member Secretary**
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B. Sc.-Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHC09	**INORGANIC CHEMISTRY-II**	**DSC THEORY-IX**	**VI**	**5**	**3**	**2**	**-**	**4**
Objective	Students will obtain a knowledge on tracer elements and their role in the biological system, metal iron transport and storage, metalloenzymes, metallurgy and their applications in Industry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Bioinorganic Chemistry** Essential and trace elements: Role of Na^+ , K^+ , Mg^{2+}, Ca^{2+}, Fe^{3+}, Cu^{2+} and Zn^{2+} in biological systems. Effect of excess intake (Toxicity) of Metal ions – trace elements - As, Cd, Pb, Hg.	K1	12
II	**Metal ion transport and storage** Iron - storage, transport - Transferrin and Ferretin; Iron-porphyrins - myoglobin, haemoglobin - oxygen transport - Bohr effect; Sodium/potassium pump, calcium pump; transport and storage - copper and zinc.	K2	12
III	**Metallo enzymes** Isomerase and synthetases, structure of cyanocobalamin (Vitamin B12), nature of Co-C bond; Metalloenzymes - functions of carboxy peptidase A, zinc metalloenzyme - mechanism and uses, Zn-Cu enzyme - structure and function, carbonic anhydrase, Vitamin B-12 as transferase and isomerase - Iron-sulphur proteins - 2Fe-2S -rubredoxin, 4Fe-2S - ferridoxin, Iron sulphur cluster enzymes.	K3	12
IV	**Metallurgy** Occurrence of elements in nature- minerals and ores, types of ores. General principles of extraction of metal – metallurgy: pulverisation, concentration of ores- electromagnetic, hydraulic leaching and froth flotation process; calcination and roasting, reduction-thermite welding, alumino thermic, smelting process, electrolytic reduction, purification of metals–zone refining, van-Arkel, MacArther forest cyanide process. Factors influencing the choice of extraction process, thermal decomposition methods; displacement of metal; high temperature chemical reduction methods. Reduction by carbon and metal. Self-reduction, reduction of oxides with hydrogen; electrolytic reduction-in aqueous solution, in non-aqueous solvents, in fused melts.	K4	12
V	**Industrial Applications of Inorganic Compounds** Refractories, pyrochemical, explosives. Alloys, Paints and pigments -	K4	12

	requirements of a good paint; classification, constituents of paints - pigments, vehicles, thinners, driers, extenders, anti-knocking agents, anti-skinning agents, plasticizers, binders-application; varnishes- oils, spirit; enamels. Nanocomposite Hydrogels: synthesis, characterization and uses. ***Current trends - Types, properties and applications of paints***		
	…… Self Study.		
Course Outcome	**CO1**: Explain the importance of essential and trace elements, its storage, metalloenzymes, metal ores and its occurence and industrial application of inorganic compounds	K1	
	CO2: Acquire knowledge about the metal ion transport, various pumps in biological systems, functions of metalloenzymes and techniques involved in metallurgy	K2	
	CO3: Articulate the biological functions of various enzymes, toxicity of metals and the applications of paints, pigments and nanocomposites	K3	
	CO4: Illustrate the mechanisms of enzyme activity, uses of metals in biological functions and steps involved in extraction of metals	K4	
	CO5: Learn in detail about the manufacture of explosives, paints, pigments and various processes involved in refining ores	K5	

Learning Resources				
Text Books	1. Puri B R, Sharma L R, Kalia K C, Principles of Inorganic Chemistry, 31st Edition, Milestone Publishers & Distributors, Delhi, 2011. 2. Satya Prakash, Tuli G. D., Basu S. K., Madan R. D., Advanced Inorganic Chemistry, 18th Edition, S. Chand & Co., New Delhi, 2009. 3. Lee J D, Concise Inorganic Chemistry, 4 th Edition, ELBS William Heinemann, London, 2011. 4. W V Malik, G D Tuli, R D Madan, Selected Topics in Inorganic Chemistry, S. Chand and Company Ltd., 2010.			
Reference Books	1. Madan R D, Sathya Prakash, Modern Inorganic Chemistry, 2nd ed., S.Chand and Company, New Delhi, 2003. 2. Gopalan R, Inorganic Chemistry for Undergraduates, Ist Edition, University Press (India) Private Limited, Hyderabad, 2009. 3. Sivasankar B, Inorganic Chemistry, Ist Edition, Pearson, Chennai, 2013. 4. Alan G. Sharp, Inorganic Chemistry, 3 rd Edition, AdditionWesley, England, 2014. 5. Peter Atkins, Tina Overton, Jonathan Rourke and Mark Weller, Inorganic Chemistry, Oxford University Press, sixth edition, 2014.			
Website Link	1.www.epgpathshala.nic.in 2. www.nptel.ac.in 3. http:/swayam.gov.in			
Self-Study Material	https://shorturl.at/GNV12			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHC09	**INORGANIC CHEMISTRY-II**		**DSC THEORY-IX**		**VI**	**5**	**3**	**2**	**-**	**4**

CO-PO Mapping

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

Tutorial Schedule	Group discussions and Learning through videos	
Teaching and Learning Methods	Chalk and Board class and PPT Presentation	
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations	
Designed By	**Verified By HoD**	**Approved By Member Secretary**
Mrs. S. Eswari	Dr. N. Nithiya	Dr. S. Shahitha

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHC10	**PHYSICAL CHEMISTRY - II**	**DSC THEORY-X**	**VI**	**5**	**3**	**2**	**-**	**4**
Objective	Students will get an overall view of the phase diagram of one and two component systems chemical equilibrium, separation techniques for binary liquid mixtures and electrochemistry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Phase rule** Definition of terms; derivation of phase rule ; application to one component systems - water and sulphur - super cooling, sublimation ; two component systems - solid liquid equilibria- simple eutectic (lead - silver), freezing mixtures (potassium iodide- water), compound formation with - congruent melting points (magnesium - zinc and ferric chloride - water system), peritectic change (sodium - potassium), copper sulphate - water system.	K2	12
II	**Chemical equilibrium** Law of mass action - thermodynamic derivation - relationship between Kp and Kc - application to the homogeneous equilibria - dissociation of PCl_5 gas – equilibrium constant and degree of dissociation - formation of HI and NH_3 - heterogeneous equilibrium - decomposition of solid calcium carbonate - Le-chatelier principle - van't Hoff reaction isotherm - temperature dependence of equilibrium constant - van't Hoff reaction isochore - Clayperon equation - Clausius Clayperon equation and its applications.	K3	12
III	**Binary liquid mixtures** Ideal liquid mixtures - non ideal solutions - azeotropic mixtures - fractional distillation - partially miscible mixtures - phenol-water, triethylamine-water, nicotine-water - effect of impurities on critical solution temperature; immiscible liquids - steam distillation; Nernst distribution law - applications.	K3	12
IV	**Electrical Conductance and Transference** Arrhenius theory of electrolytic dissociation - Ostwald's dilution law, limitations of Arrhenius theory; behavior of strong electrolytes - Debye Huckel theory - Onsager equation, significance of Onsager equation, Debye Falkenhagen effect, Wien effect. Transport number - determination - Hittorf's method, moving boundary method - factors affecting transport number. Kohlrausch's law- applications; molar ionic conductance and viscosity (Walden's rule); applications of conductance measurements -	K4	12

	determination of - degree of dissociation of weak electrolyte, dissociation constant of weak acid and weak base, ionic product of water, solubility and solubility product of sparingly soluble salts - conductometric titrations - acid base titrations.		
V	**Galvanic Cells and Applications** Galvanic cell, representation, reversible and irreversible cells, EMF and its measurement - standard cell; sign of EMF and spontaneity of a reaction, thermodynamics and EMF - calculation of ΔG, ΔH and ΔS from EMF data. Electrode potential, standard electrode potential, primary and secondary reference electrodes, Nernst equation for electrode potential and cell EMF; types of electrodes - metal/metal ion, metal amalgam/metal ion, metal, insoluble salt/anion, gas electrode, redox electrode; electrochemical series - applications of electrochemical series. Applications of EMF measurements applications of EMF measurements - determination of activity coefficient of electrolytes, transport number, valency of ions, solubility product, pH using hydrogen gas electrode and glass electrode, Fuel cells - H_2-O_2 cell - efficiency of fuel cells. ***Current trends - Applications of energy storage systems, electrochemical sensors, and sustainable technologies***	K5	12
	…… Self Study		
Course Outcome	**CO1:** Construct the phase diagram and explain the properties of freezing mixture, components with congruent melting points and solid solutions.	K1	
	CO2: Apply the concepts of chemical equilibrium to study various reactions and demonstrate the applications of various principles	K2	
	CO3: Identify an appropriate distillation method for the separation of binary liquid mixtures and the theory behind	K3	
	CO4: Explain the significance of various laws and theory in conductance.	K4	
	CO5: Construct electrochemical cell with the help of electrochemical series and calculate cell EMF.	K5	

Learning Resources	
Text Books	1. B.R. Puri and L.R. Sharma, Principles of Physical Chemistry, ShobanLal Nagin Chand and Co., forty eighth edition, 2021. 2. Peter Atkins, and Julio de Paula, James Keeler, Physical Chemistry, Oxford University press, International eleventh edition, 2018. 3. S. K. Dogra and S. Dogra, Physical Chemistry through Problems: New Age International, fourth edition, 1996. 4. J. Rajaram and J.C. Kuriacose, Thermodynamics, ShobanLal Nagin Chand and CO., 1986.
Reference Books	1. K. L. Kapoor, A Textbook of Physical Chemistry, Macmillan India Ltd, third edition,2009. 2. Gilbert. W. Castellen, Physical Chemistry, Narosa Publishing House, third edition, 1985. 3. P. W. Atkins, and Julio de Paula, Physical Chemistry, Oxford University press, seventh edition, 2002. 4. D.N.Bajpai, Advanced Physical Chemistry, S.Chand & Co., 2001.
Website Link	1. https://nptel.ac.in 2. https://swayam.gov.in 3. https://archive.nptel.ac.in/content/storage2/courses/112108150/pdf/PPT

Self-Study Material	https://greensolver.net/5-key-safety-considerations-for-battery-energy-storage-systems/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B. Sc. -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHC10	**PHYSICAL CHEMISTRY - II**			**DSC THEORY-X**			**V**	**5**	**3**	**2**	**-**	**4**

CO-PO Mapping

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

Tutorial Schedule	Group discussions and Learning through videos	
Teaching and Learning Methods	Chalk and Board class and PPT Presentation	
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations	
Designed By	**Verified By HoD**	**Approved By Member Secretary**
Dr. N. Nithiya	Dr. N. Nithiya	Dr. S. Shahitha

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B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHP06	**PRACTICAL: GRAVIMETRIC ESTIMATIONS**	**DSC PRACTICAL-VI**	**VI**	**3**	**-**	**-**	**3**	**3**

Objective	Students will gain practical knowledge and methodology for Gravimetric Estimation obtain hands on experience in carrying out the experiments		
S. No.	**Course Content**	**Knowledge Levels**	**Sessions**
1	Estimation of Barium as Barium sulphate	K5	30
2	Estimation of Barium as Barium chromate	K5	
3	Estimation of Lead as Lead chromate	K5	
4	Estimation of Calcium as Calcium oxalate monohydrate	K5	
5	Estimation of Sulphate as Barium sulphate	K5	
6	Estimation of Chloride as Silver chloride	K5	
7	Estimation of Nickel as Nickel dimethyl glyoxime	K5	
Course Outcome	**CO1:** To acquire knowledge on the systematic analysis of Mixture of salts	K4	
	CO2: To get identify the cations and anions in the unknown substance	K4	
	CO3: To impart practical Skills in identifying the give mixture of Acid raicals & interfering acid radicals	K5	
	CO4: Demonstrate laboratory skills for safe handling of the equipment and chemicals	K5	
	CO5: Demonstrate laboratory skills for safe handling of the chemicals	K5	

Learning Resources	
Text Books	1. V.Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand &Sons: New Delhi, 1997. 2. G H Jeffery, J Bassett, J Mendham and R C Denney, Vogel's Textbook of Quantitative Chemical Analysis, Pearson Education, 2009.
Reference Books	1. Laszlo Erdey, Gravimetric Analysis 1, Hassell Street Press, 2021.
Website Link	https://www.vlab.co.in/broad-area-chemical-sciences

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

B. Sc. -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**		**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHP06	**PRACTICAL: GRAVIMETRIC ESTIMATIONS**		**DSC PRACTICAL-VI**		**VI**	**3**	**-**	**-**	**3**	**3**

CO-PO Mapping

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

Tutorial Schedule	-
Teaching and Learning Methods	Demonstrate Class, Class practical
Assessment Methods	Observation, Record, Model & End Semester Practical Examinations

Designed By	**Verified By HoD**	**Approved By Member Secretary**
Mrs. S. Eswari	Dr. N. Nithiya	Dr. S. Shahitha

List of Foundation Course (FC) offered by the B.Sc., Chemistry
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S. No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	I	23M1UCHFC1	FOUNDATION COURSE IN CHEMISTRY

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637408

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHFC1	**FOUNDATION COURSE IN CHEMISTRY**	**FC THEORY - I**	**I**	**2**	**2**	**-**	**-**	**2**
Objective	The course aims to make the students understand the basic concepts of chemistry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Chemistry Lab - General Awareness and First Aid Techniques:** Safety in chemistry lab- introduction to laboratory glass wares-storage and handling of chemicals-carcinogenic chemicals - handling of ethers – toxic and poisonous chemicals. Burns and damages due to organic substances- acid, alkali - burns in the eye, inhalation of toxic vapours-hazardous chemicals-dealing with bromine, phenol and hot objects.	K1	6
II	**Introduction to Organic Chemistry:** Catenation-Classification - Homologous Series - General Molecular Formula Functional Groups - General and IUPAC Nomenclature - Modern concept of bonding in organic molecules, sp3, sp2 and sp hybridization in carbon by taking methane, ethane and benzene as examples	K2	6
III	**Introduction to Inorganic Chemistry:** Atomic orbitals and concept of atomic orbitals-shape of s,p and d orbitals periodic table and the classification of elements - Electronic configuration of elements up to atomic number 30, Types of Chemical bonds - Schematic Illustration of bonds	K3	6
IV	**Introduction to Physical Chemistry:** Units - fundamental units - derived units and SI Units - Significant Figures Mathematical Functions (logarithmic, exponential and trigonometric function)- drawing straight line-Slope and Intercept – Extrapolation - Coordinate System Spherical Polar System. States of matter – types - properties of solids, liquids and gases - solid state - types of solids - amorphous and crystalline solids.	K4	6
V	**Basic concepts of redox chemistry:** Definition - oxidation and reduction reactions-calculation of oxidation numbers Equivalent weight-definition-calculation of equivalent weight of acids, bases and salts. Reduction potential and electrochemical series.	K4	6
Course	**CO1:** Understand the lab safety measures	K1	

Outcome	**CO2:** Outline the basic concepts of organic chemistry	K2	
	CO3: Describe the importance of periodic table	K3	
	CO4: Analyse the fundamentals of physical properties	K4	
	CO5: Relate the importance of redox chemistry	K4	

Learning Resources	
Text Books	1. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, 33rd Edition, Milestone Publishers and Distributors, New Delhi, India, 2020. 2. ArubBahl, B.S. Bahl, A Text Book of Organic Chemistry, 22nd Edition, S. Chand & Co., 2019. 3. B.R. Puri, L.R. Sharma & M.S. Pathania, Principles of Physical Chemistry, 48th Edition, Vishal Publishing Co., 2020.
Reference Books	1. Madan, R. D. and SathyaPrakash, Modern Inorganic Chemistry, 2 nded.; S. Chand and Company: New Delhi, 2003. 2. Rao, C.N. R. University General Chemistry, Macmillan Publication: New Delhi, 2000. 3. Puri, B. R. and Sharma, L. R. Principles of Physical Chemistry, 38thed.;Vishal Publishing Company: Jalandhar, 2020.
Website Link	1) https://onlinecourses.nptel.ac.in 2) http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm 3) http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html

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

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards									
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M1UCHFC1	**FOUNDATION COURSE IN CHEMISTRY**	**FC THEORY - I**	**I**	**2**	**2**	**-**	**-**	**2**	

CO-PO Mapping

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

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

Tutorial Schedule	-	
Teaching and Learning Methods	Chalk and Board class and PPT Presentation	
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations	
Designed By	**Verified By HoD**	**Approved By Member Secretary**
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha

List of Elective Course (DSE) Details for B.Sc., Chemistry
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S. No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	V	23M5UCHE01	ELECTIVE – I: BIOCHEMISTRY
2	V	23M5UCHE02	ELECTIVE – II: INDUSTRIAL CHEMISTRY
3	V	23M5UCHE03	ELECTIVE – II: POLYMER SCIENCE
4	VI	23M6UCHE04	ELECTIVE – III: FUNDAMENTALS OF SPECTROSCOPY
5	VI	23M6UCHE05	ELECTIVE – IV: NANOSCIENCE
6	VI	23M6UCHE06	ELECTIVE – IV: PHARMACEUTICAL CHEMISTRY

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637408

B. Sc.-Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHE01	**BIOCHEMISTRY**	**DSE THEORY- I**	**V**	**5**	**3**	**2**	**-**	**3**
Objective	Students will gain knowledge on the relationship between biochemistry and medicine, composition of blood, Structure, biological functions and properties of biomolecules							

Unit	Course Content	Knowledge Levels	Sessions
I	**Blood and its properties** Relationship of Biochemistry and Medicine; Blood - Composition of Blood, Blood Coagulation - Mechanism Hemophilia and Sickle Cell Anaemia - Definition, Maintenance of pH of Blood - Bicarbonate Buffer, Acidosis, Alkalosis	K2	12
II	**Peptides and Proteins** Amino acids - nomenclature, classification - essential and Non-essential; Synthesis - Gabriel Phthalimide, Strecker; properties - Zwitter ion and isoelectric point, electrophoresis and reactions. **Peptides** - peptide bond - nomenclature - synthesis of simple peptides - solution and solid phase. Determination of structure of peptides, N - terminal analysis - Sanger's &Edmann method; C terminal analysis - Enzymic method. **Proteins** - classification based on composition, functions and structure; properties and reactions - colloidal nature, coagulation, denaturation, renaturation; colour tests for proteins; definition of structure of proteins - primary, secondary, tertiary and quaternary.	K3	12
III	**Enzymes and Vitamins** Nomenclature and classification, characteristics, factors influencing enzyme activity - mechanism of enzyme action - Lock and key hypothesis, Koshland's induced fit model. Vitamins as coenzymes - functions of TPP, lipoic acid, NAD, NADP, FMN, FAD, folic acid, biotin, cyanocobalamin.	K3	12
IV	**Amino acids** Components of nucleic acids - nitrogenous bases - structure of nucleosides and nucleotides, DNA - structure & functions; RNA - structure - functions; biosynthesis of proteins **Hormones** Adrenalin and thyroxine - chemistry, structure and functions (No structure elucidation).	K4	12
V	**Lipids** Occurrence, biological significance of fats, classification of lipids. **Simple lipids** - Oils and fats, chemical composition, properties, reactions - hydrolysis, hydrogenation, trans - esterification, saponification, rancidity;	K5	12

	analysis of oils and fats - saponification number, iodine number, acid value, R.M. value. Distinction between animal and vegetable fats. **Compound lipids** - Lipoproteins - VLDL, LDL, HDL, chylomicrons - biological significance. Cholesterol - occurrence, structure, test ***Current Topics – Ligand structure and protein structure study using software***		
	***……* Self Study**		
Course Outcome	**CO1:** Remember the enzyme and its classifications	K1	
	CO2: Understand the molecular logic of living organisms, the composition of blood and blood coagulation	K2	
	CO3: Recognize the synthesis and properties of amino acids, determine the structure of peptides and proteins.	K3	
	CO4: Analyse influencing factors for enzyme and coenzyme activities	K4	
	CO5: Assess the biological significance of simple and compound lipids	K5	

Learning Resources				
Text Books	1. E. David, A. Lewis, Advanced Organic Chemistry, 2015. 2. M. K. Jain, S. C. Sharma, Modern Organic Chemistry, Vishal Publications, New Delhi, 2017. 3. D. Voet, G. Judith. Biochemistry, Fourth edition, 2010			
Reference Books	1. P. W. Kuchel, S. E. Smith, V. Gysbers, J. M.Guss, D. P. Hancock, J. M. Johnston, A. Jones, J. M. Matthews. Schaum's Outline of Biochemistry, Third Edition, 2011. 2. Rambabu, Textbook of Biochemistry, AITBS Publishers, 1st edition, India 2023.			
Website Link	1.http://library.med.utah.edu/NetBiochem/nucacids.html 2.http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/E/EnzymeKine tics.html 3.https://swayam.gov.in/courses/4384-biochemistry Biochemistry			
Self-Study Material	https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBI1209.pdf https://ncert.nic.in/textbook/pdf/kebt110.pdf			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards														
Course Code	**Course Title**					**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHE01	**BIOCHEMISTRY**					**DSE THEORY - I**			**V**	**5**	**3**	**2**	**-**	**3**
CO-PO Mapping														
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**				
CO1	S	S	S	S	S	S	M	S	M	S				
CO2	S	M	M	S	S	S	M	S	M	L				
CO3	S	S	L	S	S	S	M	S	M	S				
CO4	S	S	S	M	S	S	M	S	M	S				
CO5	S	S	S	S	S	S	L	S	S	S				
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG					
Tutorial Schedule	Group discussions and learning through ARLOOPA app													
Teaching and Learning Methods	Chalk and Board class and PPT Presentation													
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations													
Designed By	**Verified By HoD**							**Approved By Member Secretary**						
Dr. P. Dhilip	Dr. N. Nithiya							Dr. S. Shahitha						

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B. Sc.-Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHE02	**INDUSTRIAL CHEMISTRY**	**DSE THEORY-II**	**V**	**5**	**3**	**2**	**-**	**3**
Objective	Students will gain knowledge on fuels, cosmetics, manufacture of sugar, paper, cement and leather and food processing, applications of abrasives, lubricants and intellectual property rights							

Unit	Course Content	Knowledge Levels	Sessions
I	**Indian Industries** Survey of Indian Industries and mineral resources in India Fuels: Classification, characteristics of fuels. Solid fuels: coal - classification; analysis of coal- proximate analysis and ultimate analysis; calorific value-determination. Liquid fuels: Petroleum - characteristics; Gasoline aviation petrol knocking in internal combustion engines, antiknock agents; unleaded petrol-octane number, cetane number. Gaseous fuel: advantages over solid and liquid fuels; water gas, producer gas, carburetted water gas - preparations - uses. Natural gas: LPG-composition, advantages, application; gobar gas production, composition, advantages, application. Propellants – rocket fuels (basic idea)	K1	12
II	**Skin care** **Cosmetics:** Powders, ingredients; creams and lotion-cleansing, moisturising, all purpose shaving cream, sunscreen. Dental care: toothpastes - ingredients. Hair care: shampoos-types, ingredients; conditioners-types, ingredients. Perfumes: natural-plant origin-parts of the plant used, chief constituents; animal origin- ambergries and musk; synthetic-classification –esters amylsalicylate alcohols – terpeneols and nerol; ketones-muskone, coumarin; aldehydes-vanilin. **Soaps and Detergents:** Soaps-properties, manufacture of soap-batch process; types-transparent soap, toilet soap and liquid soap - ingredients. Detergents-definition, properties-cleansing action; soapless detergents anionic, cationic and non-ionic (general idea only); uses of detergents as surfactants. Biodegradability of soaps and detergents.	K2	12
III	**Sugar Industry**: Manufacture from sugar cane; recovery of sugar from molasses; testing and estimation of sugar. **Food Preservation and processing:** Food spoilage - causes; Food preservation - methods - high temperature, low temperature, drying, radiation; Food additives - preservatives, flavours, colours, anti-oxidants, sweetening agents; hazards of using food additives; Food standards - Agmark and Codex alimentarius.	K3	12

IV	**Abrasives:** Definition, characteristics, types-natural and synthetic; natural abrasives - diamond, emery and quartz – composition, uses; synthetic abrasives - carborundum, aluminium carbide, boron carbide, boronnitride, synthetic graphite - composition and uses. **Leather Industry:** Structure and composition of skin, hide; Manufacture of leather – pretanning process - curing, liming, beating, pickling; methods of tanning vegetable, chrome - one bath, two bath process; finishing. **Paper Industry:** Manufacture of pulp - mechanical, chemical processes; sulphate pulp, rag pulp; manufacture of paper - beating, refining, filling, sizing, colouring, calendaring; cardboard.	K4	12
V	**Lubricants:** Definition, classification - liquid, semi-solid, solid and synthetic; properties-viscosity index, flash point, cloud point, pour point, aniline point drop point; greases-properties, types; cutting fluids. **Cement Industry:** Cement – types, raw materials; manufacture-wet process, constituent of cement, setting of cement; properties of cement-quality, setting time, soundness, strength; mortar, concrete, RCC; curing and decay of concrete. **Intellectual Property Rights:** Introduction to Intellectual Property Rights - Patents - Factors for patentability - Novelty, Non obviousness, Industrial applications - Patent offices in India: Trademark - Types of trademarks- Certification marks, logos, brand names, signatures, symbols and service marks. ***Current Trends - Top 10 Food Processing Industry Trends in 2024***	K5	12
	…… Self Study.		
Course Outcome	**CO1:** Summarize the properties of fuels which include petroleum, water gas, natural gas and propellants	K1	
	CO2: Evaluate cosmetic products, soaps, detergents.	K2	
	CO3: Explain manufacture of sugar, food spoilages and food additives	K3	
	CO4: Explain properties of abrasives, manufacture of leather and paper	K4	
	CO5: Explain properties and manufacture of lubricants and cement, and intellectual property rights	K5	
Learning Resources			
Text Books	1. Sharma, B.K. Industrial Chemistry, 9 th ed.; Goel Publishing House: Meerut, 2011. 2. Wilkinson, J.B.E. Moore, R.J. Harry's Cosmeticology, 7 th ed.; Chemical Publishers: New York, 1982. 3. Alex V. Ramani, Food Chemistry, MJP publishers: Chennai, 2009. 4. Jayashree Ghosh, Applied Chemistry, S. Chand: New Delhi, 2006. 5. Srilakshmi, B. Food Science, 4thed; New Age International Publication, 2005.		
Reference Books	1. Jain, P.C.; Jain, M. Engineering Chemistry, 17th ed.; Dhanapet Rai: Delhi, 2016. 3. Thankamma Jacob, Foods, Drugs and Cosmetics - A Consumer Guide, Macmillan: London, 1997. 4. Shankuntala Manay, N.; Shadaksharaswamy, M. Food Facts and Principles, 3 rd ed.; New Age Publication, 2008. 5. Neeraj Pandey, Khushdeep Dharni, Intellectual Property Rights, PHI Learning, 2014.		

Website Link	1. https://nptel.ac.in/courses/104105103 2. www.nptel.ac.in 3. http:/swayam.gov.in 4. https://www.wipo.int/about-ip/en/ 5. https://nptel.ac.in/courses/126105027			
Self-Study Material	https://www.startus-insights.com/innovators-guide/food-processing-industry-trends/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards														
Course Code	**Course Title**					**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M5UCHE02	**INDUSTRIAL CHEMISTRY**					**DSE THEORY-II**		**V**	**5**	**3**	**2**	**-**	**3**	
CO-PO Mapping														
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**				
CO1	S	S	S	S	S	S	M	S	M	S				
CO2	S	M	M	S	S	S	M	S	M	S				
CO3	S	S	M	S	S	S	M	S	M	M				
CO4	M	S	S	M	S	S	M	S	M	S				
CO5	S	S	S	S	S	S	M	M	S	S				
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG					
Tutorial Schedule	Group discussions and Field visit													
Teaching and Learning Methods	Chalk and Board class and PPT Presentation													
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations													
Designed By	**Verified By HoD**							**Approved By Member Secretary**						
Dr. J. Sangeetha	Dr. N. Nithiya							Dr. S. Shahitha						

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B. Sc. -Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHE03	**POLYMER SCIENCE**	**DSE THEORY - III**	**V**	**5**	**3**	**2**	**-**	**3**
Objective	Students will get an overall view of classification of polymers, preparation, kinetics of polymerization, characterization and application of polymers							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction** Difference between polymer and macromolecule-classification- synthetic and natural, organic and inorganic, thermoplastic and thermosetting. Plastics, elastomers, fibres and liquid resins. Techniques of polymerization Bulk, solution, emulsion and suspension polymerization	K1	12
II	**Types and characterization of polymers** Types of polymerization-condensation and addition polymerisation; ionic, free radical, copolymerization and coordination polymerisation - reactivity ratios - Block and Graft copolymers. Characterisation of polymers Appearance and hardness, density, Effect of heat, solubility, combustion, tensile strength, shear, stress, impact strength.	K2	12
III	**Molecular Weight and Properties of Polymers** Molecular Weight of Polymers- Number Average and Weight Average, Determination of Molecular Weight, polydispersity index; light scattering-Zimmplot, ultra centrifuge –sedimentation velocity and sedimentation equilibrium - viscometry - gel permeation chromatography. Thermal properties of polymers-Glass Transition Temperature- State of Aggregation and State of Phase Transitions, Factors Influencing Glass Transition Temperature and its importance.	K3	12
IV	**Reactions of Polymers** Hydrolysis, Acidolysis, Aminolysis, Addition and Substitution Reactions (One Example Each) Cyclisation, Cross-Linking and Reactions of Specific Functional Groups in the Polymer. Polymer technology Processing of polymers - casting, thermoforming, moulding - extrusion, compression, blow moulding - foaming, lamination, reinforcing - processing of fibres - melt, wet and dry spinning.	K4	12
V	**Speciality of polymers** Polyelectrolytes, conducting polymers, polymeric supports for solid phase synthesis, biomedical polymers, liquid crystalline polymers, electroluminescent polymers - two examples of each of these polymers.	K5	12

	Polyethylene, PVC, PMMA, polyester; rubber -synthetic and natural, vulcanisation of rubber. Polymer Degradation-Types of Degradation-Rubber-Natural and Synthetic- Structure, Mechanism of Vulcanisation Biodegradable and Non-Biodegradable Polymers. ***Current Trends-Properties of bio based and biodegradable polymers***		
	…… Self Study.		
Course Outcome	**CO1:** Explain the classification of polymers, elastomers, fibres and liquid resins	K1	
	CO2: Explain the addition and condensation polymerization, mechanical properties of polymers	K2	
	CO3: Determine the molecular weight of polymers, and explain the thermal properties of polymers	K3	
	CO4: Explain reactions of polymers and polymer processing	K4	
	CO5: Discuss speciality polymers like PVC, PMMA, rubbers, biodegradable polymers	K5	

Learning Resources	
Text Books	1. Gowariker V.R, N.V.Viswanthan and Jayadev Sreedhar, Polymer Science, New Delhi: New Age International, 2015 2. Misra G.S., Introductory Polymer Chemistry, New Delhi: Wiley Eastern, 2010. 3. Bahadur P and Sastry N V., Principles of Polymer Science., New Delhi: Narosa Publishing House, 2005 4. Ahluwalia,V.K. Anuradha Mishra, Polymer Science A Text Book, Ane Books India: New Delhi, 2008. 5. Morrison, R. R.; Boyd, R. N.; Bhattacharjee, S.K., Organic Chemistry, 7thed.; Pearson: New Delhi, 2011.
Reference Books	1. Billmeyer, F.W., Polymer Science, India: Wiley-Interscience, 2007. 2. Seymour,R.B.; Carraher Jr.C.E., Polymer Chemistry: An Introduction, 6th edition, Marcel Dckker Inc : New York, 2003. 3. Sinha,R. Outlines of Polymer Technology, Prentice Hall of India: New Delhi,2000. 4. Joel R.Fried, Polymer Science and Technology, 3rd ed.; Prentice Hall of India: New Delhi,2014.
Website Link	https://nptel.ac.in/courses/104105039
Self-Study Material	https://www.embibe.com/exams/biodegradable-polymer/

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

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHE03	**POLYMER SCIENCE**			**DSE THEORY - III**	**V**	**5**	**3**	**2**	**-**	**3**

CO-PO Mapping

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

Tutorial Schedule	Group discussion and learning through videos		
Teaching and Learning Methods	Chalk and Board class and PPT Presentation		
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations		
Designed By	**Verified By HoD**	**Approved By Member Secretary**	
Dr. J. Sangeetha	Dr. N. Nithiya	Dr. S. Shahitha	

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B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHE04	**FUNDAMENTALS OF SPECTROSCOPY**	**DSE THEORY-IV**	**VI**	**5**	**3**	**2**	**-**	**3**
Objective	After completion of this course, students will acquire knowledge on electrical and magnetic properties of organic and inorganic compounds, principles and application of various spectroscopic techniques.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Electrical and Magnetic properties of molecules** Dipole moment – polar and nonpolar molecules – polarisability of molecules. Magnetic permeability, volume susceptibility, mass susceptibility and molar susceptibility; diamagnetism, paramagnetism – determination of magnetic susceptibility using Guoy balance, ferromagnetism, anti ferromagnetism **Microwave spectroscopy** Rotation spectra - diatomic molecules (rigid rotator approximation) selection rules – determination of bond length, effect of isotopic substitution – instrumentation and applications	K1	12
II	**Ultraviolet and Visible spectroscopy** Electronic spectra of diatomic molecules (Born Oppenheimer approximation) - vibrational coarse structure – rotational fine structure of electronic-vibration transitions – Frank Condon principle – dissociation in electronic transitions – pre-dissociation energy-Types of electronic transition - σ -σ *, π-π*, n-σ*, n-π* transitions. Chromophore, auxochrome, bathochromic shift and hypsochromic shift and applications	K2	12
III	**Infrared spectroscopy** Vibrational spectra - principles - modes of vibrations - diatomic, triatomic linear (CO_2) and non- linear triatomic (H_2O) molecules - selection rules - stretching and bending vibrations - applications - determination of force constant, moment of inertia and internuclear distance - application of IR spectra to simple organic and inorganic molecules - (group frequencies). **Raman Spectroscopy** Rayleigh scattering and Raman scattering of light – Raman shift – Stokes and Antistokes lines - selection rules - mutual exclusion principle - instrumentation (block diagram) - applications - differences between IR and Raman spectroscopy.	K3	12

IV	**Nuclear magnetic resonance spectroscopy** PMR - theory of PMR - instrumentation - number of signals – chemical shift - peak areas and proton counting - spin-spin coupling - coupling constant - shielding and deshielding of protons, chemical shifts of protons in hydrocarbons and in simple monofunctional organic compounds; spin-spin splitting of neighbouring protons in vinyl and allyl systems.	K4	12
V	**Mass spectrometry** Principle - different kinds of ionisation - instrumentation - the mass spectrum - types of ions - molecular ion peak, base peak, meta stable peak, isotopic peak - fragmentation and their types – McLafferty rearrangement; Retro Diels Alder reaction - illustrations with simple organic molecules. Solving structure elucidation problems using multiple spectroscopic data (NMR, MS, IR and UV-Vis). ***Current Trends - Basic idea about Atomic spectroscopy***	K5	12
	…… Self Study.		
Course Outcome	**CO1**: Understand the electrical and magnetic properties of materials and microwave spectroscopy	K1	
	CO2: Interpret the theory, instrumentation and applications of Infrared and Raman spectroscopy	K2	
	CO3: Apply selection rules to understand spectral transitions, explain Woodward – Fieser's rule for the calculation of wavelength maximum of conjugated dienes	K3	
	CO4: Comprehend theory, instrumentation and applications of NMR spectroscopy	K4	
	CO5: Evaluate the structure elucidation problems using multiple spectroscopic data	K5	

Learning Resources	
Text Books	1. Gopalan, R.; Subramaniam, P. S.; Rengarajan, K. Elements of Analytical Chemistry; S Chand: New Delhi, 2003 2. Banwell, C.N.; Mc Cash, E. M. Fundamentals of Molecular Spectroscopy, 4th edition Tata McGraw Hill, New Delhi, 2017 3. B.K.Sharma, Spectroscopy,22nd ed., Goel Publishing House, 2011.
Reference Books	1. Srivastava, A. K.; Jain, P. C. Chemical Analysis an Instrumental Approach, 3 rded.; S.Chand, New Delhi, 1997. 2. Robert D Braun. Introduction to Instrumental Analysis; Mc.Graw Hill: New York, 2012. 3. Skoog, D. A.; Crouch, S. R.; Holler, F.J.; West, D. M. Fundamentals of Analytical Chemistry, 9 th edition; Harcourt college Publishers: USA, 2013.
Website Link	1.http://vallance.chem.ox.ac.uk/pdfs/SymmetryLectureNotes2004.pdf 2.http://chemistry.rutgers.edu/undergrad/chem207/SymmetryGroupThe ory.html 3. www.epgpathshala.nic.in
Self-Study Material	1. http://vallance.chem.ox.ac.uk/pdfs/SymmetryLectureNotes2004.pdf 2. www.nptel.ac.in

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

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards															
Course Code	**Course Title**					**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M6UCHE04	**FUNDAMENTALS OF SPECTROSCOPY**					**DSE THEORY - IV**			**VI**	**5**	**3**	**2**	**-**	**3**	
CO-PO Mapping															
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**					
CO1	S	S	S	S	S	S	M	S	M	S					
CO2	M	S	S	S	M	S	M	S	M	S					
CO3	S	S	S	M	S	S	M	S	M	S					
CO4	S	S	S	S	S	S	M	S	M	S					
CO5	S	M	S	S	S	S	M	S	S	S					
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG						
Tutorial Schedule	Group discussions and Khan academy videos														
Teaching and Learning Methods	Chalk and Board class and PPT Presentation														
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations														
Designed By	**Verified By HoD**							**Approved By Member Secretary**							
Mrs. M. Sathya	Dr. N. Nithiya							Dr. S. Shahitha							

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHE05	**NANOSCIENCE**	**DSE THEORY – V**	**VI**	**4**	**2**	**2**	**-**	**3**
Objective	This course aims at providing knowledge on synthesis, properties, characterisation and applications of nanoparticles/clusters and nanocomposites							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction to nanoscience** Definition of terms – nanoscience, nanoparticles, clusters, quantum dots, nanostructures and nanocomposites. Electron behaviour in free space, bulk material and nanomaterials. Synthesis and stabilization of nanomaterialsTop down approach (physical methods), mechanical dispersion – ball milling, methods based on evaporation of a precursor-inert gas condensation, ion sputtering, spray pyrolysis, aerosol synthesis-nanolithography. Bottom–up approach (chemical methods) - solvothermal synthesis, photochemical method, gamma radiolysis, sonochemical synthesis, electro deposition, sol-gel method, nanomaterials via chemical routes- solvents reducing agents, capping agents-stabilization of nanoparticles -electrostatic and steric stabilization, common stabilizers, nanoparticle growth in solution, templated growth, Langmuir – Blodgett (L-B) method, reverse micelles emulsion method.	K1	10
II	**Properties of materials on a nanoscale** Optical properties of metal and semiconductor nanomaterials- surface Plasmon resonance (SPR), surface enhanced Raman spectra (SERS), quantum confinement effect, tuning of optical spectrum. Magnetic properties - Fe_3O_4 particle, supra magnetic properties, electronic properties, Chemical properties- chemical process on the surface of nanoparticles, catalysis, mechanical properties.	K2	10
III	**Techniques employed for characterisation of nanomaterials** Spectrocopy – UV-visible, Photoelectron spectroscopy – Electron microscopy – Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning probe microscopy (SPM) – Atomic Force Microscopy (AFM), Scanning Tunneling Microscopy (STM), Optical microscopy – confocal microscopy, X-ray diffraction (XRD) [Principle and Block diagram only].	K3	10
IV	**Special nanomaterials** Carbon Nano Structures Carbon nanotubes: Introduction - types - zigzag, armchair, helical, synthesis by CVD, Functionalization of Carbon Nanotubes, Reactivity of Carbon Nanotubes, Field emission, Fuel Cells, Display devices. Other Important Carbon based materials: Preparation and Characterization Fullerene, Graphene, properties,	K3	10

	DLC and nanodiamonds and Applications Semiconductor nanoparticles: Quantum dots, synthesis – chemical synthesis using clusters, properties, porous silicon – aerogel – types – silica aerogel, resorcinol formaldehyde (RF) aerogels, zeolites – applications. Self Assembled Nanomaterials: Self Assembled Monolayers (SAMS) – Multi layers- Nano rods and Assembly		
V	**Application of nanomaterials** Biomedical Applications- drug, drug delivery, biolabelling, artificial implants, cancer treatment. Sensors – Natural nanoscale sensors, chemical sensors, biosensors, electronic noses. Optics & Electronics – Nanomaterials in the next generation computer technology, high definition TV, flat panel displays, quantum dot laser, single electron transistors [SET]. Nanotechnology in agriculture – Fertilizer and pesticides nanomaterials for water purification, nanomaterials in food and packaging materials, fabric industry. Impacts of Nanotechnology – human & environmental safety risks ***Current trends - Cytotoxicity of nanomaterials***	K5	10
	…… Self Study.		
Course Outcome	**CO1**: Recite the general concepts and physical phenomena of relevance within the field of nanoscience.	K1	
	CO2: Understand the properties, synthesis, characteristics of nanomaterials, special nanomaterials and applications.	K2	
	CO3: Examine the structure, properties, applicability and characterization of nanomaterials	K3	
	CO4:Analyze various synthesis procedures, characterizations and uses of carbon nanotubes, fullerene and grapheme	K4	
	CO5: Evaluate applications of nanomaterials of sensors and in optics and electronic	K5	

Learning Resources	
Text Books	1. Pradeep. T, Nano: The Essentials, Understanding Nanoscience and Nanotechnology; Tata McGraw-Hill Publishing Company Limited, NewDelhi, 2007. 2. Shah. M.A.; Tokeer Ahmad, Principles of Nanoscince and Nanotechnology; Narosa Publishing House, New Delhi, 2010.
Reference Books	1. Sharma. P.K., Understanding Nanotechnology; Vista International Publishing House, Delhi. 2008. 2. Charles P. Poole Jr.; Frank J. Owens. Introduction to Nanotechnology; A John Wiley & Sons, INC., Publication, 2003. 3. Viswanathan B., Nano Materials;Narosa Publishing House, New Delhi, 2009.
Website Link	1.http://www.nanotechnology.com/docs/wtd015798.pdf 2. http://nccr.iitm.ac.in/Nanomaterials.pdf
Self-Study Material	1.https://web.pdx.edu/~pmoeck/phy381/intro-nanotech.pdf 2.https://www.nanotech-now.com/

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

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**		
23M6UCHE05	**NANOSCIENCE**	**DSE THEORY - V**	**VI**	**4**	**2**	**2**	**-**	**3**		

CO-PO Mapping

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

Tutorial Schedule	Group discussions and experiments		
Teaching and Learning Methods	Chalk and Board class and PPT Presentation		
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations		
Designed By	**Verified By HoD**	**Approved By Member Secretary**	
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Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHE06	**PHARMACEUTICAL CHEMISTRY**	**DSE THEORY - VI**	**VI**	**4**	**2**	**2**	**-**	**3**
Objective	Students will learn about the drug design and drug metabolism, important Indian medicinal plants, common diseases and antibiotics drugs for major diseases like cancer, diabetes and AIDS, analgesics and antipyretic agents and significance of clinical tests							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction** Important terminologies - drug, pharmacognosy, pharmacy, pharmacology, pharmacodynamics, pharmacokinetics, clinical pharmacology, pharmacotherapeutics, chemotherapy, toxicology, pharmacophore, antimetabolites, mutation, bacteria, virus, fungi, actinomycetes, vaccines, pharmacopeia, posology and therapeutic index. Sources of drugs - dosage forms - bio availability - routes of administration - absorption, distribution and elimination of drugs – drug metabolism - prescription terms. Structure and pharmacological activity Effect of - unsaturation, chain length, isomerism; groups – halogens amino, nitro, nitrite, cyano, acidic, aldehydic, keto, hydroxyl and alkyl groups.	K1	10
II	**Indian medicinal plants** Some important Indian medicinal plants - tulsi, neem, kizhanelli, mango, semparuthi, adadodai, turmeric and thoothuvalai - uses. Common diseases and their treatment Causes, prevention and treatment of the following diseases: Insect borne diseases - malaria, filariasis, plague; Water borne diseases - cholera, typhoid, dysentery. Digestive system - jaundice; Respiratory system – asthma; Nervous system - epilepsy. Antibiotics Definition - classification - structure and therapeutic uses of chloramphenicol, penicillins, structure activity relationship of chloramphenicol; therapeutic uses of ampicillin, streptomycin, Erythromycin.	K2	10

III	**Drugs for major diseases** Cancer - common causes - chemotherapy - antineoplastic agents - classification - adverse effects of cytotoxic agents; alkylating agents - chlorambucil; anti metabolites - methotrexate, fluouracil; Vinca alkaloids - vincristine, vinblastine. Diabetes - types - management of diabetes - insulin; oral hypoglycemic agents - sulphonyl ureas - chlorpropamide; biguanides - metformin - thiazolidinediones. Cardiovascular drugs - cardio glycosides; anti-hypertensive drugs - Aldomet, pentolinium tartarate; AIDS - causes, symptoms and prevention - anti HIV drugs - AZT, DDC.	K3	10
IV	**Analgesics and antipyretic agents** Classification - action of analgesics - narcotic analgesics - morphine; synthetic analgesics - pethidine, methadone; antipyretic analgesics -salicylic acid derivatives, indolyl derivatives. Anaesthetics Definition, characteristics, Classification - general anaesthetics – volatile anaesthetics - nitrous oxide, ethers, cyclopropane, chloroform, halothane, trichloro ethylene - storage, advantages and disadvantage; non volatile anaesthetics - thiopental sodium; local anaesthetics - requisites - advantages- esters - cocaine, benzocaine; amides. Blood and haemotological agents Blood - composition, grouping - physiological functions of plasma proteins - mechanism of clotting; Coagulants - vitamin K, protamine sulphate, dry thrombin; Anti coagulants - coumarins, citric acid and heparin; antifibrinolytic agents, Anaemia - causes, types and control - anti anaemic drugs.	K4	10
V	**Clinical Chemistry** Blood tests - blood count - complete haemotogram - Hb, RBC, GTT, TC, DC, platelets, PCV, ESR; bleeding and clotting time – glucose tolerance test. Significance of Clinical Tests Serum electrolytes - blood Glucose - orthotoluidine method; Renal functions tests - blood urea, creatinine; liver function tests – serum proteins, albumin globulin ratio, serum bilirubin, enzymes SGOT, SGPT; lipid profile - cholesterol, triglycerides, HDL, LDL, coronary risk index. Urine examination - pH, tests for glucose, albumin and bile pigment. ***Current Trends – Analysis of tablets***	K5	10
	***……* Self Study**		
Course Outcome	**CO1:** Define the pharmaceutical terminologies; describe the principles in pharmacological activity, drug development, clinical chemistry, hematology, therapeutic drugs and treatment of diseases; list the types of IPR and trademarks.	K1	
	CO2: Discuss the development of drugs, structural activity, disease types, physio-chemical properties of therapeutic agents, significance of medicinal plants, clinical tests and factors for patentability.	K2	
	CO3: Apply the principles involved in structural activity and drug designing, functions of haematological agents; estimation of clinical parameters and therapeutic application of drugs for major diseases.	K3	
	CO4: Classification of analgesics and anasthetics, and physiological	K4	

	functions of plasma proteins			
	CO5: Explain the significance of clinical tests like blood urea, serum proteins and coronary risk index		K5	
Learning Resources				
Text Books	1. Lakshmi S, (2004), Pharmaceutical chemistry, 3rd ed., Sultanchand& sons, Delhi. 2. Tripathi K D, (2018), Essentials of medical pharmacology, 8th ed.,Jaypee brothers medical publishers (P) Limited, New Delhi. 3. Ashutosh Kar, (2018), Medicinal chemistry, 7th ed., New ageinternational (P) Limited, Publishers, New Delhi.			
Reference Books	1. Chatwal G R, (2013), Pharmaceutical chemistry, inorganic (vol-I)6thed ., Himalayapublishing house, Bombay. 2. Patrick G, (2002), Instant Notes Medicinal Chemistry, Viva BooksPrivate Limited, New Delhi. 3. Intellectual Property Rights, NeerajPandey, Khushdeep Dharni.Publisher: PHI Learning Pvt. Ltd., 2014 ISBN: 812034989X, 9788120349896.			
Website Link	1.http://www.pharmacy.umaryland.edu/faculty/amackere/courses/phar531_delete/lectures/qsar_1.pdf 2. http://www.indianmedicinalplants.info/ 3. https://www.wipo.int/about-ip/en/			
Self-Study Material	https://www.researchgate.net/figure/ANALYSIS-OF-TABLET-FORMULATION_tbl1_44630423			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards														
Course Code	**Course Title**					**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHE06	**PHARMACEUTICAL CHEMISTRY**					**DSE THEORY - VI**			**VI**	**4**	**2**	**2**	**-**	**3**
CO-PO Mapping														
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**				
CO1	S	S	S	S	S	S	M	S	M	S				
CO2	S	M	M	S	S	S	M	S	M	S				
CO3	S	S	M	S	S	S	M	S	M	S				
CO4	S	S	S	M	S	S	M	S	M	S				
CO5	S	S	S	S	S	S	M	S	S	S				
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG					
Tutorial Schedule	Group discussions and ARLOOPA app													
Teaching and Learning Methods	Chalk and Board class and PPT Presentation													
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations													
Designed By	**Verified By HoD**								**Approved By Member Secretary**					
Mrs. T. Vadivu	Dr. N. Nithiya								Dr. S. Shahitha					

List of Skill Based Elective Course (SEC) for B.Sc., Chemistry
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S. No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	II	23M2UCHS01	COSMETICS AND PERSONAL CARE PRODUCTS
2	III	23M3UCHS02	PESTICIDE CHEMISTRY
3	IV	23M4UCHS03	INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS
4	IV	23M4UCHS04	FORENSIC SCIENCE
5	III	23M3UCHSP1	ENTREPRENEURIAL SKILLS IN CHEMISTRY

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHS01	**COSMETICS AND PERSONAL CARE PRODUCTS**	**SEC THEORY- I**	**II**	**2**	**2**	**-**	**-**	**2**
Objective	Students will familiarize with formulations of various types of cosmetics and their significance, hair, skin and dental care, makeup preparations and personal grooming							

Unit	Course Content	Knowledge Levels	Sessions
I	**Skin care** Nutrition of the skin, skin care and cleansing of the skin; face powder – ingredients; creams and lotions – cleansing, moisturizing all purpose, shaving and sunscreen (formulation only); Gels – formulation and advantages; astringent and skin tonics – key ingredients, skin lightness, depilatories.	K1	6
II	**Hair care** Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner – types – ingredients **Dental care** Tooth pastes – ingredients – mouth wash	K2	6
III	**Make up** Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eye shadow, concealers, rouge	K3	6
IV	**Perfumes** Classification - Natural – plant origin – parts of the plant used, chief constituents; animal origin – amber gries from whale, civetone from civet cat, musk from musk deer; synthetic – classification emphasizing characteristics – esters – alcohols – aldehydes – ketones	K4	6
V	**Beauty treatments** Facials - types – advantages – disadvantages; face masks – types; bleach - types – advantages– disadvantages; shaping the brows; eyelash tinting; perming – types; hair colouring and dyeing; permanent waving – hair straightening; wax – types – waxing; pedicure, manicure - advantages – disadvantages	K4	6
Course Outcome	**CO1:** Know about the composition of various cosmetic products for hair, dental and skin care.	K1	
	CO2: Identify the chemical aspects and applications of various cosmetic products	K2	
	CO3: Demonstrate the methods of beauty treatments and their advantages and disadvantage	K3	
	CO4: Illustrate the classification of perfumes and the various ingredients used in it	K3	
	CO5: Inspect the hazards of cosmetic products and give the remedy	K4	

	for those hazards.			
Learning Resources				
Text Books	1. Thankamma Jacob, Foods, drugs and cometics – A consumer guide, Macmillan publication, London, 1997.			
Reference Books	1. Wilkinson J B E and Moore R J, Harry's cosmeticology, 7 th ed., Chemical Publishers, London, 1997. 2. George Howard, Principles and practice of perfumes and cosmetics, Stanley Therones, Chettenham, 1987.			
Website Link	1. http://www.khake.com/page75.html 2. Net.foxsm/list/284			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHS01	**COSMETICS AND PERSONAL CARE PRODUCTS**			**SEC THEORY - I**		**II**	**2**	**2**	**-**	**-**	**2**

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

Tutorial Schedule	-		
Teaching and Learning Methods	Chalk and Board class and PPT Presentation		
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations		
Designed By	**Verified By HoD**	**Approved By Member Secretary**	
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha	

B. Sc. -Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHS02	**PESTICIDE CHEMISTRY**	**SEC THEORY - II**	**III**	**2**	**2**	**-**	**-**	**2**
Objective	Students will gain knowledge about the various types of pesticides and their toxicity, to understand the accumulation of pesticides in the form of residues and its analysis and gain knowledge on choice of alternate and eco-friendly pesticides.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Introduction** History of pesticides. Chemistry of Pesticides: Brief introduction to classes of pesticides (Chemical class, targets), structures, chemical names, physical and chemical properties. Toxicity of pesticides: Acute and chronic toxicity in mammals, birds, aquatic species etc. Methods of analysis of pesticides.	K2	6
II	**Insecticides** Classification and study of following insecticides with respect to structure, chemical name, physical properties, chemical properties, synthesis, degradation, metabolism, formulations, Mode of action, uses, toxicity. Organophosphates and Phosphothionates: Acephate, Chlorpyriphos, Monocrotophos, and parathion-methyl. Organochlorine - Endosulfan, heptachlor; Carbamate: Cartap hydrochloride, Methomyl, Propoxur.	K3	6
III	**Pesticides residues** Introduction- application of agrochemicals, dissemination pathways of pesticides, causes of pesticide residues, remedies. Pesticides residues in atmosphere - entry into atmosphere, action of pesticides, effects on environments. Pesticides residues in water - entry into water systems, action and effect in aquatic environment. Pesticides residues in soil. entry into soil, absorption, retention and transport in soil, effects on microorganism, soil condition and fertility, decomposition and degradation by climatic factors and microorganism.	K3	6
IV	**Pesticide Residues effect and analysis** Effects of pesticides residue on human life, birds and animals - routes for exposure to pesticides, action of pesticides on living system. Analysis of pesticides residues- sample preparation, extraction of pesticides residues (soil, water and vegetables/fruits) simple methods and schemes of analysis, multi-residue analysis.	K4	6

V	**Biopesticides** Pheromones, attractants, repellents - Introduction, types and application (8-Dodecen-1-ol, 10-cis-12-hexadecadienoic, Trimedlure, Cuelure, methyl eugenol, N,N- Diethyl-m-toluamide, Dimethyl phthalate, Icaridin). Baits-Metaldehyde, Iron (II) phosphate, Indoxacarb, Zinc Phosphide, Bromadiolone.	K5	6
Course Outcome	**CO1:** Define the pesticides and Insecticides Structure of pesticides, Bio pesticides their toxicity with respect to structure and category	K1	
	CO2: Explain the preparation and property of pesticides residues	K2	
	CO3: Investigate the pesticide residues, and bio residue prevention and care	K3	
	CO4: Demonstrate the extraction and analytical methods of pesticide residues and Insecticides	K4	
	CO5: Make awareness to the public on bio-pesticides, Insecticides and Pesticides residues	K5	

Learning Resources				
Text Books	1. Handa SK. Principles of pesticide chemistry. Agrobios (India); 2012. 2. Ramesh Kumari, A beginener's guide to Pesiticide Chemistry, Prestige Publishers, 2022.			
Reference Books	1. Roy N. K., Chemistry of Pesticides. CBS Publisher & DistributorsPLtd; 1st Ed., 2010. 2. Ellerbrock R.H., Pesticide Residues: Significance, Management and Analysis, 2005			
Website Link	https://en.wikipedia.org/wiki/Pesticide https://www.who.int/news-room/questions-and-answers/item/chemical-safety-pesticides https://en.wikipedia.org/wiki/Biopesticide			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards														
Course Code	**Course Title**					**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHS02	**PESTICIDE CHEMISTRY**					**SEC THEORY - II**			**III**	**2**	**2**	**-**	**-**	**2**
CO-PO Mapping														
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**				
CO1	S	S	S	S	S	S	M	S	M	S				
CO2	S	M	M	S	S	S	M	S	M	S				
CO3	S	S	M	S	S	S	M	S	M	S				
CO4	S	S	S	M	S	S	M	S	M	S				
CO5	S	S	S	S	S	S	M	S	S	S				
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG					
Tutorial Schedule	-													
Teaching and Learning Methods	Chalk and Board class and PPT Presentation													
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations													
Designed By	**Verified By**							**Approved By** Member Secretary						
Mrs. T. Vadivu	Dr. N. Nithiya							Dr. S. Shahitha						

B. Sc.-Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHS03	**INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS**	**SEC THEORY - III**	**IV**	**2**	**2**	**-**	**-**	**2**
Objective	Students will acquire knowledge about fundamentals of analytical techniques and its application in the characterization of compounds, theory of chromatographic separation, thermo / electro analytical techniques and stoichiometry related concentration terms							

Unit	Course Content	Knowledge Levels	Sessions
I	**Qualitative and Quantitative Aspects of Analysis:** S.I Units, Distinction between Mass and Weight. Moles, Milli moles, Milli equivalence, Molality, Molarity, Normality, Percentage by Weight and Volume, ppm, ppb. Density and Specific Gravity of Liquids. Evaluation of analytical data - Errors - Types of Errors, Accuracy, Precision, Minimization of Errors. Significant Figures. Methods of Expressing Precision: Mean, Median, Average Deviation, Standard Deviation.	K2	6
II	**Atomic Absorption Spectroscopy:** Basic principles - instrumentation (source, monochromator, detector, choice of flame and Burner designs) - Techniques of atomization and sample introduction - Techniques for the quantitative estimation of trace level of lead ions from water samples.	K3	6
III	**IR and UV-Visible Spectroscopy:** Molecular spectroscopy - Origin of spectra, interaction of radiation with matter. Infrared Spectroscopy: Basic principles, instrumentation for double beam instrument; sampling techniques. UV-Visible Spectrometry: Basic principles, instrumentation for single and double beam instrument. Beer-Lambert's law and its validity.	K3	6
IV	**Thermal and Electro-analytical:** Methods of Analysis TGA and DTA- Principle, Instrumentation, factors affecting TGA/DTA, Thermal analysis of calcium oxalates. Electro analytical methods: Polarography - principle, instrumentation and applications.	K4	6
V	**Separation and purification techniques:** Principle of Solvent Extraction and liquid - liquid extraction. Chromatography: Column, TLC and Paper - principle, choice of adsorbents, solvents, preparation of column and elution - development of chromatograms and Rf value.	K5	6
Course Outcome	**CO1:** Apply error analysis in the calibration and use of analytical instruments, explain theory, instrumentation and application of	K1	

	CO2: Recite the theory, instrumentation and application of UV visible, Infrared spectroscopy and flame photometry and Atomic Absorption spectrometry	K2	
	CO3: Able to discuss instrumentation, theory and applications of thermal and electrochemical techniques	K3	
	CO4: Recommend the use of chromatographic techniques in the separation and identification of mixtures	K4	
	CO5: Compile the preparation of solutions and stoichiometric calculations	K5	

Learning Resources	
Text Books	1. Vogel, Arthur I: A Textbook of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed., The English Language Book Society of Longman. 2. R. Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand, New Delhi, 2007 3. Skoog, Holler and Crouch, Principles of Instrumental Analysis, Cengage Learning, 6th Indian Reprint (2017).
Reference Books	1. D. A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5th Edn., Saunders college publishing, Philadelphia, 2013. 2. Dash U N, Analytical Chemistry; Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 2011. 3. Christian, Gary D; Analytical Chemistry, 6th Ed., John Wiley & Sons, New York, 2004.
Website Link	1. http://www.epa.gov/rpdweb00/docs/marlap/402-b-04-001b-14- final.pdf 2. http://eric.ed.gov/?id=EJ386287 3. http://www.britannica.com/EBchecked/topic/108875/separationand-purification

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

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards													
Course Code	**Course Title**					**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHS03	**INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS**					**SEC THEORY - III**		**IV**	**2**	**2**	**-**	**-**	**2**
CO-PO Mapping													
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**			
CO1	S	S	S	S	S	S	M	S	M	S			
CO2	S	M	M	S	S	S	M	L	M	S			
CO3	S	S	M	S	L	S	M	S	M	S			
CO4	S	L	S	M	S	S	M	S	M	S			
CO5	S	S	S	S	S	S	M	S	S	S			
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG				
Tutorial Schedule	-												
Teaching and Learning Methods	Chalk and Board class and PPT Presentation												
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations												
Designed By	**Verified By**							**Approved By** Member Secretary					
Mrs. M. Saranya	Dr. N. Nithiya							Dr. S. Shahitha					

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHS04	**FORENSIC SCIENCE**	**SEC THEORY - IV**	**IV**	**2**	**2**	**-**	**-**	**2**
Objective	Students will gain an overall view of crime detection through analytical instruments, forgery and its detection and medical aspects							

Unit	Course Content	Knowledge Levels	Sessions
I	**Poisons** Poisons - types and classification - diagnosis of poisons in the living and the dead - clinical symptoms - Heavy metal contamination (Hg, Pb, Cd) of sea foods - use of neutron activation analysis in detecting arsenic in human hair.	K1	6
II	**Crime Detection** Accidental explosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs - possible explosives (gelatin sticks and RDX) - metal detector devices and other security measures for VVIP-composition of bullets and detecting powder burns.	K2	6
III	**Forgery and Counterfeiting Documents** Different types of forged signatures - writing deliberately modified - uses of ultraviolet rays - comparison of typewritten letters - checking silver line watermark in currency notes - alloy analysis using AAS (Atomic Absorption Spectroscopy) to detect counterfeit coins - detection of gold purity in 22 carat ornaments - detecting gold plated jewels - authenticity of diamond.	K3	6
IV	**Tracks and Traces** Tracks and traces - small tracks and police dogs - foot prints - costing of foot prints -residue prints, walking pattern or tyre marks – miscellaneous traces and tracks - glass fracture - tool marks - paints - fibres - Analysis of biological substances - blood, semen, saliva, urine and hair – detecting steroid consumption in athletes and racehorses.	K4	6
V	**Medical Aspects** Metabolite analysis using mass spectrum - Gas chromatography - Arson - natural fires and arson - burning characteristics and chemistry of combustible materials - nature of combustion. Ballistics - classification - internal and terminal ballistics - laboratory examination of barrel washing and detection of powder residue by chemical tests.	K5	6
Course Outcome	**CO1:** Learn about the Poisons - types and classification of poisons in the living and the dead organisms and also get information about Postmortem.	K1	
	CO2: Get awareness on Human bombs, possible explosives (gelatin sticks and RDX) and metal detector devices and other security measures for VVIP	K2	

	- composition of bullets and detecting powder burns			
	CO3: Detect the forgery documents, different types of forged signatures			K3
	CO4: Have an idea about how to tracks and trace using police dogs, foot prints identification and gain the knowledge in analyzing biological substances - blood, semen, saliva, urine and hair - DNA Finger printing for tissue identification in dismembered bodies			K4
	CO5: Get the awareness on Aids - causes and prevention and also have an exposure on handling fire explodes.			K5
Learning Resources				
Text Books	1. SA Iqbal, M Liviu, Textbook of forensic chemistry, Discovery publishing house private limited, 2011. 2. Kelly M. Elkins, Introduction to Forensic Chemistry, CRC Press, Taylor & Francis Group, 2019. 3. Javed I. Khan, Thomas J. Kennedy, Donnell R. Christian, Jr., Basic principles of Forensic chemistry, Humana Press, first edition, 2012.			
Reference Books	1. Richard Saferst in and Criminalistics-An Introduction to Forensic Science (College Version), Sopfestein, Printice hall, eighth edition,2003 2. Suzanne Bell, Forensic Chemistry, Pearson, second international edition, 2014. 3. Jay Siegel, Forensic chemistry: Fundamentals and applications, Wiley-Blackwell, first edition, 2015.			
Website Link	1. http://www.library.ucsb.edu/ist/03-spring/internet.html 2. http://www.wonder howto.com/topic/forensic-science/			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards													
Course Code	**Course Title**			**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M4UCHS04	**FORENSIC SCIENCE**			**SEC THEORY- IV**			**IV**	**2**	**2**	**-**	**-**	**2**	
CO-PO Mapping													
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**			
CO1	S	S	S	S	S	S	M	S	M	S			
CO2	S	M	M	S	S	S	M	S	M	S			
CO3	S	S	M	S	S	S	M	S	M	S			
CO4	S	S	S	M	S	S	M	S	M	S			
CO5	S	S	S	S	S	S	M	S	S	S			
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG				
Tutorial Schedule	-												
Teaching and Learning Methods	Chalk and Board class and PPT Presentation												
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations												
Designed By	**Verified By**							**Approved By** Member Secretary					
Mrs. T. Vadivu	Dr. N. Nithiya							Dr. S. Shahitha					

B. Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHSP1	**ENTREPRENEURIAL SKILLS IN CHEMISTRY**	**SEC PRACTICAL - I**	**III**	**2**	**-**	**-**	**2**	**2**
Objective	Students will be trained to develop entrepreneurial skills in students and provide hands on experience to prepare and develop products.							

S. No.	Details	Knowledge Levels	Sessions
1	**Food Chemistry** Food adulteration - contamination of food items with clay stones, water and toxic chemicals - Common adulterants	K2	30
2	**Hands on Experience** Detection of adulterants in food items like coffee, tea, pepper, chilli powder, turmeric powder, butter, ghee, milk, honey etc., by simple techniques. Extraction of oils from spices and flowers.	K3	
3	**Food additives** Natural and synthetic anti-oxidants, glazing agents (hazardous effect), food colourants, Preservatives, leavening agents, Baking powder and baking soda, yeast, MSG, vinegar.	K4	
4	**Preparation of house-hold items** Preparation of Jam, squash and Jelly, Gulkand and cottage cheese. Preparation of products like candles, soap, detergents, cleaning powder, Shampoos, pain balm, tooth paste/powder and disinfectants in small scale.	K4	
5	**Dyes** Classification - Natural, synthetic dyes and their characteristics – basic methods and principles of dyeing. Dyeing - cotton fabrics with natural and synthetic dyes. Printing - tie and dye, batik.	K4	
Course Outcome	**CO1:** Define dyes, foods additives, Preparation of house-hold items, Identify adulterated food items by doing simple chemical tests	K1	
	CO2: Explain cleaning products, Classification of Natural and synthetic dyes, food colourants	K2	
	CO3: Discuss adulterants in food items like coffee, tea, pepper, chili powder, water and toxic chemicals educate others about adulteration and motivate them to become entrepreneurs.	K3	
	CO4: Analyse the adulterants of food products ,Food additives and Dyes	K4	
	CO5: Evaluate the methodology to identify the suitable dyes for textile dyeing and good aroma food products	K5	
Learning Resources			

Text Books	1. George S & Muralidharan V, Fibre to Finished Fabric – A Simple Approach, Publication Division, University of Madras, Chennai, 2007.			
Reference Books	1. Shyam Jha, Rapid detection of food adulterants and contaminants (Theory and Practice),Elsevier, e Book ISBN 9087128004289, 1 St Edition, 2015			
Website Link	https://www.vlab.co.in/broad-area-chemical-sciences			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards													
Course Code	**Course Title**				**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M3UCHSP1	**ENTREPRENEURIAL SKILLS IN CHEMISTRY**				**SEC PRACTICAL - I**		**III**	**2**	**-**	**-**	**2**	**2**	
CO-PO Mapping													
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**			
CO1	S	S	S	S	S	S	M	S	M	S			
CO2	S	M	M	S	S	S	M	S	M	S			
CO3	S	S	M	S	S	S	M	S	M	S			
CO4	S	S	S	M	S	S	M	S	M	S			
CO5	S	S	S	S	S	S	M	S	S	S			
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG				
Tutorial Schedule	-												
Teaching and Learning Methods	Chalk and Board class and Demo class												
Assessment Methods	(Only Internal Examination) Assignment – 10 Marks CIA-I – 40 Marks and CIA-II – 40 Marks												
Designed By	**Verified By**					**Approved By** Member Secretary							
Mrs. T.Vadivu	Dr. N. Nithiya					Dr. S. Shahitha							

List of Non Major Elective Course (NMEC) offered by the B.Sc., Chemistry
SYLLABUS - LOCF-CBCS Pattern
EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards

S. No.	SEM	COURSE_CODE	TITLE OF THE COURSE
1	I	23M1UCHN01	FOOD CHEMISTRY
2	I	23M1UCHN02	ROLE OF CHEMISTRY IN DAILY LIFE
3	II	23M2UCHN03	DAIRY CHEMISTRY

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram – 637408

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHN01	**FOOD CHEMISTRY**	**NMEC THEORY - I**	**I**	**2**	**2**	**-**	**-**	**2**

Objective	Students will learn about the Types of food, Food adulteration and poisons, Food additives and preservatives

Unit	Course Content	Knowledge Levels	Sessions
I	**Food Adulteration:** Sources of food, types, advantages and disadvantages. Food adulteration - contamination of wheat, rice, milk, butter etc. with clay stones, water and toxic chemicals -Common adulterants, Ghee adulterants and their detection. Detection of adulterated foods by simple analytical techniques.	K1	6
II	**Food Poison**: Food poisons - natural poisons (alkaloids - nephrotoxin) - pesticides, (DDT, BHC, Malathion) -Chemical poisons - First aid for poison consumed victims.	K2	6
III	**Food Additives:** Food additives -artificial sweeteners – Saccharin - Cyclomate and Aspartate Food flavours -esters, aldehydes and heterocyclic compounds – Food colours – Emulsifying agents – preservatives -leavening agents. Baking powder – yeast – tastemakers – MSG - vinegar.	K3	6
IV	**Beverages:** Beverages – soft drinks – soda – fruit juices – alcoholic beverages-examples. Carbonation-addiction to alcohol– diseases of liver and social problems.	K4	6
V	**Edible Oils:** Fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats - iodine value - role of MUFA and PUFA in preventing heart diseases-determination of iodine value, RM value, saponification values and their significance.	K5	6
Course Outcome	**CO1:** Learn about the food adulteration, poisons, food additives, beverages and edible oils	K1	
	CO2: Describe the various contaminations of food products and ill effects of alcoholic beverages	K2	
	CO3: Demonstrate the use of RM value, saponification values, Iodine values and their significance and the first aid available for food poisons.	K3	
	CO4: Examine the advantages and disadvantages of beverages, soft drinks, soda, fruit juices and alcoholic beverages with examples.	K4	
	CO5: Formulate the methods to identify food contaminations and ways to reduce the food contaminations	K5	

Learning Resources	
Text Books	1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010. 2. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand & Co. Publishers, second

	edition, 2006. 3. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishning house, 2010.
Reference Books	1. H.-D. Belitz, Werner Grosch, Food Chemistry Springer Science & Business Media, 4 thEdition, 2009. 2. Hasenhuettl, Gerard. L.; Hartel, Richard. W. Food Emulsifiers and their applications Springer New York 2nd ed. 2008
Website Link	1)https://www.youtube.com/watch?v=Sz_6OKWZgFA 2)https://www.youtube.com/watch?v=dqJ6guIHfcc

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

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards													
Course Code	**Course Title**			**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**	
23M1UCHN01	**FOOD CHEMISTRY**			**NMEC THEORY - I**			**I**	**2**	**2**	**-**	**-**	**2**	
CO-PO Mapping													
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**			
CO1	M	S	S	M	M	M	S	S	S	M			
CO2	S	S	M	S	M	S	S	M	M	M			
CO3	S	S	S	M	S	S	S	M	S	S			
CO4	S	M	M	S	M	S	M	M	M	M			
CO5	S	S	S	M	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	Chalk and Board class and PPT Presentation												
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations												
Designed By	**Verified By**							**Approved By** Member Secretary					
Mrs. A. Dhivya	Dr. N. Nithiya							Dr. S. Shahitha					

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHN02	**ROLE OF CHEMISTRY IN DAILY LIFE**	**NMEC THEORY- II**	**I**	**2**	**2**	**-**	**-**	**2**
Objective	This course aims at providing an overall view of the importance of Chemistry in everyday life, chemistry of building materials and food, chemistry of Drugs and pharmaceuticals.							

Unit	Course Content	Knowledge Levels	Sessions
I	**General survey of chemicals used in everyday life** Air - components and their importance; photosynthetic reaction, air pollution, green - house effect and the impact on our life style. Water - Sources of water, qualities of potable water, soft and hard water, methods of removal of hardness-water pollution	K1	6
II	**Building materials** Cement, ceramics, glass and refractories - definition, composition and application only. Plastics - polythene, PVC, bakelite, polyesters, melamine-formaldehyde resins -preparation and uses only	K2	6
III	**Food and Nutrition** Carbohydrates, Proteins, Fats - definition and their importance as food constituents – balanced diet – Calories minerals and vitamins (sources and their physiological importance). Cosmetics – tooth paste, face powder, soaps and detergents, shampoos, nail polish, perfumes - general formulation and preparations - possible hazards of cosmetic use.	K3	6
IV	**Chemicals in food production** Fertilizers - need, natural sources; urea, NPK fertilizers and super phosphate. Fuel – classification - solid, liquid and gaseous; nuclear fuel examples and uses.	K4	6
V	**Pharmaceutical drugsand Dyes** Analgesics and antipyretics - paracetamol and aspirin. Colour chemicals - pigments and dyes - examples and applications.	K4	6
Course Outcome	**CO1:** To learn about the applications of chemistry in everyday life, building materials, food products and in pharmaceutical industry.	K1	
	CO2: To identify the various causes of air and water pollution and the methods to rectify it.	K2	
	CO3: To demonstrate the uses of plastics, glasses, fertilizers and fuels	K3	
	CO4: To analyse the hazards of various chemicals used in cosmetics	K4	
	CO5: To predict the various drugs and relate the structure of compounds used for dyes and pigments	K4	
Learning Resources			

Text Books	1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010. 2. A textbook of pharmaceutical chemistry by JayashreeGhosh, S Chand publishing, 2012. 3. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006.			
Reference Books	1. Randolph. Norris Shreve, Chemical Process Industries, McGraw-Hill, Texas, fourth edition, 1977. 2. W. A. Poucher, Joseph A. Brink, Jr. Perfumes, Cosmetics and Soaps, Springer, 2000. 3. A. K. De, Environmental Chemistry, New Age International Public Co., Multicolour Edition, 2018			
Website Link	1)https://www.youtube.com/watch?v=rHxxLYzJ8Sw 2)https://www.youtube.com/watch?v=WCD6iOQuetw 3)https://www.youtube.com/watch?v=1HJuIne-BKg			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards														
Course Code	**Course Title**					**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHN02	**ROLE OF CHEMISTRY IN DAILY LIFE**					**NMEC THEORY- II**			**I**	**2**	**2**	**-**	**-**	**2**
CO-PO Mapping														
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**				
CO1	S	M	S	M	S	S	M	S	M	S				
CO2	S	S	M	S	S	S	S	M	S	M				
CO3	S	S	S	S	M	S	S	S	S	M				
CO4	S	M	S	S	S	S	M	S	S	S				
CO5	S	S	M	M	S	S	S	M	M	S				
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG					
Tutorial Schedule	-													
Teaching and Learning Methods	Chalk and Board class and PPT Presentation													
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations													
Designed By	**Verified By**							**Approved By** Member Secretary						
Mrs. A. Dhivya	Dr. N. Nithiya							Dr. S. Shahitha						

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B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHN03	**DAIRY CHEMISTRY**	**NMEC THEORY- III**	**II**	**2**	**2**	**-**	**-**	**2**
Objective	Students will learn about the chemistry of milk and milk products, processing of milk, preservation and formation of milk products							

Unit	Course Content	Knowledge Levels	Sessions
I	**Composition of Milk:** Milk-definition-general composition of milk-constituents of milk - lipids, proteins, carbohydrates, vitamins and minerals - physical properties of milk - colour, odour, acidity, specific gravity, viscosity and conductivity -Factors affecting the composition of milk - adulterants, preservatives with neutralizer examples and their detection	K1	6
II	**Processing of Milk:** Microbiology of milk - destruction of micro - organisms in milk, physico – chemical changes taking place in milk due to processing - boiling, pasteurization – types of pasteurization -Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization.	K2	6
III	**Major Milk Products** Cream - definition - composition - chemistry of creaming process - gravitational and centrifugal methods of separation of cream - estimation of fat in cream. Butter - definition -composition - theory of churning – desi butter - salted butter, estimation of acidity and moisture content in butter. Ghee - major constituents - common adulterants added to ghee and their detection - rancidity - definition - prevention - antioxidants and synergists - natural and synthetic.	K3	6
IV	**Special Milk:** Standardised milk - definition - merits - reconstituted milk - definition - flow diagram of manufacture - Homogenised milk - flavoured milk - vitaminised milk - toned milk -Incitation milk - Vegetable toned milk - humanized milk - condensed milk - definition, composition and nutritive value.	K3	6
V	**Fermented and other Milk Products:** Fermented milk products – fermentation of milk - definition, conditions, cultured milk - definition of culture - example, conditions - cultured cream, butter milk - Bulgarious milk -acidophilous milk – YohurtIndigenous products- khoa and chhena definition - Ice cream -definition-percentage composition-types-ingredients-manufacture of ice–cream, stabilizers – emulsifiersandtheirrole-milkpowder-definition-needformakingmilkpowderdryingprocess-types of drying	K4	6
Course Outcome	**CO1:** Understand about general composition of milk – constituents and its physical properties	K1	
	CO2: Intrepret about the pasteurization of Milk and various types of	K2	

	pasteurization - Bottle, Batch and HTST Ultra High Temperature Pasteurization.		
	CO3: Report about the process of preparing milk powder, its drying and the various types of drying process.	K2	
	CO4: Demonstrate the various uses of Homogenized milk, flavoured milk, vitaminised milk and toned milk	K3	
	CO5: Relate the uses of Cream and Butter their composition and the methods to estimate fat in cream and Ghee	K3	

Learning Resources				
Text Books	1. K. Bagavathi Sundari, Applied Chemistry, MJP Publishers, first edition, 2006. 2. Dr. Pandurang Gangasagare, A Textbook of Traditional dairy Products, First Edition,Oxford Book Company, 2018. 3. Text book of dairy chemistry, M.P. Mathur, D. Datta Roy, P. Dinakar, Indian Council of Agricultural Research, 1st edition, 2008.			
Reference Books	1. Robert Jenness and S. Patom, Principles of Dairy Chemistry, S. Wiley, New York, 2005. 2. F.P. Wond, Fundamentals of Dairy Chemistry,Springer,Singapore,2006.			
Website Link	1. https://www.youtube.com/watch?v=uYhbekSGMZY 2. https://www.youtube.com/watch?v=L4ndB3b_oaI 3. https://www.youtube.com/watch?v=b1nTYnaYQw4			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHN03	**DAIRY CHEMISTRY**	**NMEC THEORY - III**	**II**	**2**	**2**	**-**	**-**	**2**

CO-PO Mapping

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

Tutorial Schedule	-	
Teaching and Learning Methods	Chalk and Board class and PPT Presentation	
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations	
Designed By	**Verified By**	**Approved By** Member Secretary
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha

Allied Course for any Degree offered by the B.Sc., Chemistry LOCF-CBCS Pattern EFFECTIVE FROM THE ACADEMIC YEAR 2023-2024 Onwards LIST OF GEC - ALLIED COURSES			
S. No.	**Sem**	**COURSE_CODE**	**TITLE OF THE COURSE**
1	I	23M1UCHA01	ALLIED CHEMISTRY I (Life Sciences)
2	III	23M3UCHA01	
3	II	23M2UCHA02	ALLIED CHEMISTRY II (Life Sciences)
4	IV	23M4UCHA02	
5	III	23M3UCHA03	ALLIED CHEMISTRY I (Physics)
6	IV	23M4UCHA04	ALLIED CHEMISTRY II (Physics)
7	II/IV	23M2UCHAP1 / 23M4UCHAP1	PRACTICAL: ALLIED CHEMISTRY

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHA01 / 23M3UCHA01	**ALLIED : CHEMISTRY- I**	**GEC THEORY - I**	**I/III**	**4**	**2**	**2**	**-**	**3**
Objective	Students will gain a basic knowledge on chemical bonds, nuclear chemistry, chemical industries, General Organic Chemistry, drugs and Analytical chemistry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Chemical Bonding and Nuclear Chemistry:** **Chemical Bonding:** Molecular Orbital Theory-bonding, antibonding and non-bonding orbital. M. O diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties. **Nuclear Chemistry:** Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions- group displacement law. Nuclear binding energy - mass defect - calculations. Nuclear fission and nuclear fusion - differences – Stellar energy. Applications of radioisotopes - carbon dating, rock dating and medicinal applications	K1	9
II	**Industrial Chemistry Fuels:** Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required). Silicones: Synthesis, properties and uses of silicones. Fertilizers: Urea, ammonium sulphate, potassium nitrate NPK fertilizer, superphosphate, triple superphosphate.	K2	9
III	**Fundamental Concepts in Organic Chemistry Hybridization**: Orbital overlap hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Polar effects: Inductive effect and consequences on Ka and Kb of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric-examples and explanation. Reaction mechanisms: Types of reactions- aromaticity-aromatic electrophilic substitution; nitration, halogenation, Friedel-Craft's alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.	K3	10
IV	**Drugs and Speciality Chemicals** Definition, structure and uses of Antibiotics viz., Penicillin, Chloramphenicol and Streptomycin; Anaesthetics viz., Chloroform and ether; Antipyretics viz., aspirin, paracetamol and ibuprofen; Artificial Sweeteners viz., saccharin, Aspartame and cyclamate; Organic Halogen compounds viz., Freon, Teflon	K4	10

V	**Analytical Chemistry** Introduction to qualitative and quantitative analysis – Principles of volumetric analysis – Separation and purification techniques: extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.	K4	10
Course Outcome	**CO1:** State the theories of chemical bonding, nuclear reactions and its applications.	K1	
	CO2: Explain the efficiencies and uses of various fuels and fertilizers.	K2	
	CO3: List the type of hybridization, electronic effect and mechanism involved in the organic reactions	K3	
	CO4: Demonstrate the structure and uses of antibiotics, anaesthetics, antipyretics and artificial sugars.	K4	
	CO5: Analyse the various methods and identify an appropriate method for the separation of chemical components.	K4	

Learning Resources

Text Books	1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition, 2009. 2. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 3. Arun Bahl, B.S. Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012
Reference Books	1. P.L.Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007. 2. B. K. Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014. 3. Jayashree gosh, Fundamental Concepts of Applied Chemistry; Sultan & Chand, Edition 2006
Website Link	1. https://www.youtube.com/watch?v=MPqCzsntjAE 2. https://www.youtube.com/watch?v=1DWZFkipYtE 3.https://www.youtube.com/watch?v=Qs8TZW6b6P4

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

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M1UCHA01 / 23M3UCHA01	**ALLIED : CHEMISTRY- I**			**GEC THEORY - I**		**I/III**	**4**	**2**	**2**	**-**	**3**

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

Tutorial Schedule	Group discussions and Video lectures
Teaching and Learning Methods	Chalk and Board class and PPT Presentation
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations

Designed By	**Verified By**	**Approved By** Member Secretary
Mrs. A. Dhivya	Dr. N. Nithiya	Dr. S. Shahitha

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B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHA02 / 23M4UCHA02	**ALLIED : CHEMISTRY- II**	**GEC THEORY - II**	**II/IV**	**4**	**2**	**2**	**-**	**3**
Objective	Students will obtain knowledge on coordination compounds, biomolecules, electrochemistry and photochemistry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Co-ordination Chemistry and Water Technology**: Co-ordination Chemistry: Definition of terms - IUPAC Nomenclature - Werner'stheory - EAN rule - Pauling's theory – Postulates - Applications to $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$,$[Co(CN)_6]^{3-}$ Chelation - Biological role of Hemoglobin and Chlorophyll (elementary idea) - Applications in qualitative and quantitative analysis. Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques – BOD and COD	K1	9
II	**Carbohydrates:** Classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose. Glucose-fructose interconversion. Preparation and properties of sucrose, starch and cellulose.	K2	9
III	**Amino Acids and Essential elements of biosystem** Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method – Proteins classification – structure - Colour reactions – Biological functions – nucleosides -nucleotides – RNA and DNA – structure. Essentials of trace metals in biological system-Na, Cu, K, Zn, Fe, Mg	K3	10
IV	**Electrochemistry:** Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pK_a, pK_b. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.	K4	10
V	**Photochemistry:** Grothus - Drapper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen -chloride reaction. Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples).	K4	10

Course Outcome	**CO1:** Familiarize the IUPAC name for complexes, and understand the different theories of the bonding in coordination compounds and water technology.	K1	
	CO2: Explain the preparation and property of carbohydrates.	K2	
	CO3: Enlighten about the biological role of transition metals, amino acids and nucleic acids.	K3	
	CO4: Apply the electrochemistry principles in corrosion, electroplating and fuel cells	K4	
	CO5: Demonstrate the various types of photochemical process.	K4	

Learning Resources	
Text Books	1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition, 2009. 2. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006. 3. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition, 2012.
Reference Books	1. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007. 3. P.L.Soni, Mohan Katyal, Text book of Inorganic chemistry Sultan Chand and Company, New Delhi, twentieth edition, 2007
Website Link	1.https://www.youtube.com/watch?v=WmaYwEMZcwY 2. https://www.youtube.com/watch?v=teTkvUtW4SA 3.https://www.youtube.com/watch?v=wvTv8TqWC48

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

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards													
Course Code	**Course Title**					**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHA02 / 23M4UCHA02	**ALLIED : CHEMISTRY- II**					**GEC THEORY - II**			**II/IV**	**4**	**2**	**2**	**-**	**3**
CO-PO Mapping														
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**				
CO1	S	S	M	S	S	S	M	S	M	S				
CO2	S	M	S	M	S	S	S	M	S	S				
CO3	S	S	S	S	S	S	M	S	M	S				
CO4	S	S	M	M	S	S	S	S	S	S				
CO5	S	M	S	S	S	S	M	M	S	S				
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG					
Tutorial Schedule	Group discussions and Video lectures													
Teaching and Learning Methods	Chalk and Board class and PPT Presentation													
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations													
Designed By	**Verified By**							**Approved By** Member Secretary						
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B.Sc - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHA03	**ALLIED: CHEMISTRY- I**	**GEC THEORY - I**	**III**	**4**	**2**	**2**	**-**	**3**
Objective	Students will gain knowledge about the chemical bonding, Industrial chemistry, thermodynamics and basics concepts of organic chemistry and analytical techniques.							

Unit	Course Content	Knowledge Levels	Sessions
I	**Chemical Bonding and Nuclear Chemistry** Chemical Bonding**:** Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. Molecular orbital diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties. Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions - group displacement law. Nuclear binding energy -mass defect - calculations. Nuclear fission and nuclear fusion -differences - Stellar energy. Applications of radioisotopes – carbon dating, rock dating and medicinal applications.	K2	9
II	**Industrial Chemistry** Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required). Silicones**:** Synthesis, properties and uses of silicones. Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate	K3	9
III	**Fundamental Concepts in Organic Chemistry** Hybridization: Orbital overlap, hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Electronic effects: Inductive effect and consequences on K_a and K_b of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric - examples. Reaction mechanisms: Types of reactions–aromaticity (Huckel's rule) - aromatic electrophilic substitution; nitration, halogenation, Friedel-Craft's alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.	K3	10
IV	**Thermodynamics and Phase Equilibria** Thermodynamics: Types of systems, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot's cycle and efficiency of heat engine. Entropy and its significance. Free energy change and its importance (no derivation).	K3	10

	Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy. Phase Equilibria**:** Phase rule - definition of terms in it. Applications of phase rule to water system. Two component system - Reduced phase rule and its application to a simple eutectic system (Pb-Ag).		
V	**Analytical Chemistry** Introduction to qualitative and quantitative analysis. Principles of Volumetric analysis. Separation and purification techniques - extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.	K4	10
Course Outcome	**CO1:** Gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications	K2	
	CO2: Evaluate the efficiencies and uses of various fuels and fertilizers.	K3	
	CO3: Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.	K4	
	CO4: Apply various thermodynamic principles, systems and phase rule	K3	
	CO5: Explain various methods to identify an appropriate method for the separation of chemical components	K4	

Learning Resources	
Text Books	1. V.Veeraiyan, Text book of Ancillary Chemistry; High Mount Publishing House, Chennai, first edition,2009 2. S. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, NewDelhi, twenty third edition, 2012.
Reference Books	1. B.R.Puri, L.R.Sharma, M.S.Pathania, Textbook of Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018. 2. B.K, Sharma, Industrial Chemistry; GOEL Publishing House, Meerut, sixteenth edition, 2014.
Website Link	1.https://unacademy.com/content/wp-content/uploads/sites/2/2022/10/4.-Chemical-bonding-Notes-min.pdf 2.https://www.news-medical.net/life-sciences/Analytical-Chemistry-Techniques.aspx 3. https://en.wikipedia.org/wiki/Laws_of_thermodynamics

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

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M3UCHA03	**ALLIED: CHEMISTRY- I**			**GEC THEORY - I**		**III**	**4**	**2**	**2**	**-**	**3**

CO-PO Mapping

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

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

Tutorial Schedule	Group discussions and ARLOOPA app
Teaching and Learning Methods	Chalk and Board class and PPT Presentation
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations

Designed By	**Verified By**	**Approved By** Member Secretary
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B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHA04	**ALLIED : CHEMISTRY- II**	**GEC THEORY - II**	**IV**	**4**	**2**	**2**	**-**	**3**
Objective	Students will acquire knowledge about Co-ordination Chemistry, Water Technology, biomolecules, electrochemistry, kinetics and photochemistry							

Unit	Course Content	Knowledge Levels	Sessions
I	**Co-ordination Chemistry and Water Technology** Co-ordination Chemistry: Definition of terms-IUPAC Nomenclature - Werner's theory - EAN rule - Pauling's theory – Postulates - Applications to $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$,$[Co(CN)_6]^{3-}$ Chelation - Biological role of Haemoglobin and Chlorophyll (elementary idea) - Applications in qualitative and quantitative analysis. Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques- BOD, COD.	K2	9
II	**Carbohydrates and Amino acids** Carbohydrates: Classification, preparation and properties of glucose, Fructose and sucrose. Discussion of open chain ring structures of glucose and fructose. Glucose - fructose interconversion. Properties of starch and cellulose. Amino acids: Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only).	K3	9
III	**Electrochemistry** Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.	K3	10
IV	**Kinetics and Catalysis** Order and molecularity. Integrated rate expression for I and II (2A Products) order reactions. Pseudo first order reaction, methods of determining order of a reaction - Half-life period - Catalysis – homogeneous and heterogeneous, catalyst used in Contact and Haber's processes. Concept of energy of activation and Arrhenius equation.	K3	10

V	**Photochemistry** Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen-chloride reaction. Phosphorescence, fluorescence, chemiluminescence and Photosensitization and photosynthesis (definition with examples).	K4	10
Course Outcome	**CO1:** Write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology	K2	
	CO2: Explain the preparation and property of carbohydrate, amino acids and nucleic acids.	K3	
	CO3: Apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.	K4	
	CO4: Identify the reaction rate, order for chemical reaction and explain the purpose of a catalyst	K3	
	CO5: Outline the various type of photochemical process	K4	

Learning Resources				
Text Books	1. V.Veeraiyan, Text book of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009 2. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition, 2012.			
Reference Books	1. B.R.Puri, L.R.Sharma, M.S.Pathania, Textbook Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018. 2. B.K,Sharma, Industrial Chemistry; GOEL publishing house,Meerut, sixteenth edition, 2014.			
Website Link	1.https://www.britannica.com/science/coordination-compound 2.https://en.wikipedia.org/wiki/Electrochemistry 3. https://www.sciencedirect.com/topics/chemistry/photochemistry			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc. - Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards													
Course Code	**Course Title**					**Course Type**			**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M4UCHA04	**ALLIED : CHEMISTRY- II**					**GEC THEORY - II**			**IV**	**4**	**2**	**2**	**-**	**3**
CO-PO Mapping														
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**				
CO1	S	S	S	S	S	S	M	S	M	S				
CO2	S	M	M	S	L	S	M	S	M	S				
CO3	S	S	M	S	S	S	M	S	M	L				
CO4	L	S	S	M	S	S	M	S	M	S				
CO5	S	S	S	S	S	S	M	S	S	S				
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG					
Tutorial Schedule	Group discussion and ARLOOPA app													
Teaching and Learning Methods	Chalk and Board class and PPT Presentation													
Assessment Methods	Class Test, Assignment, CIA and End Semester Examinations													
Designed By	**Verified By**							**Approved By** Member Secretary						
Mrs. A. Dhivya	Dr. N. Nithiya							Dr. S. Shahitha						

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHAP1/ 23M4UCHAP1	**PRACTICAL: ALLIED CHEMISTRY**	**GEC PRACTICAL - I**	**II/IV**	**3**	**-**	**-**	**3**	**3**
Objective	Students will learn about the principles and practical experience of volumetric analysis, identification of organic functional groups different types of organic compounds with respect to their properties, determination of elements in organic compounds.							

S.No.	Course Content	Knowledge Levels	Sessions
1	**VOLUMETRIC ANALYSIS** Estimation of sodium hydroxide using standard sodium carbonate.	K5	30
2	Estimation of hydrochloric acid using standard oxalic acid.	K5	
3	Estimation of ferrous sulphate using standard Mohr's salt.	K5	
4	Estimation of oxalic acid using standard ferrous sulphate.	K5	
5	Estimation of potassium permanganate using standard sodium hydroxide.	K5	
6	Estimation of magnesium using EDTA	K5	
7	Estimation of ferrous ion using diphenyl amine as indicator	K5	
8	**SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS** The analysis must be carried out as follows: (a) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehyde and glucose]. (b) Detection of elements (N, S, Halogens). (c) To distinguish between aliphatic and aromatic compounds. (d) To distinguish – Saturated and unsaturated compounds	K5	30
Course Outcome	**CO1:** Explain the basic principles involved in titrimetric analysis and inorganic preparations.	K1	
	CO2: Compare the methodologies of different titrimetric analysis.	K2	
	CO3: Calculate the concentrations of unknown solutions indifferent ways and develop the skill to estimate the amount of a substance present in a given solution.	K3	
	CO4: Assess the yield of different inorganic preparations and identify the end point of various titrations.	K4	
	CO5: Identify the end point of various titrations.	K5	

Learning Resources	
Text	1. V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry; Sultan

Books	Chand & sons, Second edition, 1997.
Reference Books	1. Furniss,B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. Vogel's Textbook of Practical Organic Chemistry, 5 th ed.; Pearson: India,1989.
Website Link	1. https://www.youtube.com/watch?v=-1nJv0k8zQU 2. https://www.youtube.com/watch?v=jJzWt3keHms

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
Course Code	**Course Title**			**Course Type**		**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M2UCHAP1/ 23M4UCHAP1	**PRACTICAL: ALLIED CHEMISTRY**			**GEC PRACTICAL - I**		**II/IV**	**3**	**-**	**-**	**3**	**3**
CO-PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	S	S	S	S	S	S	S	S	S	S	
CO2	S	S	S	M	S	S	S	S	M	S	
CO3	S	S	M	S	S	L	S	S	S	S	
CO4	S	S	S	S	S	M	S	S	S	S	
CO5	S	S	S	S	S	S	S	M	S	S	
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG		
Tutorial Schedule	-									
Teaching and Learning Methods	Demo and Practical Class									
Assessment Methods	CIA I, CIA II and ESE									
Designed By	**Verified By HoD**					**Approved By Member Secretary**				
Mrs. A. Dhivya	Dr. N. Nithiya					Dr. S. Shahitha				

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637408

B. Sc.- Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M5UCHIS1	**INTERNSHIP**	**INTERNSHIP**	**V**	**-**	**-**	**-**	**-**	**2**
Objective	To give optimum exposure on the practical aspects of Chemistry industry							

S. No.	Guidelines for Internship Training Programme	Knowledge Levels	Sessions
1	The student should undergo **15 Days Internship** training in any Chemistry lab / Food industry / Chemical companies / Water plant / Plastics industry during the vacation which falls at the end of the 2nd Semester.	K2-K4	
2	The training bridges the gap between the theoretical knowledge gained in the college and the practical application of the same in the industry / company / stores. The student will have a better exposure about the workplace and its nuances.		
3	Schedule of visit to be made by the staff is to be prepared by the HOD / Staff-in-charge.		
4	The trainees should strictly adhere to the rules and regulations and office timings of the institutions to which they are attached.		
5	A Staff member of a Department (Guide) will be monitoring the performance of the Candidate.		
6	The students should maintain a daily logbook where the student should record his details of the training.		
7	The trainees have to obtain a certificate on successful completion of the internship from the chief executive of an organization.		
8	The student should submit an attendance certificate to the institution for 15 days internship training from an organization.		
9	Internship Training Report (30 – 50 pages) should be prepared by the student and submitted in a month's time and at the end of the semester student should present the report with a power point presentation.		
10	Industrial training reports shall be prepared by the students under the supervision of the faculty of the department.		
11	Industrial training report must contain the following: Cover page Copy of training certificate, Profile of an industry report about the work undertaken by them during the tenure of training observation about the concern findings.		
12	Practical viva – voce examination will be conducted with internal & external examiners at the end of the **5th semester** and the credits will be awarded.		
13	Report Evaluation: External Viva-Voce examination will be conducted and the		

	maximum mark is 100.		
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	K5	
	CO5: Networking with people working in the science community	K6	

Learning Resources	
Text Books	1. The Successful Internship by H. Frederick Sweitzer, Mary A. King, 2013. 2. Social Media Tools in Experiential Internship Learning by Samuel Kai Wah Chu, 2020.
Reference Books	1. The Intern Files: How to Get, Keep and Make the Most of Your Internship by Jamie Fedorko, 2006.
Website Link	1. http://gen.lib.rus.ec/

B. Sc. - Chemistry LOCF-CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
23M5UCHIS1	INTERNSHIP	INTERNSHIP	V	-	-	-	-	2

CO-PO Mapping

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

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

Tutorial Schedule	-
Teaching and Learning Methods	-
Assessment Methods	**CIA – 100 Marks** 1. Work Log Book – 25 Marks 2. Training Report and Viva-Voce – 75 Marks

Designed By	Verified By HoD	Approved By Member Secretary
Dr. J. Sangeetha	Dr. N. Nithiya	Dr. S. Shahitha

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B. Sc., Chemistry LOCF-CBCS with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHPR1	**PROJECT WORK**	**PROJECT WORK**	**VI**	**4**	**-**	**-**	**4**	**3**
Objective	To inculcate/impart skills on experiment designing, experiment execution and research report to provide skills on writing thesis dissertation							

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.		
Abstract	**Abstract:** Abstract should be one page synopsis of the project report typed double line spacing, Font Style Times New Roman and Font Size 14.		
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- Review of literature		
	Chapter III- Methodology: Tools used, Procedures, Hypothesis.		
	Chapter IV- Results and Discussion: Tables and Figures, Statistical Presentations, Hypothesis Testing.		

	Chapter V- Summary and conclusion		
	Chapter VI-Scope of the Project		
	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. Subsection numbering should be left Justified using bold print. Example: 1.1.1, 1.1.2, 1.1.3, etc.	K4-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. One Author: Williams, G. State and Society in. Onco State, Nigeria, Afrographika, 1980. Two Authors: Phizacklea, A & Miles, R. Labour and Racism. London, Routledge&Kegan Paul, 1980. 3+ Authors: O'Donovan, P., *et al.* The United States. Amsterdam, Time-Life International, 1966.	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	K4-K6	

	printed/typed matter.		
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, (b) 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. (d) 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. 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.	K4-K6	
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 bond sheet. The dissertation shall be properly soft bound.		
Course Outcome	**CO1:** Identification of research idea	K4	
	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 Syllabus LOCF-CBCS with effect from 2023-2024 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
23M6UCHPR1	PROJECT WORK	PROJECT WORK	VI	4	-	-	4	3

CO-PO Mapping

CO Number	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	M	L	S	L	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	L	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 - 150 Marks 2. Viva-Voce - 50 Marks 3. Total - 200 Marks

Designed By	Verified By HoD	Approved By Member Secretary
Dr. J. Sangeetha	Dr. N. Nithiya	Dr. S. Shahitha

B.Sc., Chemistry for Competitive Examination Syllabus-LOCF-CBCS-Pattern with effect from 2023-2024 Onwards								
Course Code	**Course Title**	**Course Type**	**Sem**	**Hours**	**L**	**T**	**P**	**C**
23M6UCHOE1	**CHEMISTRY FOR COMPETITIVE EXAMINATIONS**	**Self study Online - Competitive Examination**	**VI**	**-**	**-**	**-**	**-**	**2**
Objectives	To identify topics to solve Problems and to give awareness about various competitive examinations related to their area of interest in Chemistry and enhance problem solving skills and research knowledge.							

	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, JISC, TIFR, JNU, BHU, Pondicherry University, CUET, etc. to get admission in M.Sc., or Integrated Ph.D., in Chemistry. In addition, it is also use full for UPSC and states PSC. **Rules for creating MCQ pattern.** 1. Objective type online examination will be conducted at the end of6th 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 are al life context. Eg. l Ability to Justify Methods and Procedures, The shape of SF4 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**	K1- K6	

	Keep correct answers in random positions and don't let them fall intoa pattern that can be detected **6. Use a Question Format** Multiple-choice items to be prepared as questions (rather thanincomplete 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 theanswer 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. I0. Each Department to prepare the Questions (MCQ pattern with fouranswers) and submit to ICT.		
Course Outcome	**CO1:** Identification of pattern of questions asked in competitiveexams	K2	
	CO2: Analyze the topics that are repeated in competitive exams	K4	
	CO3: Able to categorize the topics and select the topics of theirinterest	K4	
	CO4: Ability to solve problems related to each topic	K5	
	CO5: Get confidence about appearing for competitive exams	K6	
Text Books	IIT - JAM: M.Sc (Chemistry) Previous Papers & Practice Test Papers (Solved), R Gupta		
Reference Books	Solved papers & practice sets IIT JAM (Joint admission test for M.Sc from IITs)-Chemistry,Arihant Publication .		
Website Link	https://www.pw.live/exams/iit-jam/iit-jam-previous-year-question-papers/		

B.Sc-Chemistry Syllabus LOCF-CBCS with effect from 2023-2024 Onwards										
CO- PO Mapping										
CO Number	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	M	M	S	S	S	S	S
CO2	S	S	M	S	S	S	S	M	L	S
CO3	S	S	M	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	S	S
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	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	I00 multiple choice questions through computer based online examinations passing minimum is 50%									
Prepared By					**Verified By HoD**			**Approved By Member Secretary**		
Dr. J. Sangeetha					Dr. N. Nithiya			Dr. S. Shahitha		