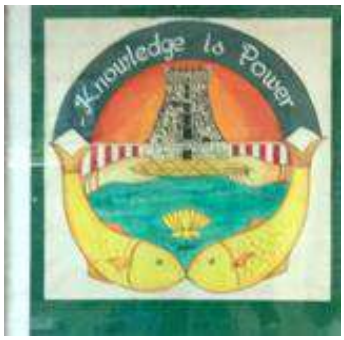
Sri Meenakshi Government Arts College For Women (A)

Madurai-02



Department Of Chemistry

Syllabus For

B.Sc., CHEMISTRY

Based on TANSCHE

From

2023 Onwards

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)

Department Of Chemistry

(Academic year 2023 onwards)

ABOUT THE DEPARTMENT OF CHEMISTRY

The department of chemistry was established in the year 1965 for the pre-university course. Bachelor degree of Chemistry was started in the year 1968 with a few staff members. The department has been upgraded to post graduate department in 2017.

FACULTY

The Department comprises of a goal-oriented group of highly qualified, experienced and dynamic faculty members. The Department of Chemistry has 15 faculty members, and three guest lecturers and all are Ph.D., holders. Their areas of expertise and research include organic, inorganic, physical, electrochemistry, phytochemistry, nanotechnology and supramolecular chemistry.

ACTIVITIES AND ACHIEVEMENTS

Most of the staff members are actively involved in research and various important decision-making committees at the College level and act as expertise in Boards of studies at college as well as University level. The staff members have been serving as NSS & NCC coordinators,Science Forums coordinator, Autonomy-in-charge, remedial/ special coaching coordinators, Sports committee member, Thaatha-paattikuzhu coordinator, Admission committee member, admission coordinator, Career guidance cell coordinator, Controller of examinations, additional controller of examinations, Deputy warden in college hostel, Youth welfare association coordinator, RUSA Coordnator, Parent Teacher Association treasurer, Old student's association, Course coordinators, syllabus committee representatives, question paper setters and external examiners at undergraduate as well as postgraduate levels. Faculty members have contributed to academics by publishing books, contributing research articles in journals, presenting papers in conferences and delivering guest lectures. Faculty members have been recognized by national agencies and Universities with awards for their contribution to research.

Four staff members (retired from service) were elevated to the cadre of Principal, Regional Joint Director and have served as efficient administrators at various colleges and regional offices. Some of the staff members are carrying out UGC funded minor research projects, received research awards, awards from All India Radio serial programme and have also served as editors in peer journals like Elsevier.

COURSE

At present our department caters to the needs of 294 (UG - 243 and PG - 51) major chemistry students and 230 Ancillary chemistry students. Our march towards the zeal will continue in the forthcoming years also.

DEPARTMENT HIGHLIGHTS

The Department organizes National Conferences, workshops and faculty Development Programmes for the benefit of students. The Department, with a focus on enhancing the knowledge and skills of the students, has been conducting inter-Departmental and inter-collegiate activities, through the Chemistry Association, Science Forum and Chemistry Club. It has also been actively involved in various outreach programmes for the uplift of society. Equal opportunity centre program has been conducted by our department.

RESOURCES

The Department has five laboratories which are fully equipped with instruments for teaching and research activities. The instruments available in the laboratories include UV-visible spectrophotometer, Conductometer, Potentiometer, pH meter, Polarimeter, Turbidity meter, BOD incubator, photocolorimeter etc.

The Department has an excellent library for the benefit of students, faculty members and research scholars. Library has a large collection of books covering various branches of Chemistry like organic, inorganic, physical, electrochemistry, greenchemistryandnanochemistry. Internet facility is available in the department.

ALUMNI ACTIVITIES

During 55 years of successful journey, our department has produced flourishing alumni who have occupied various positions in different sectors like academic, administrative, research, innovative scientists, overseas employment, banking and recent blooming fields like information technology.

The alumni of the department had served as the Principal in Govt Arts College, HOD and eminent professor in the School of chemistry at MKU, Madurai. It is a privilege to specify that, 22 alumni of chemistry department are serving as Associate Professors and Assistant Professors in various esteemed institutions. Alumni meet for the 1991 – 94 batch of B.Sc., Chemistry was organized on 8thJanuary 2017.

We have further goals to enrich our department as research department for the benefits of the students.

COURSES OFFERED:

- **UG COURSE: B.Sc., CHEMISTRY**
- **PG COURSE: M.Sc., CHEMISTRY**

GOAL

- **Students will understand, demonstrate and apply scientific methods of chemistry in day-to-day life**

VISION

- **To create an academically sound environment that nurtures, motivates and inspires excellence in chemistry along with concern for society**

MISSION

- **Imparting sound theoretical knowledge and practical training in different areas of chemistry**
- **Creating programme of excellence in the areas of education, research and public outreach.**
- **Inculcating the spirit of entrepreneurship to become an empowered women.**

B.Sc CHEMISTRY COURSE

Chemistry is the study of composition and transformation of matter. A science that is central to energy production, health care, new material development for electronics and other applied fields and environmental protection. Bachelor's degree in Chemistry is the culmination of in-depth knowledge of Inorganic, Organic and Physical chemistry and specialized courses such as Pharmaceutical Chemistry, spectroscopy, Nanoscience, Forensic Science, Cosmetics & Personal Grooming, Food chemistry, Dairy Chemistry and so on. Thus, this programme helps learners in building a solid foundation for higher studies in Chemistry. The hands on experience the students gain in Practicals enable them to apply theory to solve problems in everyday life, think critically and innovatively. An aptitude for research is instilled through project work and industrial internship.

Students completing this programme will be able to present the concepts of Chemistry clearly and precisely. They can find solutions to pressing problems that mankind is facing today. They can interpret data and present their findings to both scientific community and laymen and have ability to work as a team and evolve to become an entrepreneur.

Completion of this programme will also enable the learners to join teaching profession, conducting research in Industry and Government run research labs. A B.Sc chemistry student has the option to diversify to other branches such as Biochemistry, Biotechnology, Forensic Science etc… They have employability opportunities in public and private sector jobs in energy, pharmaceutical, Food, cosmetic industries etc…

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc. Chemistry**
Programme Code:	
Duration:	**3 Years (UG)**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

	PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstratingthe ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
Programme Specific Outcomes:	On successful completion of Bachelor of Physics with Computer Applications programme, the student should be able to: **PSO1: Disciplinary Knowledge:** Understand the fundamental principles, concepts, and theories related to physics and computer science. Also, exhibit proficiency in performing experiments in the laboratory.

	PSO2: Critical Thinking: Analyse complex problems, evaluate information, synthesize information, apply theoretical concepts to practical situations, identify assumptions and biases, make informed decisions and communicate effectively **PSO3: Problem Solving:** Employ theoretical concepts and critical reasoning ability with physical, mathematical and technical skills to solve problems, acquire data, analyze their physical significance and explore new design possibilities. **PSO4: Analytical & Scientific Reasoning:** Apply scientific methods, collect and analyse data, test hypotheses, evaluate evidence, apply statistical techniques and use computational models. **PSO5: Research related skills:** Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects. **PSO6: Self-directed & Lifelong Learning:** Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.

DEPARTMENT OF CHEMISTRY

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate	
	between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Credit Distribution for UG Programme in Chemistry(Total of 140 credits)

Sem I	**credit**	**Hrs**	**SemII**	**Credit**	**Hrs**	**Sem III**	**Credit**	**Hrs**	**Sem IV**	**Credit**	**Hrs**	**Sem V**	**Credit**	**Hrs**	**Sem VI**	**Credt**
LC1	3	6	LC2	3	6	LC3	3	6	LC4	3	6	CC9	5	5	CC13	5
ELC1	3	6	ELC2	3	6	ELC3	3	6	ELC3	3	6	CC10	5	5	CC14	5
CC1	5	5	CC3	5	5	CC5	4	5	CC7	4	4	CC11	3	6	CC15	3
CC2	3	3	CC4	3	3	CC6	3	3	CC8	3	3	CC12	4	4	DSEC3	3
GEC1	4	4	GEC3	4	4	GEC4	4	4	GEC6	4	4	DSEC1	3	4	DSEC4	3
GEC 2	-	2	GEC2	2	2	GEC 5	-	2	GEC 5	2	2	DSEC2	3	4	EX	1
SEC1/ NM	2	2	SEC2	2	2	SEC4	1	1	SEC6	2	2	VE	2	2	Prof	2
FC	2	2	SEC3/ NM	2	2	SEC5/ NM	2	2	SEC7	2	2	Intern	2	-		
						EVS	-	1	EVS	2	1					
TOT	22	**30**		24	**30**		20	**30**		25	**30**		27	**30**		22

B.Sc Chemistry 2023-2024
Question paper pattern

SectionA (10marks)		**Section B (25 marks) Either Or Pattern**		**Section C (40 marks) Either Or Pattern**	
No of Q	**Marks**	**No of Q**	**Marks**	**No of Q**	**Marks**
10	1	5	5	5	8

Evaluation Pattern for Extension Activity (Total marks100)

Criterion	Marks
Attendance	**50**
Participation	**25**
Report	**25**

SRI MEENAKSHI NGOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI 2

DEPARTMENT OF CHEMISTRY

SEMESTER 1

Part	Course Type	Course code	Title of the course	Hrs/ week	Credits	Exm hrs	Marks	
							INT	EXT
I	LC1	U231A1/ U231H1	Tamil/Hindi	6	3	3	25	75

II	**ELC1**	**U232A1**	**English**	**6**	**3**	**3**	**25**	**75**
III	**CC1(T)**	**U23CC1**	**General Chemistry I**	**5**	**5**	**3**	**25**	**75**
	CC2(P)	**U23CC2P**	**Quantitative Inorganic Estimation (titremetry) and Inorganic Preparations**	**3**	**3**	**3**	**25**	**75**
	GEC1(T)	**U23GP17**	**Allied Physics I**	**4**	**4**	**3**	**25**	**75**
	GEC 2(P)	**U23GP18P**	**Allied Physics Practical - I**	**2**	**-**	**-**	**-**	**-**
IV	**SEC1(T)/ NM**	**U23SEC1**	**Food Chemistry**	**2**	**2**	**3**	**25**	**75**
		U23SEC2	**Role of Chemistry in Daily Life**					
IV		**U23FC1**	**Foundation course**	**2**	**2**	**3**	**25**	**75**
TOTAL				**30**	**22**			

SEMSESTER II

Part	**Course type**	**Course code**	**Title of the course**	**Hrs/ week**	**credits**	**Exam hrs**	**Marks**		
							INT	**EXT**	**TOT**
I	**LC2**	**U231A2/ U231H2**	**Tamil/Hindi**	**6**	**3**	**3**	**25**	**75**	**100**
II	**ELC2**	**U232A2**	**English**	**6**	**3**	**3**	**25**	**75**	**100**
III	**CC3(T)**	**U23CC3**	**General Chemistry II**	**5**	**5**	**3**	**25**	**75**	**100**
	CC4(P)	**U23CC4P**	**Qualitative Organic Analysis and Preparation of Organic compunds**	**3**	**3**	**3**	**25**	**75**	**100**
	GEC3(T)	**U23GP19**	**Allied Physics II**	**4**	**4**	**3**	**25**	**75**	**100**
	GEC 2(P)	**U23GP18P**	**Allied Physics Practical - I**	**2**	**2**	**3**	**25**	**75**	**100**
IV	**SEC2 (T)**	**U23SEC3**	**Dairy Chemistry**	**2**	**2**	**3**	**25**	**75**	**100**
	SEC3(T)/ NM	**U23SEC4**	**Cosmetics and Personal Grooming / NM**	**2**	**2**	**3**	**25**	**75**	**100**
TOTAL				**30**	**24**				**800**

SEMESTER III

Part	Course Type	Course code	Title of the course	Hrs/ week	cred its	Exam hrs	Marks	
							INT	EXT
I	LC3	U231A3 / U231H3	Tamil/Hindi	6	3	3	25	75
II	ELC3	U232A3	English	6	3	3	25	75
III	CC5 (T)	U23CC5	General Chemistry III	5	4	3	25	75
	CC6 (P)	U23CC6P	Qualitative Inorganic Analysis	3	3	3	25	75
	GEC 4(T)	U23GM14	Allied Mathematics – Paper I	4	4	3	25	75
	GEC4 (T)	U23GZ25	Allied Zoology - I					
	GEC5(T)	U23GM16	Allied Mathematics paper III	2	-	-	-	-
	GEC5(P)	U23GZ26P	Allied Zoology practical					
IV	SEC4(P)	U23SEC5P	Entrepreneurial Skills in Chemistry	1	1	3	25	75
	SEC5(T)/ NM	U23SEC6	Pesticide Chemistry/NM	2	2	3	25	75

	EVS	U23EVS1	Environmental studies	1	-	-	-	-
		TOTAL		30	20			

SEMESTER IV

Part	Course Type	Course CODE	Title of the course	Hrs/ week	credits	Exam hrs	Marks	
							INT	EXT
I	LC 4	U231A4 / U231H4	Tamil/Hindi	6	3	3	25	75
II	ELC 4	U232A4	English	6	3	3	25	75
III	CC7 (T)	U23CC7	General Chemistry IV	4	4	3	25	75
	CC8(P)	U23CC8P	Physical Chemistry Practical I	3	3	3	25	75
	GEC 6(T)	U23GM15	Allied Mathematics - paper II	4	4	3	25	75
	GEC 6(T)	U23CZ27	Allied Zoology- II					
	GEC 5(T)	U23GM16	Allied Maths	2	2	3	25	75
	GEC 5 (P)	U23GZ26P	Allied Zoology Practical					
IV	SEC6(T)	U23SEC7	Instrumental Methods of Chemical Analysis	2	2	3	25	75
IV	SEC7(T)/	U23SEC8	Forensic Science / NM	2	2	3	25	75

	NM							
IV	EVS	U23EVS1	Environmental Studies	1	2	3	25	75
		TOTAL		30	25			

SEMESTER V

Part	Course Type	Course code	Title of the course	Hrs/ week	credits	Exam hrs	Marks		
							INT	EXT	T
III	CC9 (T)	U23CC9	Organic Chemistry I	5	5	3	25	75	1
	CC10(T)	U23CC10	Inorganic Chemistry	5	5	3	25	75	1
	CC11(P)	U23CC11P	Gravimetric Analysis and Water Analysis	6	3	6	25	75	1
	CC12(P)	U23CC12P	Organic Estimation and Natural Products isolation	4	4	6	25	75	1
	DSEC1	U23DC01	Industrial chemistry	4	3	3	25	75	1
	DSEC 2	U23DC02	BioChemistry	4	3	3	25	75	1
IV		U23SIC1	Summer internship/Industrial training	-	2	-	-	--	1
V		U23VE1	Value Education	2	2	3	25	75	1
		TOTAL		30	27				8

SEMESTER VI

Part	Course Type	Course Code	Title of the course	Hrs/ week	credits	Exam hrs	Marks	
							INT	EXT
III	CC13 (T)	U23CC13	Organic Chemistry II	6	5	3	25	75
	CC14(T)	U23CC14	Physical chemistry	6	5	3	25	75
	CC15(P)	U23CC15P	Physical chemistry practical II	6	3	6	25	75
	DSEC3	U23DC03	Fundamentals of spectroscopy	5	3	3	25	75
	DSEC 4	U23DC04	DSEC 4 A Nano Science	5	3	3	25	75
		U23DC05	DSEC 4 B Polymer Science					
		U23DC06	DSEC4C Pharmaceutical Chemistry					
IV		U23EAC	Extension Activity	-	1	-	-	-
IV	Professional Competency Skill	U23PCC1	chemistry for Competitive examination	2	2	3	25	75
		TOTAL		30	22			

SRI

MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

LIST OF GENERIC ELECTIVE COURSES

S.No	Course type	Course Code	Title of the paper	Hrs/Week	Credit
1	GEC1(T) I /III SEM (I/II YEAR)	U23GC20	Chemistry For Physical Sciences I	4	4
2	GEC2(P) I&II SEM/ III&IV SEM (I/II YEAR)	U23GC21P	Chemistry practical for Physical and biological sciences	2	2
3	GEC3(T) II / IV SEM (I/II YEAR)	U23GC22	Chemistry For Physical Sciences II	4	4

4	**GEC4(T) III SEM (II YEAR)**	**U23GC23**	**Chemistry For Biological Sciences I**	**4**	**4**
6	**GEC5 (T) IV SEM (II YEAR)**	**U23GC24**	**Chemistry For Biological Sciences II**	**4**	**4**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY
List of Discipline Specific Elective Courses

S.No	Course type	Course Code	Sem	Title	Hours/week	Credits
1	**DSEC1**	**U23DC01**	**V**	**Industrial Chemistry**	**4**	**3**
2	**DSEC2**	**U23DC02**	**V**	**Biochemistry**	**4**	**3**
3	**DSCEC3**	**U23DC03**	**V1**	**Fundamentals of Spectroscopy**	**5**	**3**
4	**DSCE4**	**U23DC04**	**VI**	**Nano Science**	**5**	**3**
		U23DC05	**V1**	**Polymer Science**	5	3
		U23DC06	**V1**	**Pharmaceutical Science**	5	3

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY
List of Skill Enhancement Paper

S.No	Course type	Course Code	Sem	Title of the paper	Hours/Week	Credits
1	**SEC1**	**U23SEC1**	**I**	**Food Chemistry**	**2**	**2**
		U23SEC2	I	**Role of Chemistry in Daily Life**	2	2
2	**SEC2**	**U23SEC3**	**II**	**Dairy Chemistry**	**2**	**2**
3	**SEC3**	**U23SEC4**	**II**	**Cosmetics and Personal Grooming**	**2**	**2**
4	**SEC4**	**U23SEC5P**	**III**	**Entrepreneurial Skills in Chemistry**	**1**	**1**
5	**SEC5**	**U23SEC6**	**III**	**Pesticide Chemistry**	**2**	**2**
6	**SEC6**	**U23SEC7**	**IV**	**Instrumental mthods of Chemical Analysis**	**2**	**2**
7	**SEC7**	**U23SEC8**	**IV**	**Forensic Science**	**2**	**2**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

COURSE STRUCTURE ABSTRACT

Part	Course	Total No. of Papers	Hours	Credit	Marks
I	Tamil	4	24	12	400
II	English	4	24	12	400
III	Core Course -Major(CCM)	15	69	60	1500
III	GEC– Elective Course	6	24	20	600
III	DSEC –ElectiveCourse	4	18	12	400
III	Internship	1	--	2	100
IV	Skill Enhancement Course (SEC-6 &Naan Muthalvan course)	7	13	13	700
IV	Foundation Course	1	2	2	100
IV	E.V.S.	1	2	2	100
IV	Value Education	1	2	2	100

IV	Extension Activity/NSS/NCC/SPORTS	1	-	1	100
IV	Professional Competency Skill	1	2	2	100
TOTAL		**46**	**180**	**140**	**4600**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**GENERAL CHEMISTRY I**		**Course code**	**U23CC1**
Paper No.	**CC1(T)**		**Category**	**Core**
Year	I	**Semester I**	**Credits**	5
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	1	-	5
Prerequisites	Higher Secondary Chemistry			
Objectives of the course	The course aims at giving an overall view of the ● various atomic models and atomic structure ● wave particle duality of matter ● periodic table, periodicity in properties and its application in explaining the chemical behaviour ● nature of chemical bonding, and fundamental concepts of organic chemistry			
Course Outline				
Unit 1	**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 principle; Numerical problems involving the core concepts**.**			
Unit 2	**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			

	wavefunctions, Formulation of Schrodinger wave equation - Probability and electron density-visualizing the orbitals -Probability density and significance of Ψ and Ψ2.**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
Unit 3	**Stucture 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, Madelung 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 AB2, AB3, AB4, AB5, AB6 and AB7. Partial ionic character of covalent bond-dipole moment, application to molecules of the type A2, AB, AB2, AB3, AB4; percentage ionic character- numerical problems based on calculation of percentage ionic character.
Unit4	**Structure and Bonding II** VB theory – application to hydrogen molecule; concept of resonance - resonance structures of some inorganic species – CO2, NO2, CO32-, NO3- ; limitations of VBT; MO theory - bonding, antibonding and nonbonding orbitals, bond order; MO diagrams of H2, C2, O2, O2+, O^{2-}, O $^{2-}$N2, NO, HF, CO; magnetic characteristics, comparison of VB and MO theories. **Coordinate bond:** Definition, Formation of BF3, NH3, NH4+, $H3O^{+}$ 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.
Unit 5	**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 organicreactions-** addition, substitution, elimination and rearrangements.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations UPSC/ JAM/TNPSC and other to be solved.(To be discussed during the tutorial hours).
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended text	1. Madan, R. D. and Sathya Prakash, *Modern Inorganic Chemistry,* 2nded.; 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, 2002. 4. Bruce, P. Y. and PrasadK. J. R. *Essential Organic Chemistry*, Pearson Education: New Delhi, 2008. 5. Dash UN, Dharmarha OP, Soni P.L. Textbook of Physical Chemistry, Sultan Chand & Sons: New Delhi,2016
Reference Books	1. Maron, S. H. and Prutton C. P. *Principles of Physical Chemistry,*4thed.; 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,* 26thed.; Goel Publishing House: Meerut, 2001.

	4. Atkins, P.W. & Paula, J. *Physical Chemistry*, 10th ed.; Oxford University Press:New York, 2014. 5. Huheey, J. E. *Inorganic Chemistry: Principles of Structure and Reactivity,* 4th ed .; Addison, Wesley Publishing Company: India,1993.
Website and e-learning source	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 4) https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding 5)https://www.chemtube3d.com/
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	explain the atomic structure, wave particle duality of matter, periodic properties bonding, and properties of compounds.
CO2	classify the elements in the periodic table, types of bonds, reaction intermediates electronic effects in organic compounds, types of reagents.
CO3	apply the theories of atomic structure, bonding, to calculate energy of a spectral transition, Δx, Δp electronegativity, percentage ionic character and bond order.
CO4	evaluate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions; structure reactivity and electronic effects
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.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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'S AND PSO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3

CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)

MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**Quantitative Inorganic Estimation (titrimetry) and Inorganic Preparations**		**Course code**	**U23CC2P**
Paper No.	**CC2(P)**		**Category**	**Core**
Year	I	**Semester I**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	-	-	3	3
Prerequisites	Higher Secondary Chemistry			
Objectives of the course	This course aims at providing knowledge on ● laboratory safety ● handling glasswares ● Quantitative estimation ● Preparation of inorganic compoundspreparation of inorganic compounds			
Course Outline				
Unit 1	**CHEMICAL LABORATOEY SAFETY IN ACADEMIC INSTITUION** 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. **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. **Principle of Quantitative Estimations(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.
Unit 2	**Quantitative Estimation(Volumetric)** Preparation of standard solution, dilution from stock solution **Permanganometry** Estimation of sodium oxalate using standard ferrous ammonium sulphate **Dichrometry** Estimation of ferric alum using standard dichromate (external indicator) Estimation of ferric alum using standard dichromate (internal indicator) **Iodometry** Estimation of copper in copper sulphate using standard dichromate **Argentimetry** Estimation of chloride in barium chloride using standard sodium chloride/ Estimation of chloride in sodium chloride (Volhard's method)
Unit 3	**Complexometric Titrations** Estimation of hardness of water using EDTA **Estimations** Estimation of Iron in Iron tablets Estimation of Ascorbic acid **Preparation of Inorganic Compounds** 1.Potash alum 2.Tetramine copper (II) sulphate 3.Hexamine cobalt (III) chloride 4.Mohr's Salt
Extended Professional Component (is a part of internal component only,Not to be included in the external	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended text	**Reference Books:** 1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. *Basic Principles of Practical Chemistry,* 2nd ed.; Sultan Chand &Sons: New Delhi, 1997. 2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; *An advanced course in Practical Chemistry,* 3rd ed.; New Central Book Agency: Kolkata, 2007.
Reference Books	1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; *2. Vogel's Textbook of Quantitative Chemical Analysis*, 6th ed.; Pearson Education Ltd: New Delhi, 2000.
Website and e-learning source	**Web References:** 1) http://www.federica.unina.it/agraria/analytical-chemistry/volumetric- analysis 2) https://chemdictionary.org/titration-indicator/
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	explain the basic principles involved in titrimetric analysis and inorganic preparations.
CO2	compare the methodologies of different titrimetric analysis.
CO3	calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution.and assess the yield of different inorganic preparations and identify the end point of various titrations.
CO4	Asses the yield of different inorganic preparations and identify the end point of various titrations

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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

LEVEL OF CORRELATION OF CO'S AND PSO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SCHEME OF EVALUATION

Internal : 25	**External: 75**
Estimation : 15 marks (Procedure-5, Experiment – 10) Error up to 2% - 10 marks 3% - 8 marks 4% - 6 marks >4 – 5 marks **Preparation :10 marks** Procedure-3: Preparation -7	**Estimation : 50 marks** (Procedure-10, Experiment -40) Error up to 2% - 40 marks 3% - 30 marks 4% - 20 marks >4 – 15 marks **Preparation : 15 marks** **(**Procedure 5 ; Preparation 10) **Record :10 marks**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**FOOD CHEMISTRY**		**Course code**	**U23SEC1**
Paper No.	**SEC1A(T)**		**Category**	**SEC**
Year	I	**Semester I**	**Credits**	2
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	2	-	-	2
Prerequisites	Higher Secondary Chemistry			
Objectives of the course	This course aims at giving an overall view of the ● Types of food ● Food adulteration and poisons ● Food additives and preservation			
Course Outline				
Unit 1	**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.			
Unit 2	**Food Poison** Food poisons - natural poisons (alkaloids - nephrotoxin) - pesticides, (DDT, BHC, Malathion) -Chemical poisons - First aid for poison consumed victims.			
Unit 3	**Food Additives**			

	Food additives -artificial sweeteners – Saccharin - Cyclomate a n d Aspartate Food flavours -esters, aldehydes and heterocyclic compounds – Food colours– Emulsifying agents – preservatives -leavening agents. Baking powder –yeast – tastemakers – MSG - vinegar.
Unit4	**Beverages** Beverages-softdrinks-soda-fruitjuices-alcoholicbeverages-examples. Carbonation-addiction to alcohol– diseases of liver and social problems.
Unit 5	**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.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	Food processing, Additives and detection of food adultrants
Recommended text	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. 4. Food Chemistry, Dr. L. Rakesh Sharma, Evincepub publishing, 2022. 5. Food processing and preservation, G. Subbulakshmi, Shobha A Udipi, Pdmini S Ghugre, New age international publishers, second edition, 2021.
Reference Books	1. H.-D. Belitz, Werner Grosch, Food Chemistry Springer Science & Business Media, 4th Edition, 2009. 2. M.Swaminathan, Food Science and Experimental Foods, Ganesh and Company,1979. 3. Hasenhuettl, Gerard. L.; Hartel, Richard. W. Food Emulsifiers and their applications Springer New York 2nd ed. 2008. 4. Food Chemistry, H.-D. Belitz, W. Grosch, P. Schieberle, Springer, fourth revised and extended edition, 2009. 5. Principles of food chemistry, John M. deMan, John W. Finley, W. Jefferey Hurst, Chang Yong Lee, Springer, Fourth edition, 2018.
Course Learning outcomes (For Mapping with POs and PSO s)	

On Completion of the course the students should be able to	
CO1	learn about Food adulteration - contamination of Wheat, Rice, Milk, Butter.
CO2	get an awareness about food poisons like natural poisons (alkaloids - nephrotoxin) pesticides, DDT, BHC, Malathio
CO3	get an exposure on food additives, artificial sweeteners, Saccharin, Cyclomate and Aspartate in the food industries.
CO4	acquire knowledge on beverages, soft drinks, soda, fruit juices and alcoholic beverages examples.
CO5	study about fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats –MUFA and PUFA

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 OF CO'S and PSO'S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**Role of Chemistry in Daily Life**		**Course code**	**U23SEC2**
Paper No.	**SEC1B (T)**		**Category**	**SEC**
Year	I	**Semester I**	**Credits**	2
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	2	-	-	2
Prerequisites	Higher Secondary Chemistry			
Objectives of the course	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			
Course Outline				
Unit 1	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			
Unit 2	Building materials - cement, ceramics, glass and refractories - definition, composition and application only. Plastics - polythene, PVC, bakelite, polyesters, melamine-formaldehyde resins -preparation and uses only			
Unit 3	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.
Unit4	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.
Unit 5	Pharmaceutical drugs - analgesics and antipyretics - paracetamol and aspirin. Colour chemicals - pigments and dyes - examples and applications. Explosives - classification and examples.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Recommended text	1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010. 2. A textbook of pharmaceutical chemistry by Jayashree Ghosh, S Chand publishing, 2012. 3. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006. 4. B. K, Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.Introduction to forensic chemistry, Kelly M. Elkins, CRC Press Taylor & Francis Group, 2019. 5.Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand & Co.Publishers, second edition, 2006.
Reference Books	1.Randolph. Norris Shreve, Chemical Process Industries, McGraw-Hill, Texas, fourthedition, 1977. 2.W.A.Poucher,JosephA.Brink,Jr.Perfumes,Cosmetics and Soaps,Springer, 2000. 3. A.K.De,EnvironmentalChemistry,NewAge,InternationalPublicCo.,1990
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	learn about the chemicals used in everyday life as well as air pollution and water pollution.
CO2	get knowledge on building materials cement, ceramics, glass and plastics, polythene, PVC bakelite, polyesters,
CO3	acquire information about Food and Nutrition. Carbohydrates, Proteins, Fats Also have an awareness about Cosmetics Tooth pastes, face powder,

	soaps and detergents.
CO4	discuss about the fertilizers like urea, NPK fertilizers and super phosphate. Fuel classification solid, liquid and gaseous; nuclear fuel - examples and uses
CO5	have an idea about the pharmaceutical drugs analgesics and antipyretics like paracetamol and aspirin and also about pigments and dyes and its applications.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 CORRELATIONS OF CO'S AND PSO'S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15

Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**FOUNDATION COURSE**		**Course code**	**U23FC1**
Paper No.	FC		**Category**	FC
Year	I	**Semester I**	**Credits**	2
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	2	-	-	2
Prerequisites	Higher Secondary Chemistry			
Objectives of the course	This course aims at strengthen an overall view of ● chemistry of hydrocarbons ● methods of extraction of metals from ores ● Principles laws governing electronic configuration and quantum chemistry ● Purification of water ● Role of chemistry in health care			
Course Outline				
Unit 1	**Organic chemstry** Hydrocarbons- Classification-Alipahtic, alicyclic, Aromatic and heterocyclic compounds-IUPAC Nomenclature-catenation-Huckel's rule for Aromaticity-Concept of Hybradisation-Sp3, Sp2 and Sp- Types of organic chemical reactions.			
Unit 2	**Inorganic Chemistry-Metallurgy**			

	Definition-Types of ores- Gangue or matrix-General methods of extraction of metals from ores- grinding-concentration of ores- calcination and roasting of ores-reduction process-Refining of metals-
Unit 3	**S**
Unit4	**Water Technology** Hardness definition- water analysis-physical (taste, odour, Colour and Chemical examination-TDS, Fluoride, - BOD and COD- Scales- lime soda process and Zeolite Process- Potable drinking water treatment
Unit 5	**Clinical Chemistry -** Defn-normal level-Chemical test -Quantitative estimation of cholesterol-Sugar-Hemoglobin and Albumin-Kidney stones.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended text	1)Madan, R. D. and Sathya Prakash, *Modern Inorganic Chemistry,* 2nded.; 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, 2002. 4)Bruce, P. Y. and PrasadK. J. R. *Essential Organic Chemistry*, Pearson Education: New Delhi, 2008. 5)Dr Jayashree Ghosh, Fundamental Concepts of Applied chemistry, S.Chand publication.
Reference Books	1)Maron, S. H. and Prutton C. P. *Principles of Physical Chemistry,*4thed.;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,* 26thed.; Goel Publishing House: Meerut, 2001. 4)Atkins, P.W. & Paula, J. *Physical Chemistry*, 10th ed.; Oxford University Press:New York, 2014. 5)Huheey, J. E. *Inorganic Chemistry: Principles of Structure and Reactivity,*4th

	ed .; Addison, Wesley Publishing Company: India,1993.
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	Learn about the concept of hybridization and
CO2	Discuss the Various methods of metal extraction
CO3	Explainn the electronic configuration of elements
CO4	Explain the hardness and its removal
CO5	Acquire knowledge about the role of chemicals in health

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 OF PO'S AND PSO'S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15

Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**GENERAL CHEMISTRY II**		**Course code**	**U23CC3**
Paper No.	**CC3(T)**		**Category**	Core
Year	I	**Semester II**	**Credits**	5
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	1	-	5
Prerequisites	General Chemistry I			
Objectives of the course	This course aims at providing an overall view of 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			
Course Outline				
Unit 1	**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
Unit 2	**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, Na2CO3, KBr, KClO3 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 monocarbonates and per dicarbonates.
Unit 3	**Chemistry of p- Block Elements (Group 15-18)** General characteristics of elementsof Group 15; chemistry of H2N-NH2, NH2OH, HN3 and HNO3. Chemistry of PH3, PCl3, PCl5, POCl3, P2O5 and oxy acids of phosphorous (H3PO3 and H3PO4). General properties of elements of group16 - 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 (HClO4). Inter-halogen compounds (ICl, ClF3, BrF5 and IF7), pseudo halogens [(CN)2 and (SCN)2] and basic nature of Iodine. Noble gases: Position in the periodic table. Preparation, properties and structure of XeF2, XeF4, XeF6 and XeOF4; uses of noble gases - clathrate compounds.
Unit4	**Hydrocarbon Chemistry-I** **Petroproducts:** Fractional distillation of petroleum; cracking, isomerisation , alkylation, reforming and uses.. **Alkenes**-Nomenclature, general methods of preparation – Mechanism of 🚲-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.
Unit 5	**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 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.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved. (To be discussed during the Tutorial hours)
Skills acquired	Knowledge, Problem solving, Analytical ability, Professional Competency,

from this course	Professional Communication and Transferable skills.
Recommended text	1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nded, S.Chand and Company, New Delhi. 2. Sathya Prakash, Tuli G D,Basu S K and Madan R D, (2003), Advanced Inorganic Chemistry, 17th ed., S.Chand and Company, New Delhi. 3. Bahl B S, Arul Bhal, (2003), Advanced Organic Chemistry, 3rd ed., S.Chand and Company, New Delhi. 4. Tewari K S, Mehrothra S N and Vishnoi N K, (1998), Text book of Organic Chemistry, 2nd ed., Vikas Publishing House, New Delhi. 5. Puri B R, Sharma L R, (2002), Principles of Physical Chemistry, 38th ed., Vishal Publishing Company, Jalandhar.
Reference Books	1. Maron S H and Prutton C P, (1972), Principles of Physical Chemistry, 4th ed., The Macmillan Company, Newyork. 2. Barrow G M, (1992), Physical Chemistry, 5th ed., Tata McGraw Hill, New Delhi. 3. Lee J D, (1991), Concise Inorganic Chemistry, 4thed., ELBS William Heinemann, London. 4. Huheey J E, (1993), Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed., Addison Wesley Publishing Company, India. 5. Gurudeep Raj, (2001), Advanced Inorganic Chemistry Vol – I, 26th ed., Goel Publishing House, Meerut. 6. Agarwal O P, (1995), Reactions and Reagents in Organic Chemistry, 8thed., Goel Publishing House,Meerut.
Website and e-learning source	1. https://onlinecourses.nptel.ac.in 2. http://cactus.dixie.edu/smblack/chem1010/lecture_notes/4B.html 3. http://www.auburn.edu/~deruija/pdareson.pdfhttps://swayam.gov.in/course/64 -atomic-structure-and-chemical-bonding **MOOC components** 1.http://nptel.ac.in/courses/104101090/ Lecture 1:Classification of elements and periodic properties http://nptel.ac.in/courses/104101090/
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
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
CO2	discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids
CO3	classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons

CO4	explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements
CO5	assess the application of hard and soft acids indicators, buffers, compounds of s and p- block elements and hydrocarbons

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 OF CO'S AND PSO'S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

<table>
<tr><td>Title of the course</td><td colspan="2">QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS</td><td>Course code</td><td>U23CC4P</td></tr>
<tr><td>Paper No.</td><td colspan="2">CC4 (P)</td><td>Category</td><td>Core</td></tr>
<tr><td>Year</td><td>I</td><td>Semester II</td><td>Credits</td><td>3</td></tr>
<tr><td>Instructional hrs/week</td><td>Lecture</td><td>Tutorial</td><td>Lab. Practice</td><td>Total</td></tr>
<tr><td></td><td>-</td><td>-</td><td>3</td><td>3</td></tr>
<tr><td>Prerequisites</td><td colspan="4"></td></tr>
<tr><td>Objectives of the course</td><td colspan="4">This course aims at providing knowledge on
● laboratory safety
● handling glass wares
● analysis of organic compounds
● preparation of organic compounds</td></tr>
<tr><td colspan="5">Course Outline</td></tr>
<tr><td>Unit 1</td><td colspan="4">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</td></tr>
<tr><td>Unit 2</td><td colspan="4">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
● monocarboxylic acid, dicarboxylic acid</td></tr>
</table>

	● monohydric phenol, polyhydric phenol ● aldehyde, ketone, ester ● carbohydrate (reducing and non-reducing sugars) ● primary, secondary, tertiary amine ● monoamide, diamide, thioamide ● anilide, nitro compound Preparation of derivatives for functional groups
Unit 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 **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. 4. **Chromatography (any one) (Group experiment)** (i) Separation of amino acids by Paper Chromatography (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. 5. **Electrophoresis –** Separation of amino acids and proteins. **(Demonstration)** 6.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)
Extended Professional Component (is a part of internal component	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

only,Not to be included in the external examination question paper)	
Skills acquired from this course	Analysis of functional groups, types of reactio, involved in organic synthesis,
Recommended text	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.
Reference Books	1)Gurtu, J. N; Kapoor, R. *Advanced Experimental Chemistry (Organic)*, Sultan Chand: New Delhi, 1987. 2)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 and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	observe the physical state, odour, colour and solubility of the given organic compound.
CO2	identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.
CO3	compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non- reducing sugars and explain the reactions behind it.
CO4	exhibit a solid derivative with respect to the identified functional group.

COURSE

ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10

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

LEVEL OF CORRELATION BETWEEN PSO'S AND CO'S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SCHEME OF EVALUATION

Int : 25 Marks	**Ext: 75 Marks**
Analysis - 15 Marks (Report with suitable procedure) Aromatic/Aliphatic : 2 marks Saturation/unsaturated : 2 marks Elements test : 3 marks Functional groups: 6 marks Derivative : 2 marks **Preparation :10** marks **[Pocedure - 3 ; Preparation -7]**	**Analysis : 50 Marks (Report with suitable procedure)** Aromatic/Aliphatic : 5 marks Saturation/unsaturated : 5 marks Elements test : 10 marks Functional groups: 25 marks Derivative : 5 marks **Preparation :15** marks **[**PROCEDURE -5: PREPARATION :10] **Record :10** marks

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**Dairy Chemistry**		**Course code**	**U23SEC3**
Paper No.	SEC2 (T)		**Category**	SEC
Year	I	**Semester II**	**Credits**	2
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	2	-	-	2
Prerequisites	Higher Secondary Chemistry			
Objectives of the course	This course aims at providing an overall view of the ● chemistry of milk and milk products ● processing of milk ● preservation and formation of milk products.			
Course Outline				
Unit 1	**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- estimation of fat, acidity and total solids in milk			
Unit 2	**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.			

Unit 3	**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.
Unit4	**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
Unit 5	**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 – Yoheer Indigeneous products- khoa and chhena definition - Ice cream -definition-percentage composition-types-ingredients-manufacture of ice–cream, stabilizers - emulsifiers- and their role-milkpowder-definition-needformakingmilkpowder- dryingprocess-types of drying.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	Explain the importance of dairy products and its role in health care
Recommended text	1. K. Bagavathi Sundari, Applied Chemistry, MJP Publishers, first edition, 2006. 2. K. S. Rangappa and K.T. Acharya, Indian Dairy Products, Asia Publishing House New Delhi, 1974. 3. Text book of dairy chemistry, M.P. Mathur, D. Datta Roy, P. Dinakar, Indian

	Council of Agricultural Research, 1 st edition, 2008. 4. A Text book of dairy chemistry, Saurav Singh, Daya Publishing house, 1 st edition,2013. 5. Text book of dairy chemistry, P. L. Choudhary, Bio-Green book publishers, 2021.
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. 3. Sukumar De, Outlines of Dairy Technology, Oxford University Press, New Delhi, 1980. 4. P.F.Fox and P.L.H. Mcsweeney, Dairy Chemistry and Biochemistry, Springer, Second edition, 2016. 5. Dairy chemistry and biochemistry, P. F. Fox, T. Uniacke-Lowe, P.L.H.McSweeney, J.A. OMahony, Springer, Second edition, 2015.
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	understand about general composition of milk – constituents and its physical properties.
CO2	acquire knowledge about pasteurization of Milk and various types of pasteurization - Bottle, Batch and HTST Ultra High Temperature Pasteurization.
CO3	earn about Cream and Butter their composition and how to estimate fat in cream and Ghee
CO4	explain about Homogenized milk, flavoured milk, vitaminised milk and toned milk.
CO5	have an idea about how to make milk powder and its drying process - types of drying

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 CLRRELATION OF CO'S AND PSO'S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**COSMETICS AND PERSONAL GROOMING**		**Course code**	**U23SEC4**
Paper No.	SEC3 (T)		**Category**	SEC
Year	I	**Semester II**	**Credits**	2
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	2			2
Prerequisites	Higher Secondary Education			
Objectives of the course	This course aims at familiarizing the students with ● formulations of various types of cosmetics and their significance ● hair, skin and dental care ● makeup preparations and personal grooming			
Course Outline				
Unit 1	**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.			
Unit 2	**Hair Care** Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner – types – ingredients			

	Dental care Tooth pastes – ingredients – mouth wash
Unit 3	**FACE MAKE UP COSMETICS** Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eye shadow, concealers, rouge
Unit4	**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
Unit 5	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
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	Explain the various beauty product formulation and inspiration to do innovation in beauty care products
Recommended text	1)Thankamma Jacob, (1997) Foods, drugs and cometics – A consumer guide, Macmillan publication, London.
Reference Books	1)Wilkinson J B E and Moore R J, (1997) Harry's cosmeticology, 7th ed., Chemical Publishers, London. 2)George Howard, (1987) Principles and practiceof perfumes and cosmetics
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	know about the composition of various cosmetic products
CO2	understand chemical aspects and applications of hair care and dental care and skin care products.
CO3	understand chemical aspects and applications of perfumes and skin care products.
CO4	to understand the methods of beauty treatments their advantages and disadvantage

CO5	understand the hazards of cosmetic products.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 OF CO'S AND PSO'S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**GENERAL CHEMISTRY -III**		**Course code**	**U23CC5**
Paper No.	CC5 (T)		**Category**	Core
Year	II	**Semester III**	**Credits**	4
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	1	-----	5
Prerequisites	General Chemistry – I and II			
Objectives of the course	This course aims to provide a comprehensive knowledge on ● the physical properties of gases, liquids, solids and X-ray diffraction of solids. ● fundamentals of nuclear chemistry and nuclear waste management. ● applications of nuclear energy ● basic chemistry of halo-organic compounds, phenol and other aromatic alcohols. preparation and properties of phenols and alcohols.			
Course Outline				
Unit 1	**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 and viscosity of gases. Real gases: Deviations from ideal gas behaviour, (Andrew's and Amagat's plots); compressibility factor, Z, and its variation with pressure for different gases. equations of states for real gases-van der Waal's equation; Virial equation; Boyle temperature; Numerical problems based on equations of states for real gases, isotherms of real gases – critical phenomena – isotherms of CO2 - continuity of state–Van der waal's equation and the critical state; law of corresponding states-liquefaction of gases; numerical problems involving the core concepts**.**
Unit 2	**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. Crystals –size and shape; laws of crystallography; 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 centered cubic, face centered and hexagonal close packing; Co-ordination number in typical structures - NaCl, CsCl, ZnS, TiO2; comparison of structure and properties of diamond and graphite;.numerical problems involving core conceptsDefects in solids - stoichiometric and nonstoichiometric defects.Liquid crystals – classification and applications.
Unit 3	**Nuclear Chemistry** Natural radioactivity - α, β and γ rays; half-life period; Fajan–Soddy group displacement law; Geiger–Nattal rule; isotopes, isobars, isotones, mirror nuclei, iso diaphers; 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 t1/2 and 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.
Unit4	**Halogen derivatives** **Aliphatic halogen derivatives** Nomenclature and classes of alkyl halides – isomerism, physical properties, Chemical reactions. Nucleophilic substitution reactions – SN^1, SN^2 and SNi mechanisms with stereochemical aspects and effect of solvent.

	Di, Tri & Tetra Halogen derivatives: Nomenclature, classification, preparation, properties and applications. **Aromatic halogen compounds** Nomenclature, preparation, properties and uses Mechanism of nucleophilic aromatic substitution – benzyne intermediate. **Aryl alkyl halides** Nomenclature, benzyl chloride – preparation – preparation properties and uses **Alcohols:** Nomenclature, classification, preparation, properties, use; conversions – ascent and descent of series; test for hydroxyl groups. Oxidation of diols by periodic acid and lead tetraacetate.
Unit 5	**Phenols** Nomenclature; classification, Preparation from diazonium salts, cumene, Dow's process, Raching process; properties – acidic character and effect of substitution on acidity. Reactions – Fries, claisen rearrangement, Electrophilic substitution reactions, Reimer - Teimen, Kolbe, Schmidt, Gatermann synthesis, Libermann, nitro reaction, phthalein reaction. Resorcinol, quinol, picric acid – preparation, properties and uses. **Aromatic alcohols** Nomenclature, benzyl alcohol – methods of preparation – hydrolysis, reduction of benzaldehyde, Cannizzaro reaction, Grignard synthesis, physical properties, reactions – reaction with sodium, phosphorus pentachloride, thionyl chloride, acetic anhydride, hydrogen iodide, oxidation – substitution on the benzene nucleus, uses. Thiols: Nomenclature, structure, preparation and properties.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended text	1. B.R. Puri, L.R. Sharma, M.S. Pathania; *Principles of Physical Chemistry*, 46th edition, Vishal Publishing, 2020. 2. B.R. Puri, L.R. Sharma and K.C. Kalia, *Principles of Inorganic Chemistry*, Milestone Publishers and Distributors, New Delhi, thirtieth edition, 2009. 3. 4. P.L. Soni and Mohan Katyal, *Textbook of Inorganic Chemistry*, Sultan Chand & amp; Sons, twentieth edition, 2006. 4. M. K. Jain, S. C. Sharma, *Modern Organic Chemistry*, Vishal Publishing, fourth reprint, 2003. 5 S.M. Mukherji, and S.P. Singh, *Reaction Mechanism in Organic Chemistry*, Macmillan India Ltd., third edition, 1994.
Reference Books	1. T. W. Graham Solomons, *Organic Chemistry*, John Wiley & Sons, fifth edition, 1992.

	2. A. Carey Francis, *Organic Chemistry*, Tata McGraw-Hill Education Pvt., Ltd.,New Delhi, seventh edition, 2009. 3. I. L. Finar, *Organic Chemistry*, Wesley Longman Ltd, England, sixth edition, 1996 4. P. L. Soni, and H. M.Chawla - *Text Book of Organic Chemistry*, New Delhi, Sultan Chand & Sons, twenty ninth edition, 2007. 5. J.D. Lee, *Concise Inorganic Chemistry*, Blackwell Science, fifth edition, 2005
Website and e-learning source	**MOOC components** https://nptel.ac.in/courses/104104101 Solid state chemistry https://nptel.ac.in/courses/103106071Nuclear industries and safety https://nptel.ac.in/courses/104106119s Introduction to organic chemistry
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	explain the kinetic properties of gases by using mathematical concepts.
CO 2	describe the physical properties of liquid and solids; identify various types of crystals with respect to its packing and apply the XRD method for crystal structure determinations
CO 3	investigate the radioactivity, nuclear energy and it's production, also the nuclear waste management.
CO 4	write the nomenclature, physical & chemical properties and basic mechanisms of halo organic compounds and alcohols.
CO 5	investigate the named organic reactions related to phenol; explain the preparation and properties of aromatic alcohol including thiol.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted	3.0	3.0	3.0	3.0	3.0

percentage of Course Contribution to Pos					

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**QUALITATIVE INORGANIC ANALYSIS**		**Course code**	**U23CC6P**
Paper No.	**CC6 (P)**		**Category**	Core
Year	II	**Semester III**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	-----	----------	3	3
Prerequisites	General chemistry			
Objectives of the course	To develop the skill on systematic analysis of simple inorganic salts and mixture of salts.			
Course Outline				
	Semi - Micro Qualitative Analysis 1. Analysis of simple acid radicals: Carbonate, sulphide, sulphate, thiosulphite, chloride, bromide, iodide, nitrate 2. Analysis of interfering acid radicals: Fluoride, oxalate, borate, phosphate, arsenate, arsenite.			

	3. Elimination of interfering acid radicals and Identifying the group of basic radicals 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 5 Analysis of a mixture - I to VIII containing two cations and two anions (of which one is interfering type
Skills acquired from this course	Knowledge about the Semi - Micro Qualitative Analysis, learn the analysis skill
Recommended text	V. Venkateswaran, R. Veeraswamy and A. R. Kulandivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, second edition, 1997.
Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	acquire knowledge on the systematic analysis of Mixture of salts.
CO2	Identify the anions and the cations
CO 3	identify the cations and anions in the soil and water and to test the quality of water.
CO 4	Assess the role of common ion effect and solubility product

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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	S	S	S	S	S	S	M	S	M

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	12	12	12	12	12
Weightage	3.0	3.0	3.0	3.0	3.0
Weighted percentage of	3	3	3	3	3

Course Contribution to Pos					

SCHEME OF EVALUATION

Inernal marks : 25	**External marks: 75**
Acid radical with suitable procedure: 10 Basic radical with suitable procedure: 10 Elimination and original solution preparation : 5	Acid radical with suitable procedure: 30 Basic radical with suitable procedure: 30 Elimination and original solution preparation: 5 **Record : 10**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**ENTREPRENEURIAL SKILLS IN CHEMISTRY**		**Course code**	**U23SEC5P**
Paper No.	**SEC4 (P)**		**Category**	**SEC**
Year	II	**Semester III**	**Credits**	1
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	-------	-------	1	1
Prerequisites	General Chemistry			
Objectives of the course	The course aims at providing training to ● develop entrepreneur skills in students ● to provide hands on experience to prepare and develop products develop start ups			
Course Outline				

Unit 1	**Food Chemistry** Food adulteration-contamination of food items with clay stones, water andtoxicchemicals -Common adulterants. **Food additives,** Natural and synthetic anti-oxidants, glazing agents (hazardous effect),food colourants, Preservatives, leavening agents, Baking powder and baking soda, yeast,MSG,vinegar. **Dyes** Classification – Natural, synthetic dyes and their characteristics – basic methods and principles of dyeing
Unit 2	**Hands on Experience (Students can choose any four)** Detection of adulterants in food items like coffee, tea, pepper, chilli powder, turmeric powder, butter, ghee, milk, honey etc., by simple techniques. Testing of water samples using testing kit. Dyeing – cotton fabrics with natural and synthetic dyes Printing – tie and dye, batik.
Skills acquired from this course	Learn the Entrepreneurial skills.
Recommended text	1.George S &Muralidharan V, (2007) Fibre to Finished Fabric – A Simple Approach, Publication Division, University of Madras, Chennai. 2.Appaswamy G P, A Handbook on Printing and Dyeing of Textiles.
Reference Books	1.Shyam Jha, Rapid detection of food adulterants and contaminants (Theory and Practice),Elsevier, e Book ISBN 9087128004289, 1stEdition,2015
Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	identify adulterated food items by doing simple chemical tests.
CO2	prepare cleaning products and become entrepreneurs
CO 3	educate others about adulteration and motivate them to become entrepreneurs

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
Weightage	9	9	9	9	9
Weighted percentage of Course Contribution to Pos	3	3	3	3	3

SHEME OF EVALUATION

Inernal marks : 25	External marks: 75
Experiment – 20 marks Result 5 marks	Experiment – 50 marks result - 15 marks **Record : 10 marks**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	PESTICIDE CHEMISTRY		Course code	U23SEC6
Paper No.	SEC 5(T)/Naan Mudalvan		Category	SEC/Naan Mudalvan
Year	II	Semester III	Credits	2
Instructional hrs/week	Lecture	Tutorial	Lab. Practice	Total
	2	----	----	2
Prerequisites	Fundamentals in chemistry			
Objectives of the course	This course aims to providing the students ● knowledge about the various types of pesticides and their toxicity. ● to understand the accumulation of pesticides in in the form of residues			

	and its analysis. knowledge on choice of alternate and eco-friendly pesticides.
Course Outline	
Unit 1	**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.
UNIT 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
Unit 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.
UNIT 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.
Unit V	**Biopesticides:** Pheromones, attractants, repellents – Introduction, types and application (8- Dodecen-1-ol, 10-cis-12-hexadecadienoic, Trimedlure, Cue-lure, methyl eugenol, N,N- Diethyl-m-toluamide, Dimethyl phthalate, Icaridin). Baits- Metaldehyde, Iron (II) phosphate, Indoxacarb, Zinc Phosphide, Bromadiolone.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

Skills acquired from this course	Knowledge about the pesticides
Recommended text	1. Handa SK. Principles of pesticide chemistry. Agrobios (India); 2012. 2. Matolcsy G, Nádasy M, Andriska V. Pesticide chemistry. Elsevier; 1989. 3. J. Miyamoto and P. C. Kearney Pesticide Chemistry Human Welfare and the Environment vol. IV Pesticide Residue and Formulation Chemistry, Pergamon press,1985. 4 R. Cremlyn: Pesticides, John Wiley.
Reference Books	1. Roy N. K., Chemistry of Pesticides. CBS Publisher & Distributors P Ltd; 1st Ed. (2010). 2. Nollet L.M., Rathore H.S., Handbook of pesticides: methods of pesticide residues analysis. CRC press; 2016. 3.Ellerbrock R.H., Pesticide Residues: Significance, Management and Analysis, 2005
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	Teach about the pesticides and their toxicity with respect to structure and category
CO2	Explain the preparation and property of pesticides
CO 3	Investigate the pesticide residues, prevention and care
CO 4	Demonstrate the extraction and analytical methods of pesticide residues
CO 5	Make awareness to the public on bio-pesticides

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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	S	S	S	S	S	S	M	S	M

LEVEL OF CORRELATION OF CO'S AND PSO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3

CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**GENERAL CHEMISTRY-IV**		**Course code**	**U23CC7**
Paper No.	CC7(T)		**Category**	Core
Year	II	**Semester IV**	**Credits**	4
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	----	-----	4
Prerequisites	General Chemistry III			
Objectives of the course	This course aims to provide a comprehensive knowledge on ● thermodynamic concepts on chemical processes and applied aspects. ● thermo chemical calculations			

	• transition elements with reference to periodic properties and group study of transition metals. • the organic chemistry of ethers, aldehydes and ketones the organic chemistry of carboxylic acids
Course Outline	
Unit 1	**Thermodynamics I** Terminology – Intensive, extensive variables, state, 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, irreversible expansion of ideal and real gases under isothermal and adiabatic conditions; relation between heat capacities (Cp & Cv); Joule Thomson effect- inversion temperature. Thermochemistry - heats of reactions, standard states; types of heats of reactions and their applications; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions; Hess's law and its applications; determination of bond energy; Measurement of heat of reaction – determination of calorific value of food and fuels Zeroth law of thermodynamics-Absolute Temperature scale.
Unit 2	**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 and a van der Waals gas with changes in temperature, volume and pressure, entropy and disorder. Third law of thermodynamics - Nernst heat theorem; Applications of third law - evaluation of absolute entropies from heat capacity measurements, exceptions to third law. **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, Ellingham Diagram-application. Partial molar properties - chemical potential – Gibbs Duhem equation, Variation of chemical potential with temperature and pressure, Chemical potential of the system of ideal gases, Gibbs- Duhem- Margules equation
Unit 3	**General Characteristics of d-block elements** **Transition Elements**- Electronic configuration - General periodic trend 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
Unit4	**Ethers, Thio 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 LiAH4 Thioethers - nomenclature, structure, preparation, properties and uses. **Aldehydes and Ketones** Nomenclatue, structure and reactivity of aliphatic and aromatic aldehydes and ketones; general methods of preparation and physical properties. Nucleophilic addition reactions, base catalysed reactions with mechanism- Aldol, Cannizzaro's reaction, Perkin reaction, Benzoin condensation, Haloform reaction, Knoevenagel reaction. Oxidation of aldehydes. Baeyer - Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf - Kishner reduction, Meerwein – Pondorf Verley reduction, reduction with LiAlH4 and NaBH4 Addition reactions of unsaturated carbonyl compounds: Michael addition.
Unit 5	**Carboxylic Acids**: Nomenclature, structure, preparation and reactions of aliphatic and aromatic monocarboxylic acids. Physical properties, acidic nature, effect of substituent on acidic strength. HVZ reaction, Claisen ester condensation, Bouveault Blanc reduction, decarboxylation, Hunsdieckerreaction.Formic acid-reducing property Reactions of dicarboxylic acids, hydroxy acids and unsaturated acids **Carboxylic acid Derivatives:** Preparations of aliphatic and aromatic acid chlorides, esters, amides and anhydrides. Nucleophilic substitution reaction at the acyl carbon of acyl halide, anhydride, ester, amide. Schottan- Baumann reaction. Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann bromamide degradation and Curtius rearrangement **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 **Hydroxy acids** – nomenclature; preparation from halo, amino, aldehydic and ketonic acids, ethylene glycol, aldol acetaldehyde; reactions – action of heat on ✔, and ██hydroxy acids.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

question paper)	
Skills acquired from this course	Gain the knowledge in physical and organic chemistry
Recommended text	1. B.R. Puri and L.R. Sharma, *Principles of Physical Chemistry*, Shoban Lal Nagin Chand and Co., thirty three edition, 1992. 2. K. L. Kapoor, *A Textbook of Physical chemistry*, (volume-2 and 3), Macmillan, India Ltd, third edition, 2009. 3. P.L. Soni and Mohan Katyal, *Textbook of Inorganic Chemistry*, Sultan Chand & Sons, twentieth edition, 2006. 4. M. K. Jain, S. C. Sharma, *Modern Organic Chemistry*, Vishal Publishing, fourth reprint, 2003. 5 S.M. Mukherji, and S.P. Singh, *Reaction Mechanism in Organic Chemistry*, Macmillan India Ltd., third edition, 1994.
Reference Books	1. Maron, S. H. and Prutton C. P. *Principles of Physical Chemistry,*4thed.; 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,* 26thed.; Goel Publishing House: Meerut, 2001. 4. Atkins, P.W. & Paula, J. *Physical Chemistry*, 10th ed.; Oxford University Press:New York, 2014. 5 Huheey, J. E. *Inorganic Chemistry: Principles of Structure and Reactivity,* 4th ed; Addison Wesley Publishing Company: India,1993.
Website and e-learning source	**MOOC components** https://nptel.ac.in/courses/112102255Thermodynamics https://nptel.ac.in/courses/104101136 Advanced transition metal chemistry
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	Explain the terms and processes in thermodynamics; discuss the various laws of thermodynamics and thermo chemical calculations.
CO2	Discuss the second law of thermodynamics and its application to heat engine; discuss third law and its application on heat capacity measurement.
CO 3	Investigate the chemistry of transition elements with respect to various periodic properties and group wise discussions.
CO 4	Discuss the fundamental organic chemistry of ethers, epoxides and carbonyl compounds including named organic reactions.
CO 5	Discuss the chemistry and named reactions related to carboxylic acids and their derivatives; discuss chemistry of active methylene compounds, halogen substituted acids and hydroxyl acids.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**PHYSICAL CHEMISTRY PRACTICAL – I**		**Course code**	**U23CC8P**
Paper No.	**CC8(P)**		**Category**	**core**
Year	II	**Semester IV**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	----	------	3	3
Prerequisites	General Chemistry			
Objectives of the course	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 colligative properties and adsorption isotherm
Course Outline	
Unit 1	**Chemical kinetics** 1 Determination of rate constant of acid catalysed hydrolysis of an ester(methyl acetate). 2. Determination of order of reaction between iodide and persulphate (initial rate method). 3. Polarimetry: Determination of rate constant of acid catalysed inversion of cane sugar **Thermochemistry** 4.Determination of heat of neutralisation of a strong acid by a strong base 5.Determination of heat of hydration of copper sulphate.
Unit 2	**Electrochemistry – Conductance measurements** 6.Determination of cell constant 7. Determination of molar conductance of strong electrolyte 8.Determination of dissociation constant of acetic acid **Colorimetry** 9.Determination of concentration of copper sulphate solution (demonstration only)
Unit 3	**UNIT III** **Colligative property** 10.Determination of molecular weight of an organic compound by Rast method using naphthalene or diphenyl as solvent **Adsorption** 11.Construction of Freundlich isotherm for the adsorption of acetic acid on activated charcoal. .(Demonstration only)
Skills acquired from this course	Gain the knowledge about chemical kinetics, Thermochemistry, Electro chemistry, colligative property and adsorption
Recommended text	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. 3 Gupta, Renu, *Practical Physical Chemistry*, 1st Ed.; New Age International: New Delhi, 2017.
Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	Describe the principles and methodology for the practical work
CO2	Explain the procedure, data and methodology for the practical work.
CO 3	Apply the principles of electrochemistry, kinetics for carrying out the practical work.
CO 4	Demonstrate laboratory skills for safe handling of the equipment and chemicals

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	12	12	12	12	12
Weightage	3.0	3.0	3.0	3.0	3.0
Weighted percentage of Course Contribution to Pos	3	3	3	3	3

SCHEME OF EVALUATION

Internal marks : 25	External marks: 75
Experiment : 15 Result : 10	Experiment : 40 Result : 25 Record : 10

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS		Course code	U23SEC7
Paper No.	SEC 6 (T)		Category	SEC
Year	II	Semester IV	Credits	2
Instructional hrs/week	Lecture	Tutorial	Lab. Practice	Total
	-----	------	2	2
Prerequisites	General Chemistry			

Objectives of the course	The course aims at providing an overall view of the ● operation and troubleshooting of chemical instruments ● fundamentals of analytical techniques and its application in the characterization of compounds theory of chromatographic separation and ● theory of thermo / electro analytical techniques stoichiometry and the related concentration terms
Course Outline	
Unit 1	**Qualitative and Quantitative Aspects of Analysis** S.I Units, Distinction between Mass and Weight. Moles, Millimoles, Milli equivalence, Molality, Molarity, Normality, Percentage by Weight and Volume, ppm, ppb. Density and Specific Gravity of Liquids. Stoichiometry Calculations Sampling, 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, Coefficient of Variation, Confidence Limits, Q- test, F-test, T-test. The Least Square Method for Deriving Calibration plots.
Unit 2	**Atomic Absorption Spectroscopy**: Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples
Unit 3	**Electro Analytical Techniques** **Coulometry**-Constant current couolometry- Coulometric titrations-applications- potentiostatic coulometry **Polorography**- Principle - Experimental assembly-working- advantages and disadvantages of DME **Amperometric** titrations-theory-apparatus-general procedure-applications and advantages
Unit4	**Thermal and Electro-analytical Methods of Analysis** **TGA and DTA**- Principle, Instrumentation, methods of obtaining Thermograms, factors affecting TGA/DTA, Thermal analysis of silver nitrate, calcium oxalate and calcium acetate **DSC-** Principle, Instrumentation and applications. Electroanalytical methods: polarography - principle, instrumentation and applications. Derivative polarography- Cyclic Voltammetry - principle.
Unit 5	**Separation and purification techniques** Classification, principle, Factors affecting - Solvent Extraction – Liquid - Liquid Extraction, **Chromatography**: Column, TLC, Paper, Gas, HPLC and Electrophoresis, Principle, Classification, Choice of Adsorbents, Solvents, Preparation of Column, Elution Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms and Rf value.
Extended Professional Component (is a part of internal	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

component only,Not to be included in the external examination question paper)	
Skills acquired from this course	Obtain the knowledge about various instrumental methods
Recommended text	1. Vogel, Arthur I: A Test book 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). 4. R. Speyer, Thermal Analysis of Materials, CRC Press, 1993. 4 R.A. Day and A.L. Underwood, Quantitative Analysis, 6thedn., Prentice Hall of India Private Ltd., New Delhi, 1993
Reference Books	1. D. A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5thedn., Saunders college publishing, Philadelphia, 1998. 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. 4. Mikes, O. &Chalmes, R.A. Laboratory Handbook of Chromatographic & Allied Methods, Elles Harwood Ltd. London 5 G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, sixth edition Pearson Education, 2000
Website and e-learning source	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.sjsu.edu/faculty/watkins/diamag.htm 4 http://www.britannica.com/EBchecked/topic/108875/separation- and-Purification 5.http://www.chemistry.co.nz/stoichiometry.htm
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	apply error analysis in the calibration and use of analytical instruments, explain theory, instrumentation and application of flame photometry and Atomic Absorption Spectroscopy
CO2	explain theory, instrumentation and application of UV visible and Infrared spectroscopy.
CO 3	able to discuss instrumentation, theory and applications of thermal and electrochemical techniques
CO 4	explain the use of chromatographic techniques in the separation and identification of mixtures

CO 5	explain preparation of solutions, stoichiometric calculations

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the vcourse	**FORENSIC SCIENCE**		**Course code**	**U23SEC8**
Paper No.	**SEC7(T)**		**Category**	**SEC**
Year	II	**Semester IV**	**Credits**	2
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	2	-------	------	2

Prerequisites	General Chemistry
Objectives of the course	This course aims at giving an overall view of ● crime detection through analytical instruments ● forgery and its detection medical aspects involved
Course Outline	
Unit 1	**Poisons** Poisons - types and classification - diagnosis of poisons in the living and the dead -clinical symptoms - postmortem appearances. Heavy metal contamination (Hg, Pb, Cd) of seafoods - use of neutron activation analysis in detecting arsenic in human hair. Treatment in cases of poisoning – use of antidotes for common poisons.
Unit 2	**Crime Detection** Accidental explosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs - possible explosives (gelatin sticks and RDX) - metal detector devices andother security measures for VVIP-composition of bullets and detecting powder burns.
Unit 3	**Forgery and Counterfeiting** Documents - different types of forged signatures - simulated and traced forgeries -inherent signs of forgery methods - writing deliberately modified - uses of ultraviolet rays -comparison of type written letters – checking silver line water mark in currency notes – alloy analysis using AAS to detect counterfeit coins – detection of gold purity in 22 carat ornaments – detecting gold plated jewels -authenticity of diamond.
Unit4	**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 - Cranial analysis (head and teeth) DNA Finger printing for tissue identification in dismembered bodies - detecting steroid consumption in athletes and race horses
Unit 5	**Medical Aspects** Aids - causes and prevention - misuse of scheduled drugs - burns and their treatment by plastic surgery. 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 - small arms -laboratory examination of barrel washing and detection of powder residue by chemical tests.
Extended Professional Component (is a part of internal component only,Not to be included in the external	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

examination question paper)	
Skills acquired from this course	Obtain knowledge about Forensic science
Recommended text	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. 4. Bapuly AK, (2006) Forensic Science – Its application in crime investigation, Paras Medical Publisher, Hyderabad. 5. Sharma B.R., (2006) Scientific Criminal Investigation, Universal Law Publishing Co. Pvt. Ltd, New Delhi.
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. 4. Max M. Houck & Jay A. Segal, (2006) Fundamentals of Forensic Science, Elsevier Academic press. 5 Henry C. Lee, Timothy Palmbach, Marilyn T. Miller, (2006) Henry Lee's CrimeSicene Book Elsevier Academic press.
Website and e-learning source	1. http://www.library.ucsb.edu/ist/03-spring/internet.html 2 http://www.wonder howto.com/topic/forensic-science/
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	Learn about the Poisons - types and classification of poisons in the living and the dead organisms and also get information about Postmortem.
CO2	Get awareness on Human bombs, possible explosives (gelatin sticks and RDX) and metal defector devices and other security measures for VVIP - composition of bullets and detecting powder burns
CO 3	Detect the forgery documents, different types of forged signatures
CO 4	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
CO 5	Have an idea DNA Finger printing for tissue identification in dismembered bodies

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	ORGANIC CHEMISTRY -I		Course code	U23CC9
Paper No.	CC9 (T)		Category	Core
Year	III	Semester V	Credits	5
Instructional hrs/week	Lecture	Tutorial	Lab. Practice	Total
	4	1		5
Prerequisites	General Chemistry I,II, III and IV			

Objectives of the course	This course aims to provide an understanding of ● stereoisomerism in chirals and geometric isomerism in olefins, conformations of ethane and butane ● preparation and properties of aromatic and aliphatic nitro compounds and amines ● preparation of different dyes, food colour and additives ● preparation and properties of five membered heterocycles like pyrrole, furan and thiophene ● preparation and properties of six membered heterocycles like pyridine, quinoline and isoquinoline.
Course Outline	
Unit 1	**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- methods of 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 – allenes and biphenyls. Conformational analysis of ethane and butane
Unit 2	**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.Nitro - aci nitro tautomerism. **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 Schmidt rearrangement. Physical properties, reactions – alkylation, acylation, carbylamine reaction, Mannich reaction, oxidation, basicity of amines.
Unit 3	**UNIT 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 between primary, secondary and tertiary amines – **Diazonium compounds**

	Diazomethane, Benzene diazonium chloride - preparations and synthetic applications. **Dyes** Theory of colour and constitution; classification based on structure and application; preparation –Martius yellow, aniline yellow, methyl orange, alizarin, indigo, malachite green. **Industry oriented content** Dyes Industry, Food colour and additives
Unit4	**UNIT IV** **Heterocyclic compounds** Nomenclature and classification. General characteristics - aromatic character and reactivity. **Five-membered heterocyclic compounds** Pyrrole – preparation - from succinimide, Paal Knorr synthesis; reactions – reduction, basic character, acidic character, electrophilic substitution reactions, ring opening. Furan – preparation from mucic acid and pentosan; 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.
Unit 5	**UNIT 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.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills
Recommended text	1.M.K. Jain, S.C.Sharma, Modern Organic Chemistry, Vishal

	Publishing, fourth reprint, 2009. 2.S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan India Ltd., third edition, 2009. 3. ArunBahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S.Chand& Company Pvt. Ltd., Multicolour edition, 2012. 4.P. L.Soni and H. M. Chawla, Text Book of Organic Chemistry, Sultan Chand & Sons, New Delhi, twenty ninth edition, 2007. 5..C.N.Pillai, Text Book of Organic Chemistry, Universities Press (India) Private Ltd., 2009.
Reference Books	1.R. T. Morrison and R. N. Boyd, Organic Chemistry, Pearson Education, Asia, sixth edition, 2012. 2. T.W.Graham Solomons, Organic Chemistry, John Wiley & Sons, eleventh edition, 2012. 3. A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, seventh edition,2009. 4. I. L. Finar, Organic Chemistry, Vol. (1& 2), England, Wesley Longman Ltd, sixth edition, 2006. 5. J. A. Joule, and G. F. Smith, Heterocyclic Chemistry, Wiley, Fifth Edition, 2010.
Website and e-learning source	1.www.epgpathshala.nic.in 2. www.nptel.ac.in 3. http:/swayam.gov.in 4.Virtual Textbook of Organic Chemistry

Course Learning outcomes (For Mapping with POs and PSO s)
On Completion of the course the students should be able to

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

CO1: assign RS notations to chirals and EZ notations to olefins and explain conformations of ethane and butane.

CO2: explain preparation and properties of aromatic and aliphatic nitro compounds and amines

CO3: explain colour and constitution of dyes and food additives

CO4: discuss preparation and properties of five membered heterocycles like pyrrole, furan and thiophene

CO5: discuss preparation and properties of six membered heterocycles like pyridine, quinoline and I isoquinoline

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**INORGANIC CHEMISTRY**	**Course code**	**U23CC10**

Paper No.	CC10 (T)		Category	Core
Year	III	Semester V	Credits	5
Instructional hrs/week	Lecture	Tutorial	Lab. Practice	Total
	4	1		5
Prerequisites	General Chemistry I , II, III and IV			
Objectives of the course	the course aims to provide knowledge on ● nomenclature, isomerism and theory of coordination compounds, and chelate complexes ● crystal field theory, magnetic properties, stability of complexes and Jahn Teller effect ● preparation and properties of metal carbonyls ● Lanthanoids and actinoid ● preparation and properties of inorganic polymers			

Course Outline

Unit 1	**Co-ordination Chemistry** 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 co-ordination compounds with co-ordination number 4 &6. Chelates – types of ligands forming chelates . Role of metal chelates in living systems- Chlorophyll 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 –Jahn- Tellar effect -Comparison of VBT and CFT.
Unit 2	**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
Unit 3	**Inner transition elements (Lanthanoids and Actinoids)** General characteristics of f-block elements - Comparative account of lanthanoids and actinoids - Occurrence, Oxidation states, Magnetic properties, Colour and spectra - Lanthanoids and Actinoids, Separation by ion-Exchange and Solvent extraction methods - Lanthanoids contraction- Chemistry of thorium and Uranium-Occurrence, Ores, Extraction, properties and uses - Preparation, Properties and uses of ceric ammonium sulphate, thorium dioxide and uranyl acetate.
Unit4	**Inorganic polymers** General properties – classification of inorganic polymers based on element in

	the backbone (Si and P) - preparation and properties of silicones (polydimethylsiloxane and polymethylhydrosiloxane) phosphorous based polymer (polyphosphazines and polyphophonitrilic chloride),) – industrial applications of inorganic compounds. General properties – classification of inorganic polymers based on element in the backbone (Si and P) - preparation and properties of silicones (polydimethylsiloxane and polymethylhydrosiloxane) phosphorous based polymer (polyphosphazines and polyphophonitrilic chloride),) – industrial applications of inorganic compounds. **Industrial Applications of Inorganic Compound** Refractories, , Paints and pigments - requirements of a good paint; classification, constituents of paints – pigments, vehicles, thinners, driers, extenders, anti-knocking agents, anti-skinning agents, Industrial visits and internship mandatory.
Unit 5	**Unit V** **Bio inorganic chemistry** Essentials and trace elements : role of Na +,K+,Mg 2+ in biological systems .effect of excessintake of metal ions –trace elements Cd ,Pb,Hg, **Metal ion transport and storage** Iron-storage-transport-transferrin and ferritin., iron-porphyrins-myoglobin,haemoglobin-oxygen transport **Metllo enzymes** Structure of cyanocobalamin (vitamin 12)metalloenzymes-functions of carboxy peptidase A, zinc metallo enzyme-mechanism and uses. Carbonic anhydrase, vitamin B12 as transferase and isomerase –iron sulfur proteins 2fe-2s rubredoxin-invivo and invitro nitrogen fixation-biological functions of nitrogenase and molybdo enzymes.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills
Recommended text	1. Puri B R, Sharma L R, Kalia K C (2011), Principles of Inorganic Chemistry, 31thEdition, Milestone Publishers & Distributors, Delhi. 2 Satya Prakash, Tuli G. D., Basu S. K., Madan R. D. (2009), Advanced Inorganic Chemistry, 18th Edition, S. Chand & Co., New

	Delhi 3. Lee J D, (1991), Concise Inorganic Chemistry, 4th Edition, ELBS William Heinemann, London. 4. W V Malik, G D Tuli, R D Madan, (2000), Selected Topics in Inorganic Chemistry, S. Chand and Company Ltd. 5. A. K. De, Text book of Inorganic Chemistry, Wiley East Ltd, seventh edition, 1992.
	1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nd ed ., S.Chand and Company, New Delhi. 2. Gopalan R, (2009) Inorganic Chemistry for Undergraduates, Ist Edition, University Press (India) Private Limited,Hyderabad 3. Sivasankar B, (2013) Inorganic Chemistry.Ist Edition, Pearson, Chennai 4. Alan G. Sharp (1992), Inorganic Chemistry, 3rd Edition, Addition- Wesley, England 5. Peter Atkins, Tina Overton, Jonathan Rourke and Mark Weller, Inorganic Chemistry, Oxford University Press, sixth edition, 2014.
Website and e-learning source	1.www.epgpathshala.nic.in 2. www.nptel.ac.in 3. http:/swayam.gov.in

Course Learning outcomes (For Mapping with POs and PSO s)
On Completion of the course the students should be able to

CO1: explain isomerism, Werner's Theory and stability of chelate complexes
CO2: discuss crystal field theory, magnetic properties and spectral properties of complexes.
CO3: explain preparation and properties of metal carbonyls
CO4: give a comparative account of the characteristics of lanthanoids and actinoids
CO5:explain properties and uses of inorganic polymers of silicon, sulphur, boron and phosphorous

COURSE ATRICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

DEPARTMENT OF CHEMISTRY

Title of the course	**GRAVIMETRIC ANALYSIS AND WATER ANALYSIS**		**Course code**	**U23CC11P**
Paper No.	**CC11 (P)**		**Category**	**Core**
Year	III	**Semester V**	**Credits**	**3**
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	1	**-**	**5**	**6**
Prerequisites	Theoretical knowledge on **Gravimetric analysis and water analysis practical**			
Objectives of the course	the course aims to provide knowledge on ● Conditions for good precipitations ● Careful precipitation and weighing ● Techniques for Potable water analysis			
Course Outline				
Unit 1	**Principles of Gravimetric analysis** Introduction to Gravimetric analysis- precipitation methods-colloidal state –super saturation and precipitate formation –co-precipitation –conditions of precipitation- precipitation from homogeneous solution - washing of precipitate-Ignition of the precipitate.			
Unit 2	**GRAVIMETRIC ANALYSIS** Estimation of Calcium as oxalate Estimation of Barium as chromate Estimation of Lead as chromate Estimation of Nickel as dimethylglyoximate Estimation of Barium as sulfate Estimation of Zinc as quinaldate			
Unit 3	**Water Analysis** 1 Determination of TDS of water 2 Determination of Alkalinity of water 3 Determination of BOD of water 4 Determination of p^H of water 5 Determination of Dissolved oxygen in water- Winkler method (Demonstration only)			
Extended Professional Component (is a part of internal component	Questions related to the above topics,			

only,Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, , Analytical ability for carry out the Gravimetric analysis and preparation of coordination complexes
Recommended text	**Reference Books:** 1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. *Basic Principles of Practical Chemistry,*2nd ed.; Sultan Chand &Sons: New Delhi, 1997. 2.Nad, A. K.; Mahapatra, B.; Ghoshal, A.; *An advanced course in Practical* *Chemistry,* 3rd ed.; New Central Book Agency: Kolkata, 2007.
Reference Books	1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; *2)Vogel's Textbook of Quantitative Chemical Analysis*, 6th ed.; Pearson Education Ltd: New Delhi, 2000.
Website and e-learning source	**Web References:** 1)http://www.federica.unina.it/agraria/analytical-chemistry/volu metric- analysis 2) https://chemdictionary.org/titration-indicator/
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	Describe the principles and methodology for the practical work
CO2	Explain the procedure and methodology for the practical work
CO 3	Apply the principles of gravimetry for carrying out the gravimetric determnation
CO 4	Demonstrate laboratory skills for safe handling of the equipment and chemicals

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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

LEVEL OF CORRELATION OF CO'S AND PSO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Internal marks : 25	**External marks: 75**
Gravimetric analysis : 15 marks **(Procedure : 5 Experiment : 10)** **Error up to 2% - 10 marks** **3% - 8 marks** **4% - 6 marks** **>4 – 5 marks** **Water Analysis :10** **[Procedure:3 ; Experiment -7]**	**Gravimetric analysis: 40 marks** **(Procedure-10 ; Experiment : 30)** **Error Up to 2% - 30 marks** **3% - 20 marks** **4 % - 10 marks** **>4% - 8 marks** **Water Analysis : 25**

Error up to 2% - 7 marks **3% - 6 marks** **4% - 5 marks** **>4 – 4 marks**	**(Procedure -5: Experiment – 20)** **Error up to 2% - 20 marks** **3% - 15 marks** **4% - 10 marks** **>4% – 8 marks** **Record :10**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**ORGANIC ESTIMATION AND NATURAL PRODUCTS ISOLATION**		**Course code**	**U23CC12P**
Paper No.	**CC12(P)**		**Category**	Core
Year	III	**Semester V**	**Credits**	4
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	1		3	4
Prerequisites	Theoretical knowledge on quantitative estimations and significance of natural products			
Objectives of the course	the course aims to provide knowledge on ● Skills and principles of organic estimations ● Techniques for isolation of natural products			
Course Outline				
Unit 1	Principle behind organic estimation - Significance of natural products - various isolation techniques.			
Unit 2	**Organic Estimations** 1.Estimation of Phenol 2.Estimation of Aniline 3.Estimation of Glucose (Lane – Eynon method) 4.Estimation of Glucose (Bertrands method) (Demonstration only) 5.Estimation of Glycine 6.Estimation of Ethyl Methyl ketone			
Unit 3	**Isolation of Natural products** 1. Isolation of citric acid from lemon 2. Isolation of casein from milk 3. Isolation of lactose from milk 4. Isolation of caffine from tea			
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics,			
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills			

Recommended text	Vogel's textbook of Quantitative Inorganic Analysis revised by J.Basset, R.C.Denney, G.H.Jeffery and J.Mendham, ELBS 4th Edition.
Reference Books	Organic Chemistry Lab manual by Dr.N.S.Gnanapragasam and Prof.G.Ramamurthy, S.Viswanathan Printers and Publishers Pvt Ltd, Revised edition 2008.
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	Describe the principles and methodology for the organic estimation.
CO2	Explain the procedure and methodology for the isolation of natural products
CO 3	Apply the principles of complexation for carrying out the complexometric titrations
CO 4	Demonstrate laboratory skills for safe handling of the equipment and chemicals

COURSE ARTICULATION MATRIX

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3

LEVEL OF CORRELATION BETWEEN PO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SCHEME OF VALUATION

Internal marks : 25	External marks: 75
Organic Estimation : 15 marks **(Procedure - 5 : Experiment - 10)** **Error up to 2% - 10 marks** **3% - 8 marks** **4% - 6 marks** **>4 – 4 marks** **Natural product Isolation :10 marks** **[Procedure-3 ; Experiment -7]**	**Organic Estimation : 40 marks** **Procedure-10 : : Experiment - 30)** **Error Up to 2% - 30 marks** **3% - 20 marks** **4 % - 10 marks** **>4% - 8 marks** **Natural product Isolation : 25 marks** **Procedure -10: Isolation :15** **Record :10**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**INDUSTRIAL CHEMISTRY**		**Course code**	**U23DC01**
Paper No.	**DSEC1(T)**		**Category**	DSEC
Year	III	**Semester V**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	1	3	-	4
Prerequisites	General Chemistry I,II, III and IV			
Objectives of the course	This course is designed to provide knowledge on ● classifications and characteristics of fuels ● preparation of cosmetics ● manufacture of sugar, paper, cement and leather and food processing ● applications of abrasives, lubricants and other industrial products intellectual property rights			
Course Outline				
Unit 1	**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, carbonisation of coal. **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)			
Unit 2	**Cosmetics** Skin care: powders, ingredients; creams and lotion-cleansing, moisturising, all purpose shaving cream, sunscreen; make up preparations Dental care: tooth pastes – ingredients. Hair care: shampoos-types, ingredients; conditioners-types, ingredients. Perfumes: natural-plant origin-parts of the plant used, chief constituents; **Soaps and Detergents** Soaps-properties, manufacture of soap-batch process; types-transparent soap, toilet soap, powder soap and liquid soap – ingredients. Detergents-definition, properties-cleansing action; soaplessdetergents- anionic, cationic and non-ionic (general idea only); uses of detergents as surfactants. Biodegradability of soaps and detergents.			
Unit 3	**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.
Unit4	**Abrasives** Definition, characteristics, types-natural and synthetic; natural abrasives – diamond, corundum, emery, garnet, quartz – composition, uses; synthetic abrasives – carborundum, aluminium carbide, boron carbide, boron nitride, synthetic graphite – composition and uses. **Leather Industry** Structure and composition of skin, hide; Manufacture of leather – pre- tanning 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.
Unit 5	**Lubricants** Definition, classification-liquid, semi-solid, solid and synthetic; properties-viscosity index, flash point, cloud point, pour point, aniline point and drop point; greases-properties, types; cutting fluids, selection of lubricants. **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
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended text	1. Sharma, B.K. *Industrial Chemistry*, 9th ed.; Goel Publishing House: Meerut, 1998. 2. Wilkinson, J.B.E. Moore, R.J. *Harry's Cosmeticology*, 7th ed.; Chemical Publishers : New York, 1982. 3. Alex V. Ramani, *Food Chemistry,* MJP publishers: Chennai, 2009. 4. Jayashree Ghosh, *Applied Chemsitry*, S. Chand : New Delhi, 2006. Srilakshmi, B. *Food Science*, 4th ed.; New Age International Publication, 2005.

Reference Books	1. Jain, P.C.; Jain, M. *Engineering Chemistry*, 16th ed.; Dhanapet Rai: Delhi, 1992 2. George Howard, *Principles and Practice of Perfumes and Cosmetics*, Stanley Therones, Cheltenham: UK, 1987. 3. Thankamma Jacob, *Foods, Drugs and Cosmetics - A Consumer Guide*, Macmillan : London, 1997. 4. ShankuntalaManay, N.; Shadaksharaswamy, M. *Food Facts and Principles*, 3rd ed.; New Age Publication, 2008. 5..Neeraj Pandey, KhushdeepDharni, *Intellectual Property Rights*, PHI Learning, 2014.
Website and e-learning source	
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	summarize the properties of fuels which include petroleum, water gas, natural gas and propellents
CO2	**e**valuate cosmetic products, soaps, detergents
CO 3	explain manufacture of sugar, food spoilages and food additives
CO 4	explain properties of abrasives, manufacture of leather and paper
CO 5	explain properties and manufacture of lubricants and cement, and intellectual property rights

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PO'S and PSO"S

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**BIOCHEMISTRY**		**Course code**	**U23DC02**
Paper No.	**DSEC2(T)**		**Category**	DSEC
Year	III	**Semester V**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	3	1		4
Prerequisites	Organic Chemistry - I			
Objectives of the course	The course aims at providing knowledge on ● relationship between biochemistry and medicine, composition of blood ● structure and properties of amino acids, peptides, enzyme, vitamins and proteins ● biological functions of proteins, enzymes, vitamins and hormones ● biochemistry of nucleic acids and lipids ● metabolism of lipids			
Course Outline				
Unit 1	**Logic of Living Organisms** Relationship of Biochemistry and Medicine Blood - Composition of Blood, Blood Coagulation – Mechanism. Hemophilia and Sickle Cell Anaemia Maintenance of pH of Blood – Bicarbonate Buffer, Acidosis, Alkalosis			
Unit 2	**Peptides and Proteins** **Amino acids** – nomenclature, classification – essential and Non-essential; Synthesis - Gabriel Phthalimide, Strecker; properties – zwitter on 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, hydrolysis, oxidation, denaturation, renaturation; colour tests for proteins. Structure of proteins – primary, secondary, tertiary and quaternary. .			
Unit 3	**Enzymes and Vitamins** Nomenclature and classification, characteristics, factors influencing enzyme activity – mechanism of enzyme action – Lock and key hypothesis, Koshland's induced fit model Proenzymes, antienzymes, coenzymes and isoenzymes; allosteric enzyme egulation. Vitamins as coenzymes – functions of TPP, lipoic acid, NAD, NADP			

	FMN, FAD, pyridoxal phosphate, CoA, folic acid,biotin, cyanocobalamin
Unit4	**Nuclic acids** structure of nucleosides and nucleotides, DNA- structure & functions; RNA –types– structure - functions; biosynthesis of proteins **Hormones** Adrenalin and thyroxine — chemistry, structure and functions (No structure elucidation).
Unit 5	**Lipids** Occurrence, biological significance of fats, classification of lipids. **Simple lipids** – Oils and fats, chemical composition, properties, reactions– hydrolysis, hydrogenation, trans-esterification, saponification, rancidity; 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, physiological activity. Metabolism of lipids: β-oxidation of fatty acids.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills
Recommended text	1. . Bahl, B. S.; Bhal, A. *Advanced Organic Chemistry*, 3rd ed.; S. Chand: New Delhi, 2003. 2. Jain, M.K.; Sharma, S.C. *Modern Organic Chemistry*, Vishal Publications: New Delhi, 2017. 3. Shanmugam, A. *Fundamentals of Biochemistry for Medical Students*, 6th ed.; Published by the author, 1999. 4. Veerakumari, L. *Biochemistry*, 1st ed.; MJP Publications: Chennai, 2004. 5. Jain, J. L.; *Fundamentals of Biochemistry*, 2nd ed.; S.Chand: New
Reference Books	1. Conn, E. E.; Stumpf, P. K. *Outline of Biochemistry*, 5th ed.; Wiley Eastern: New Delhi, 2002. 2. West, E. S.; Todd, W. R.; Mason, H. S.; Van Bruggen, J. T. *Text Book of*

	Biochemistry, 4th ed.; Macmillan: New York, 1970. 3. Lehninger, A. L. *Principles of Biochemistry*, 2nd ed.; CBS Publisher: Delhi, 1993. 4.Rastogi, S. C. *Biochemistry*, 2nd ed.; Tata McGraw-Hill: New Delhi, 2003. 5. Chatterjea, M. N.; Shinde, R. *Textbook of Medical Biochemistry*, 5th ed.; Jaypee Brothers: New Delhi, 2002.
Website and e-learning source	1)http://library.med.utah.edu/NetBiochem/nucacids.html 2)http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/E/EnzymeKinetics.html 3) https://swayam.gov.in/courses/4384-biochemistry Biochemistry 4)https://onlinecourses.nptel.ac.in/noc19_cy07/preview Experimental Biochemistry
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	explain molecular logic of living organisms, composition of blood and blood coagulation
CO2	explain synthesis and properties of amino acids, determination of structure of peptides and proteins
CO 3	explain factors influencing enzyme activity and vitamins as coenzymes
CO 4	explain RNA and DNA structure and functions
CO 5	explain biological significance of simple and compound lipids

COURSE ARTICULATION MATRIX

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**ORGANIC CHEMISTRY II**		**Course code**	**U23CC13**
Paper No.	**CC13 (T)**		**Category**	Core
Year	III	**Semester VI**	**Credits**	5
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	5	1		6
Prerequisites	Organic Chemistry – I			
Objectives of the course	This course aims at providing knowledge on ● classification, isolation and discussing the properties of alkaloids and terpenes ● preparation and properties of saccharides ● biomolecules ● different molecular rearrangement preparation and properties of organometallic compounds			
Course Outline				
Unit 1	**Alkaloids** Classification, isolation, general properties- Hofmann Exhaustive Methylation; Structure elucidation – Coniine, piperine, nicotine. **Terpenes:** Classification, Isoprene rule, isolation and structural elucidation of Citral, alpha terpineol, Menthol, Geraniol and Camphor			
Unit 2	**Carbohydrates** Definition and Classification of Carbohydrates with examples.Relative configuration of sugars. Determination of configuration (Fischer's Proof). 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. Interconversions of sugar series – ascending, descending, aldose to ketose and ketose to aldose. **Disaccharides** – sucrose, lactose, maltose - preparation, properties and uses (no structural elucidation). **Polysaccharides** – Source, constituents and biological importance of homopolysaccharides- starch and cellulose, heteropolysaccharides –hyaluronic acid, heparin.			
Unit 3	**Molecular rearrangements:** Molecular Rearrangement: Type of rearrangements, Mechanism for Benzidine, Favorskii, Clasien, Fries, Hofmann, Curtius, Schmidt and Beckmann,			

	Pinacol-pinacolone rearrangement
Unit4	**Special reagents in organic synthesis** AIBN, 9BBN, 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
Unit 5	**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.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	**Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved**
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills
Recommended text	1. M.K.Jain, S. C.Sharma, Modern Organic Chemistry, Vishal Publishing, 4th reprint,2009. 2. S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan IndiaLtd., 3rd edition,2009 3. Arun Bahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S.Chand& Company Pvt. Ltd., Multicolour edition,2012. 4. P. L.Soni and H. M. Chawla, Text Book of Organic Chemistry, Sultan Chand & Sons, New Delhi, 29th edition, 2007. 5. 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, 2012. 2. T.W.Graham Solomons, Organic Chemistry, John Wiley & Sons,11th edition, 2012. 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, 6th edition, 2006. 5. J. A. Joule, and G. F. Smith, Heterocyclic Chemistry, Wiley, 5th Edition, 2010.
Website and e-learning source	1.www.epgpathshala.nic.in 2.www.nptel.ac.in 3.http:/swayam.gov.in

	4.Virtual Textbook of Organic Chemistry https://vlab.amrita.edu/
Course earning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	explain isolation and properties of alkaloids and terpenes
CO2	explain preparation and reactions of mono and disachharides
CO 3	classify biomolecules and natural products based on their structure, properties, reactions and uses.
CO 4	explain molecular rearrangements like benzidine, Hoffmann etc.
CO 5	preparation and properties of organolithium compounds

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**PHYSICAL CHEMISTRY**		**Course code**	**U23CC14**
Paper No.	**CC14(T)**		**Category**	Core
Year	III	**Semester VI**	**Credits**	5
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	5	1		6
Prerequisites	General Chemistry I,II,III and IV			
Objectives of the course	The course aims at providing an overall view of ● Gibbs free energy, Helmholtz free energy, Ellingham's diagram and partial molar properties ● chemical kinetics and different types of chemical reactions ● adsorption, homogeneous and heterogeneous catalysis ● colloids and macromolecules ● photochemistry, fluorescence and phosphorescence			
Course Outline				
Unit 1	**Chemical equilibrium** Law of mass action – thermodynamic derivation – relationship between Kpand Kc –application to the homogeneous equilibria – dissociation of PCl5 gas,N2O4 gas –equilibrium constant and degree of dissociation - formation of HI–heterogeneous equilibrium – decomposition of solid calcium carbonate –Lechatelier principle – van't Hoff reaction isotherm – temperature dependence of equilibrium Constant –Clausius Clayperon equation and its applications			
Unit 2	**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), peritectic change (sodium – potassium **Binary liquid mixtures** Ideal liquid mixtures – non ideal solutions – azeotropic mixtures –fractional distillation – partially miscible mixtures – phenol-water,– effect of impurities on critical solution temperature; Nernst distribution law – applications.			
Unit 3	**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 **Catalysis** – general characteristics of catalytic reactions, auto catalysis, promoters, negative catalysis, poisoning of a catalyst – theories of homogenous			

	and heterogeneous catalysis – Kinetics of Acid – base and enzyme catalysis. **Colloids and Surface Chemistr**y **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)–Application of colloids **Macromolecules:** Molecular weight of Macromolecules - average molecular weight, Determination of Molecular weight of molecules
Unit4	**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 and characteristics for zero, first order and second order (equal initial concentration) - Derivation of time for half change with examples.. .Theories of reaction rates – Collision theory. Lindemann's theory of unimolecular reaction. **Photochemistry** Laws of photo chemistry – Lambert – Beer, Grotthus – Draper and Stark – Einstein. Quantum efficiency. Photochemical reactions – rate law – Kinetics of H2-Cl2, H2-Br2, comparison between thermal and photochemical reactions. Fluorescence –phosphorescence- applications- - chemiluminescence and photosensitisation .
Unit 5	**UNIT V** **ELECTRO CHEMISTRY** Arrhenius theory of electrolytic dissociation – Ostwald's dilution law, limitations of Arrhenius theory; behavior of strong electrolytes – interionic effects – Debye Huckel theory –Onsager equation (no derivation),. Ionic mobility – Discharge of ions on electrolysis (Hittorf's theoretical device), transport number –determination –Hittorf's method – determination of ionic mobility; Kohlrausch's law- applications and viscosity (Walden's rule);– determination of dissociation constant of weak acid and weak base, ionic product of water, solubility and solubility product of sparingly soluble salts. **Galvanic Cells and Applications** Galvanic cell, representation, reversible and irreversible cells, EMF and its measurement – standard cell- Nernst equation for electrode potential and cell EMF; types of electrodes – metal/metal ion, metal amalgam/metal ion, **Applications of EMF measurements –Determination of activity coefficient of electrolytes** **Industrial component** Fuel cells – H2-O2 cell – efficiency of fuel cells. corrosion –, types and methods of prevention.
Extended Professional	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

Component (is a part of internal component only,Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills
Recommended text	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. ArunBahl, B.S. Bahl, G. D. Tuli Essentials of physical chemistry, 28th edition 2019, S, Chand & Co. 4. S. K. Dogra and S. Dogra, Physical Chemistry through Problems: New Age International, fourth edition, 1996. 5. J. Rajaram and J.C. Kuriacose, Thermodynamics, ShobanLalNagin Chand and CO., 1986.
Reference Books	1. J. Rajaram and J.C. Kuriacose, Chemical Thermodynamics, Pearson, 1st 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. K. L. Kapoor, A Textbook of Physical Chemistry, Macmillan India Ltd, third edition, 2009. 5. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, Shobanlal Nagin Chand and Co. Jalendhar, forty first, edition, 2001
Website and e-learning source	1. https://nptel.ac.in 2. https://swayam.gov.in 3. www.epgpathshala.nic.in
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	construct phase diagram for one component system,explain the properties of freezing mixture and component with congruent melting points
CO2	apply the concepts of chemical kinetics to predict the rate of the reaction and order of the reaction, demonstrate the effect of temperature on reaction rate, and the significance of free energy and entropy of activation.
CO 3	compare chemical and physical adsorption, Freundlich and Langmuiradsorption isotherms, and differentiate between homogenous and heterogeneous catalysis.

CO 4	demonstrate the types and characteristics of colloids, preparation of sols and emulsions, and determine the molecular weights of macromolecules
CO 5	utilize the concepts of photochemistry in fluorescence, phosphorescence, chemiluminescence and color perception of vision.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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 PSO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**PHYSICAL CHEMISTRY PRACTICAL II**		**Course code**	**U23CC15P**
Paper No.	**CC15(P)**		**Category**	Core
Year	III	**Semester VI**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
		1	5	6
Prerequisites	Theoretical knowledge on physical chemistry			
Objectives of the course	This course aims at providing ● basic principles of physical chemistry experiments ● hands on experience in carrying out the experiments			
Course Outline				
Unit 1	**Phase diagrams** 1. Simple eutectic - determination of eutectic temperature and composition of naphthalene-diphenyl amine or naphthalene-diphenyl system 2. Determination of transition temperature of a salt hydrate. 3. Determination of upper critical solution temperature of phenol – water system 4. Effect of an electrolyte on miscibility temperature of phenol – water system 5. Determination of concentration of sodium chloride using phenol- sodium chloride system			
Unit 2	**Distribution law** 6.Determination of the distribution coefficient of iodine between carbon tetrachloride and water. 7.Determination of equilibrium constant of the reaction $I_2 + I^- \rightleftharpoons I_3^-$ 8.Determination of concentration of the given potassium iodide solution using the above equilibrium constant.			
Unit 3	**Electrochemistry** 9.Conductometric titration of hydrochloric acid against sodium hydroxide 10.Potentiometric titration of ferrous ion against potassium dichromate using quinhydronde electrode.			
Extended Professional	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved			

Component (is a part of internal component only,Not to be included in the external examination question paper)	Electrochemistry
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skill**s**
Recommended text	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. 3.Gupta, Renu, *Practical Physical Chemistry*, 1st Ed.; New Age International : New Delhi, 2017
Reference Books	4.J. Rajaram and J.C. Kuriacose, Chemical Thermodynamics, Pearson, 1st edition, 2013. 5.Keith J. Laidler, Chemical kinetics, third edition, Pearson, 2003. 6.P. W. Atkins, and Julio de Paula, Physical Chemistry, Oxford University press, seventh edition, 2002. 7.K. L. Kapoor, A Textbook of Physical Chemistry, Macmillan
Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	Describe the principles and methodology for the practical work.
CO2	Explain the procedure, data and methodology for the practical work
CO 3	Apply the principles of phase rule and electrochemistry for carrying out the practical work
CO 4	Demonstrate laboratory skills for safe handling of the equipment and chemicals

COURSE ARTICULATION MATRIX

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3

CO3	3	3	3	3	3
CO4	3	3	3	3	3

LEVEL of Correlation between PSO's and CO's

CO /PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SCHEME OF EVALUATION

Internal marks : 25	**External marks: 75** **The following pattern has to be followed**
Estimation : 15 marks **Experiment- 10 marks** **Result -5 marks**	**Two Questions (A and B)** **Question A - 35 marks** **Experiment- 25marks** **Result -10 marks** **Question B - 30 marks**

	Experiment- 20marks **Result -10 marks** **Record :10**

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**FUNDAMENTALS OF SPECTROSCOPY**		**Course code**	**U23DC03**
Paper No.	**DSEC3(T)**		**Category**	DSEC
Year	III	**Semester VI**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	1		5
Prerequisites	General Chemistry I,II,III and IV			
Objectives of the course	This course is designed to provide knowledge on ● electrical and magnetic properties of organic and inorganic compounds ● basic principles of microwave, UV-Visible, infrared, Raman, NMR and Mass spectrometry ● instrumentation of microwave, UV-Visible, infrared, Raman, NMR and Mass spectrometry ● applications of various spectral techniques in structural elucidation solving combined spectral problems			
Course Outline				
Unit 1	**Electrical and Magnetic properties of molecules** Dipole moment – polar and nonpolar molecules – polarisability of molecules. Application of dipole moments in the study of organic and inorganic 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			
Unit 2	Vibrational spectra-diatomic molecules-harmonic oscillator and anharmonic			

	oscillator, vibration-rotaion spectra- diatomic molecules rigid rotator and anharmonic oscillator-(Bornopenheimer approximation oscillator)-selection rules, vibrations of polystomic molecules- stretching and bending vibrations-applications- determination of force constant-moment of inertia and internuclear distance -isotopc shift-application of IR spectra to simple organic and inorganic molecules-group frequencies. Raman spectroscopy Rayleigh scattering and Raman scattering of light- raman Shift-classical theory of Raman effect-quantum theory of raman effect-Vibrational Raman spectrum-selection rules-mutual exclusion principle-instrumentation(block diagram)-applications
Unit 3	**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 – BirgeSponer method of evaluation of dissociation energy – pre-dissociation transition – σ –σ *, π-π*, n-σ*, n-π* transitions. Applications of UV-Woodward – Fieser rules as applied to conjugated dienes and α, β – unsaturated ketones. Elementary Problems. Colorimetry - principle and applications (estimation of Fe3+)
Unit4	**Nuclear magnetic resonance spectroscopy** PMR-theory of PMR- instrumentation-number of signals-chemical shift-peak areas and proton counting-spin-spin coupling-applications-problems related to shielding and deshielding of protons chemical shift of protons in hydrocarbons and in simple monofunctional organic compounds, spin-spin splitting of neighbouring ;protons in vinyl and allyl systems.
Unit 5	**Mass spectroscopy** Principle-different kinds of ionisation -Instrumentation of the mass spectrum-types of ions-determination of molecular formula-fragmentation and structural elucidation-McLafferty rearrangement, Retero Diels Alder reaction-illustration with simple organic molecules Solving structure elucidation problem using multiple spectroscopic data(NMR, IR and UV-VIS)
Extended Professional Component (is a part of internal component only,Not to be included in the external examination	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills
Recommended text	1. Gopalan, R.; Subramaniam, P. S.; Rengarajan, K. *Elements of Analytical Chemistry*; S Chand: New Delhi, 2003. 2. Usharani, S. *Analytical Chemistry*, 1sted.; Macmillan: India, 2002. 3. Banwell, C.N.; Mc Cash, E. M. *Fundamentals of Molecular Spectroscopy*, 4th ed.; Tata McGraw Hill, New Delhi, 2017. 4. U.N.Dash, Analytical Chemistry Theory and Practice, Sultan Chand &Sons,2nd Ed., 2005 B.K.Sharma, Spectroscopy,22nd ed., Goel Publishing House, 2011.
Reference Books	1. Srivastava, A. K.; Jain, P. C. *Chemical Analysis an Instrumental Approach*, 3rded.; S.Chand, New Delhi, 1997. 2. Robert D Braun. *Introduction to Instrumental Analysis*; Mc.Graw Hill: New York, 1987. 3. Skoog, D. A.; Crouch, S. R.; Holler, F.J.; West, D. M. *Fundamentals of Analytical Chemistry*, 9thed.; Harcourt college Publishers: USA, 2013. 4. Madan, R. L.; Tuli, G. D. *Physical Chemistry*, 2nded.; S.Chand: New Delhi, 2005. 5. Puri, B. R.; Sharma, L. R.; Pathania, M.S. *Principles of PhysicalChemistry*, 43rd ed.; Vishal Publishing: Delhi, 2008.
Website and e-learning source	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 4.www.nptel.ac.in 5.http:/swayam.gov.in
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	explain electrical and magnetic properties of materials and microwave spectroscopy
CO2	explain theory, instrumentation and applications of Infrared and Raman spectroscopy
CO 3	Apply selection rules to understand spectral transitions, explain Woodward – Fieser's rule for the calculation of wavelength maximum of conjugated dienes
CO 4	explain theory, instrumentation and applications of NMR spectroscopy
CO 5	explain theory, instrumentation and applications of Mass spectrometry

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10

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 PSO'S AND CO'S

CO /PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**NANO SCIENCE**		**Course code**	**U23DC04**
Paper No.	**DSEC4 A(T)**		**Category**	DSEC4
Year	III	**Semester VI**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	1		5
Prerequisites	Basics knowledge in physics and chemistry			
Objectives of the course	This course aims at providing knowledge on ● introduction to nanoparticles/clusters and nanocomposites ● properties of nanomaterials ● characterization of nanomaterials by different methods ● synthesis of carbon nanotubes, graphene, quantum dots, self-assembled nanomaterials ● applications of nanomaterials as sensors			
Course Outline				
Unit 1	**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 stericstabilization, common stabilizers, nanoparticle growth in solution, nanoparticle growth in solution, templated growth, Langmuir-Blodgeti(L-B)method, reverse micelles-emulsion			

	method.
Unit 2	**Properties of materials on a nanoscale** Optical properties of metal and semiconductoe nanomaterials-surface plasmon resonance(SPR) surface resonance ran=a=man spectra(SERS)quantum confinement effect, tuning of optical spectrum - magnetic properties-Feo4particle, supra magnetic properties, electronic properties, chemical properties chemical process on the surface of nanoparticles, catalysis mechanicsl properties
Unit 3	**Techniques Employed for characterisation of nanomaterials** Spectroscopy-UV-Visible, photoelectron spectroscopy-Electron microscopy-Scanning Electron Microscopy(SEM) Transition Electron microscopy(TEM), Scanning Probe microscopy(SPM)-Atomic Force microscopy(AFM), Scanning Tunneling Microscopy(STM), Optical microscopy-confocal microscopy, X-ray difraction (XRD)(principle and block diagram only)
Unit4	**SPECIAL NANO MATERIALS** Carbon nano structures , carbon nanotubes- Introduction- types- ZIG Zag armchair,, helical , synthesis by CVD, Functionalisation of carbon nanotubes, Reactivity of carbon nanotubes, field emission, Fuel Cells, Display devices. Other important carbon based materials-preparation and characterization of fullerenes , Graphenes, properties, DLC and nanodiamonds and applications Semiconductor nanoparticle , Quantum dots, synthesis -chemical synthesis using clusters, properties, porous silicon-electrochemical etching-aerogel-types-silica aerogel-resorcinol formaldehyde(RF) aerogels, zeolites, applications Self assembled nanomaterials, self assembled monolayers (SAMS) inorganic, organic molecules.
Unit 5	UNIT V **Apllications of nano materials** Biomedical applications-drug delivery, biolabelling-artificial implants, cancer treatnents, Sensors, natural nanoscale sensors, chemical sensors, biosensors, electronic noses. Optical and electronics- nanomaterials in the next generation computer technology, high definition TV, flat panel display, quantum dot laser, single electron transistors(SET) Nanotechnolgy in agriculture-fertiliszer and pesticide nano materials for water purification, nano material in food and packaging materials, fabric industry Impacts of nanotechnolgy- human and environments safety risks
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)

Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended text	1. Sulabha K. Kulkarni, *Nanotechnology: Principles and Practices*, Capital Publishing Co., New Delhi. 2. Pradeep. T, *Nano: The Essentials, Understanding Nanoscience and Nanotechnology*; Tata McGraw-Hill Publishing Company Limited, NewDelhi, 2007. 3. Shah. M.A.; Tokeer Ahmad, *Principles of Nanoscince and Nanotechnology*; Narosa Publishing House, New Delhi, 2010. 4. Murthy. B.S; Shankar. P, Baldev Raj.; Rath. B.B. JamesMurday, *Textbook of Nanoscience and Nanotechnology*;Universities press, India Ltd ,Hyderabad. 2012.
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. 4. Edited by C.N.R. Rao; Mu¨ller.A; Cheetham, A.K.*Nanomaterials Chemistry Recent Developments and New Directions*, WILEY-VCH Verlag GMBH & Co.,KGaA, Darmstad. 5. ing Zhong Zhang, *Optical properties and spectroscopy of Nanomaterials*; World Scientific Publishing Pvt. Ltd., Singapore.
Website and e-learning source	1) http://www.nanotechnology.com/docs/wtd015798.pdf 2) http://nccr.iitm.ac.in/Nanomaterials.pdf
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	explain the general concepts and physical phenomena of relevance within the field of nanoscience.
CO2	describe the properties, synthesis, characteristics of nanomaterials, special nanomaterials and applications.
CO3	examine the structure, properties, applicability and characterization of nanomaterials.
CO4	analyze various synthesis procedures, characterizations and uses of carbon nanotubes, fullerene and graphene
CO5	discuss applications of nanomaterials of sensors and in optics and electronics

COURSE ARTICULATTION MATRIX

CO /PO	PO1	PO2	PO3	PO4	PO5

CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

LEVEL OF CORRELATION BETWEEN PSO'S AND CO'S

CO /PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**POLYMER SCIENCE**		**Course code**	**U23DC05**
Paper No.	DSEC4B(T)		**Category**	
Year	III	**Semester VI**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	1		5
Prerequisites	Knowledge on functional groups and reaction mechanisms			
Objectives of the course	The course aims at providing an overall view of ● classification of polymers, preparation of polymers ● kinetics of polymerization and characterization of polymers ● analytical techniques used to characterize polymers ● reactions of polymers ● speciality polymers like PVC, PMMA			
Course Outline				
Unit 1	**Introduction** Difference between polymer and macromolecule – classification –synthetic and natural, organic and inorganic, thermoplastic and thermosetting plasrics, elastomers, fibres and liquid resins **Techniques of polymerization** Bulk, solution, emulsion and suspension polymerization			

Unit 2	**Kinetics of polymerization** Kinetics of condensation and addition polymerisation; ionic, free radical, copolymerisation and coordination polymerisation – reactivity ratios – block and graft copolymers. **Charecterisation of polymers** Appearance, Feel and hardness, density, effect of heta, solubility, combustions, tensile strength, shear, stress impact strength, mechnaical themomechnaical and rheological properties of poymers in viscoelastic state.
Unit 3	**Molecular Weight and Properties of Polymers** Molecular Weight of Polymers-Number Average and Weight Average, Molecular Weight Distribution, Determination of Molecular Weight polydispersity index – membrane and vapour phase osmometry, light scattering - Zimm plot, ultracentrifuge – 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, Importance of Glass Transition Temperature, Heat Distortion Temperature, TGA / DTA,Crystallinity of Polymers: Crystalline Behaviour, Degree of Crystallinity
Unit4	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.
Unit 5	**Speciality polymers** Polyelectrolytes, conducting polymers, polymeric supports for solid phase synthesis, biomedical polymers, liquid crystalline polymers, electroluminescent polymers – two examples of each of these polymers.Polyethylene, PVC, PMMA, polyester; rubber – synthetic and natural, vulcanisation of rubber. **Polymer Degradation** Types of Degradation - Thermal, Mechanical, Ultra Sound, Photo radiation and chemical degradation methods. Rubber-Natural and Synthetic-Structure, Mechanism of Vulcanisation Biodegradable and Non-Biodegradable Polymers.
Extended Professional	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

Component (is a part of internal component only,Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills
Recommended text	1. Gowariker V.R, N.V. Viswanthan and Jayadev Sreedhar. Polymer Science. 2. New Delhi: New Age International, 2015 3. Misra G.S. Introductory Polymer Chemistry. New Delhi: Wiley Eastern, 2010. 4. Bahadur P and Sastry N V. Principles of Polymer Science. New Delhi: Narosa Publishing House, 2005 5. Ahluwalia, V.K. Anuradha Mishra, *Polymer Science A Text Book*, Ane Books India: New Delhi, 2008. 6. Morrison, R. R.; Boyd, R. N.; Bhattacharjee, S. K. *Organic Chemistry*, 7th ed.; Pearson: New Delhi, 2011.
Reference Books	1. Billmeyer, F.W. Polymer Science. India: Wiley-Interscience, 2007. 2. Seymour, R. B.; CarraherJr.C.E. *Polymer Chemistry: An Introduction,* Marcel Dckker Inc : New York, 1981. 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 and e-learning source	1. https://polymerdatabase.com 2.http://amrita.vlab.co.in/?sub=2&brch=190&sim=603&cnt=1 3.http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/polymers. htm 4.http://nsdl.niscair.res.in/bitstream/123456789/406/2/Molecular+weigh ts+of+polymers.pdf
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	explain classification of polymers, elastomers, fibres and liquid resins
CO2	explain addition and condensation polymerization, mechanical properties of polymers
CO 3	determine the molecular weight of polymers, and explain the thermal properties of polymers
CO 4	explain reactions of polymers and polymer processing

CO 5	discuss speciality polymers like PVC, PMMA, rubbers, biodegradable polymers

COURSE OF ARTICULATION MATICX

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

LEVEL OF CORRELATION BETWEEN PSO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3

CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**PHARMACEUTICAL CHEMISTRY**		**Course code**	**U23DC06**
Paper No.	**DSEC4 C(T)**		**Category**	DSEC
Year	III	**Semester VI**	**Credits**	3
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	1		5
Prerequisites	Knowledge on active chemical compounds and biochemistry			
Objectives of the course	The course aims at providing an overall view of ● drugs 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 ● significance of clinical tests			
Course Outline				
Unit 1	**Structure and pharmacological activity** Effect of – unsaturation, chain length, isomerism; groups - halogens amino, nitro, nitrite, cyano, acidic, aldehydic, keto, hydroxyl and alkyl groups. **Development of Drugs** Development of a drug – classic steps- lead compounds- comparison of traditional and modern methods of development of drugs – drug design			

	by method of variation – disjunction and conjunction methods. **Structure and pharmacological activity** Effect of – unsaturation, chain length, isomerism; groups - halogens amino, nitro, nitrite, cyano, acidic, aldehydic, keto, hydroxyl and alkyl groups. **Development of Drugs** Development of a drug – classic steps- lead compounds- comparison of traditional and modern methods of development of drugs – drug design by method of variation – disjunction and conjunction methods.
Unit 2	**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;Air borne diseases– diphtheria, whooping cough, influenza, measles, mumps, common cold, tuberculosis; 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, tetracycline, rifamycin.
Unit 3	**Drugs for major diseases** Cancer – common causes – chemotherapy – anti neoplastic 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 arrhythmic agents – quinidine, propranolol hydrochloride ; anti- hypertensive drugs - Aldomet, pentoliniumtartarate; vasodilator- tolazoline hydrochloride, sodium nitroprusside.AIDS – causes,symptoms and prevention – anti HIV drugs - AZT, DDC.
Unit4	**Analgesics and antipyretic agents** Classification – action of analgesics – narcotic analgesics –morphine; synthetic

	analgesics – pethidine, methadone; antipyretic analgesics – salicylic acid derivatives, indolyl derivatives, p-aminophenol derivatives. **Anaesthetics** Definition, characteristics, classification - general anaesthetics – volatile anaesthetics – nitrous oxide, ethers, cyclopropane, chloroform, halothane, trichloro ethylene– storage, advantages and disadvantages ; non volatileanaesthetics – thiopental sodium ; local anaesthetics – requisites – advantages- esters – cocaine, benzocaine ; amides – lignocaine, cinchocaine. **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 – aminocaproic acid and tranexamic acid. Anaemia– causes, types and control – anti anaemic drugs.
Unit 5	**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 test Serum electrolytes-blood Glucose - orthotoluidine method**;** Renal unctions 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 p[igment.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	**Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved**
Skills acquired from this course	**Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills**
Recommended text	1. Jayashree Ghosh, (1999), A text book of pharmaceutical chemistry, 2nd ed., S.Chand& company, New Delhi. 2. Lakshmi S, (2004), Pharmaceutical chemistry, 3rd ed., Sultan chand& sons, Delhi.

	3. Tripathi K D, (2018), Essentials of medical pharmacology, 8th ed., Jaypee brothers medical publishers (P) Limited, New Delhi. 4. Ashutosh Kar, (2018), Medicinal chemistry, 7th ed., New age international (P) Limited, Publishers, New Delhi.
Reference Books	**Reference Books:** 1. Chatwal G R, (2013), Pharmaceutical chemistry, inorganic (vol-I) 6thed ., Himalaya publishing house, Bombay. 2. Chatwal G R, (1991), Pharmaceutical chemistry, organic (vol-II)., Himalaya publishing house, Bombay. 3. Patrick G, (2002), Instant Notes Medicinal Chemistry, Viva Books Private Limited, New Delhi. 4. Intellectual Property Rights, NeerajPandey, Khushdeep Dharni. Publisher: PHI Learning Pvt. Ltd., 2014 ISBN: 812034989X, 9788120349896.
Website and e-learning source	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/
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	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.
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.
CO 3	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.
CO 4	explain classification of analgesics and anasthetics, and physiological functions of plasma protiens
CO 5	explain classification of analgesics and anasthetics, and physiological functions of plasma protiens

COURSE ARTICULATION MATRIX

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

LEVELOF CORRELATION BETWEEN PO'S AND CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**Chemistry For Competitive examination**		**Course code**	**U23PCC1**
Paper No.	Professional competency skill		**Category**	Part IV
Year	III	**Semester VI**	**Credits**	2
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	2			2
Prerequisites	Profeciency in organic, inorganic and physical chemistry			
Objectives of the course	This course aims to provide knowledge on the ● Solving numericals in chemistry ● To give practice in solving MCQ's in chemistry ● Guide then to solve Competitive exam like JAM			
Course Outline				
Unit 1	Multiple choice questions in organic chemistry			
Unit 2	Multiple choice questions in Inorganic chemistry			
Unit 3	Multiple choice questions in Physical chemistry			
Unit4	Multiple choice questions in Analytical chemistry			
Unit 5	Multiple choice questions in Applied hemistry			

Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	
Recommended text	
Reference Books	
Website and e-learning source	
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO1	**CO1:**discuss General characteristics of alkanes, alkenes, alkynes, stereochemistry, Explain carbohydrates, hybridization, polar effects
CO2	describe the periodic properties, metallurgical processes, types of chemical bonding and nuclear chemistry.
CO3	explain Colligative properties, Phase rule, Catalysis, chemical kinetics and electrochemistry
CO4	apply the concepts of volumetric analysis, thermo gravimetric analysis
CO5	discuss the properties of Paints, varnishes, cement, fuels soaps and detergents, insecticides

COURSE ARTICULATION MATRIX

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3

CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

LEVEL OF CORRELATION BETWEEN CO'S AND PSO'S

CO /PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

GENERIC ELECTIVE

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY FOR PHYSICAL SCIENCES I

(FOR MATHEMATICS & PHYSICS STUDENTS)</td></tr>
<tr><td>Paper No.</td><td colspan="7">GEC I (T)</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic

Elective</td><td>Year</td><td>I/II</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course

Code</td><td rowspan="2">U23GC20</td></tr>
<tr><td>Semester</td><td>I/III</td></tr>
<tr><td rowspan="2">Instructional

hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>4</td><td>-</td><td colspan="3"></td><td colspan="2">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
</table>

Objectives of the course	This course aims to provide knowledge on the ● basics of atomic orbitals, chemical bonds, hybridization ● concepts of thermodynamics and its applications. ● concepts of nuclear chemistry ● importance of chemical industries ● Qualitative and analytical methods.
Course Outline	**UNIT 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. **Unit 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.

	UNIT III **Fundamental Concepts in Organic Chemistry** Hybridization: Orbital overlap, hybridization and geometry of CH4, C2H4, C2H2 and C6H6. Electronic effects: Inductive effect and consequences on Ka and Kb 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
	UNIT 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). 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).
Extended Professional Component (is a part of internal component only, Not to be included in the external examination	**UNIT 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. Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours) Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills

question paper) **Skills acquired** **from this course**	
Recommended Text	1. V.Veeraiyan, Text book of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009. 2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 3. S.ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, NewDelhi, twenty third edition, 2012. 4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninthedition, 2007.
Reference Books	5. P.L.Soni,MohanKatyal,TextbookofInorganicchemistry;SultanChandandCompany,New Delhi, twentieth edition, 2007. 6. B.R.Puri,L.R.Sharma,M.S.Pathania,TextbookPhysicalChemistry;VishalPublishingCo., New Delhi, fortyfortyseventh edition, 2018. 7. B.K,Sharma,IndustrialChemistry;GOELpublishinghouse,Meerut,sixteenthedition, 2014.
Course Learning Outcomes (for Mapping with POs and PSOs) **On completion of the course the students should be able to**	

CO 1: gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications.

CO 2: evaluate the efficiencies and uses of various fuels and fertilizers

CO 3: explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.

CO 4: apply various thermodynamic principles, systems and phase rule.

CO 5: explain various methods to identify an appropriate method for the separation of chemical components

COURSE ARTICULATION MATRIX

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

LEVEL OF CORRELATION BETWEEN PSO'S AND CO'S

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY PRACTICAL FOR PHYSICAL AND BIOLOGICAL SCIENCES

(for Mathematics and Physics – I /IIYear)

(for Botany and Zoology II Year)</td></tr>
<tr><td>Paper No.</td><td colspan="7">GEC 2 (P)</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic Elective</td><td>Year</td><td>I/ II</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td>Course Code</td><td rowspan="2">U23GC21P</td></tr>
<tr><td>Semester</td><td>I&II/
III&IV</td><td></td><td></td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>-</td><td>-</td><td colspan="3">2</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary</td></tr>
</table>

Objectives of the course	This course aims to provide knowledge on the ● basics of preparation of solutions. ● 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..
Course Outline	**VOLUMETRIC ANALYSIS** 1. Estimation of sodium hydroxide using standard sodium carbonate. 2. Estimation of hydrochloric acid using standard oxalic acid. 3. Estimation of ferrous sulphate using standard Mohr's salt. 4. Estimation of oxalic acid using standard ferrous sulphate. 5. Estimation of potassium permanganate using standard sodium hydroxide. 6. Estimation of magnesium using EDTA. 7. Estimation of ferrous ion using diphenyl amine as indicator.
	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
Reference Books	V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles ofPractical Chemistry; Sultan Chand & sons, Second edition, 1997.

Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to

CO 1: design, carry out, record and interpret the results of volumetric titration.

CO 2: apply their skill in the analysis of wate hardness.

CO3 : Carry out the organic analysis

CO4 : gain knowledge in organic analysis

Level of correlation between PSO'S and CO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

COURSE ARTICULATION MATRIX

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SCHEME OF EVALUATION

Internal : 25	**External: 75**
Volumetric analysis : 13 marks (Procedure-3, Experiment – 10) Error up to 2% - 10 marks 3% - 8 marks 4% - 6 marks >4 – 5 marks **Organic analysis :12 marks** Procedure-8 Report - 4	**Volumetric analysis: 35 marks** Procedure-5 Error up to 2% - 30 marks 3% - 20 marks 4% - 10 marks >4 – 8 marks **Analysis : 30 Marks (Report with suitable procedure)** Aromatic/Aliphatic : 5 marks Saturation/unsaturated : 5 marks Elements test : 5 marks Functional groups: 10 marks Derivative : 5 marks **Record :10 marks**

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DEPARTMENT OF CHEMISTRY

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY FOR PHYSICAL SCIENCES II

(FOR MATHEMATICS & PHYSICS STUDENTS)</td></tr>
<tr><td>Paper No.</td><td colspan="7">GEC 3 (T)</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic
Elective</td><td>Year</td><td>I/II</td><td>Credits</td><td>4</td><td>Course
Code</td><td rowspan="2">U23GC22</td></tr>
<tr><td>Semester</td><td>II/IV</td></tr>
<tr><td rowspan="2">Instructional
hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>4</td><td>-</td><td colspan="2">-</td><td colspan="3">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Chemistry for physical sciences -I</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at providing knowledge on the
● Co-ordination Chemistry and Water Technology
● Carbohydrates and Amino acids
● basics and applications of electrochemistry
● basics and applications of kinetics and catalysis
● Various photochemical phenomenon</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT 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 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.</td></tr>
</table>

	Unit 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 ofalanine, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only).
	UNIT 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.
	UNIT 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.
	UNIT 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).

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	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. 4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.
Reference Books	1. P.L.Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007. 2. R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018. 3. B.K,Sharma, Industrial Chemistry; Meerut, sixteenth edition, 2014. GOEL publishing house,
Website and e-learning source	

Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to

CO 1: write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology

CO 2: explain the preparation and property of carbohydrate, amino acids and nucleic acids.

CO 3: apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.

CO 4: identify the reaction rate, order for chemical reaction and explain the purpose of a catalyst.

CO 5: outline the various type of photochemical process.

COURSE ARTICULATION MATRIX

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

LEVEL OF CORRELATION BETWEEN PSO'S AND CO'S

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of	3.0	3.0	3.0	3.0	3.0

Course Contribution to POs					

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)
MADURAI -2
DEPARTMENT OF CHEMISTRY

Title of the course	**CHEMISTRY FOR BIOLOGICAL SCIENCES-I** (FOR ZOOLGY/ BOTANY STUDENTS)		**Course code**	**U23GC23**
Paper No.	**GEC4 (T)**		**Category**	GEC
Year	II	**Semester III**	**Credits**	4
Instructional hrs/week	**Lecture**	**Tutorial**	**Lab. Practice**	**Total**
	4	-	-	4
Prerequisites	Higher Secondary			
Objectives of the course	This course aims at providing knowledge on ● basics of atomic orbitals, chemical bonds, hybridization and fundamentals of organic chemistry ● nuclear chemistry and industrial chemistry ● importance of speciality drugs and separation and purification techniques.			
Course Outline				
Unit 1	**Chemical Bonding and Nuclear Chemistry** Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. 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 - carbondating, rock dating and medicinal applications.			
Unit 2	**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.			

Unit 3	**Fundamental Concepts in Organic Chemistry** **Hybridization:** Orbital overlap hybridization and geometry of CH4, C2H4, C2H2 and C6H6. Polar effects: Inductive effect and consequences of Ka and Kb of organic acids and bases , ele ctronic, mesomeric,hyoerconjucation and steric- examples and explanations. **Reaction Mechanism:**Types of reaction-aromaticity-aromatic electrophilic substituion, nitration, halogenation, Friedal Crafts alkylation and acylation. **Heterocyclic compounds** Preparation, properties of pyrrole, and pyridine
Unit4	**Drugs and speciality chemicals** Definition-structure and uses- Antibiotics-viz, penicilin, cholamphenicol and streptomycin, Anaesthetics viz., choroform and ether, antipyretics viz., aspirin, paracetamol and ibuprofen. Artificial seetner viz., saccharin, aspartame and cyclamate .,Organic halogen compounds viz Freon, Teflon
Unit 5	**Analytical Chemistry** Introduction 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.
Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper)	Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended text	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. 4.P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.
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.
Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to	
CO 1	state the theories of chemical bonding, nuclear reactions and its applictions.
CO2	evaluate the efficiencies and uses of various fuels and fertilizers.
CO 3	explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.
CO 4	demonstrate the structure and uses of antibiotics, anaesthetics, antipyretics and artificial sugars.
CO 5	analyse various methods to identify an appropriate method for the separation of chemical components.

COURSE ARTICULATION MATRIX

CO /PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

LEVEL OF CORRELATION BETWEEN PSO'S AND CO'S

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

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MADURAI -2
DEPARTMENT OF CHEMISTRY

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY FOR BIOLOGICAL SCIENCES II

(FOR BOTANY AND ZOOLOGY STUDENTS)</td></tr>
<tr><td>Paper No.</td><td colspan="7">GEC 5(T)</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic

Elective</td><td>Year</td><td>II</td><td>Credits</td><td>4</td><td>Course</td><td rowspan="2">U23GC24</td></tr>
<tr><td>Semester</td><td>IV</td><td></td><td></td><td>Code</td></tr>
<tr><td rowspan="2">Instructional

hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>4</td><td>-</td><td colspan="2">-</td><td colspan="3">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Chemistry for Biological Sciences I</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims to provide knowledge on
● nomenclature of coordination compounds and carbohydrates.
● Amino Acids and Essential elements of biosystem
● understand the concepts of kinetics and catalysis
● provide fundamentals of electrochemistry and photochemistry</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT 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.</td></tr>
</table>

	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.
	UNIT 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.
	UNIT IV **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.
	UNIT 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).

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	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. 4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.
Reference Books	1. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition, 2012. 2. 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. 4. B.R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018. 5. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to

CO 1: write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology.

CO 2: explain the preparation and property of carbohydrate.

CO 3: enlighten the biological role of transition metals, amino acids and nucleic acids.

CO 4: apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.

CO 5: outline the various type of photochemical process.

LEVEL OF CORRELATION OF CO'S AND PSO'S

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

COURSE ARTICULATION MATRIX

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

SRI MEENAKSHI GOVERNMENT

ARTS COLLEGE FOR WOMEN(A)

DEPARTMENT OF CHEMISTRY

PROGRAMME SPECIFIC OUTCOMES

On successful completion of the programme the students will be able to

PSO1: acquire in-depth knowledge of the fundamental concepts in all disciplines of chemistry.

PSO2: disseminate the basics of chemistry and advanced topics and analytical skills in organic, inorganic and physical chemistry.

PSO3: uphold ethical values in personal life, research and career.

PSO4: demonstrate laboratory skills, analytical acumen, creatively in academics and research.

PSO5: apply digital tools to collect, analyze and interpret data and presents cientific findings.

PSO6: gain competence to pursue higher education and career opportunities in chemistry and allied fields.

PSO7: exhibit leadership qualities to work individually and within a team in organizing curricular, co-curricular and extracurricular activities.

PSO8: apply the concepts of chemistry to solve problems in the community, entrepreneurial and research pursuits.

PSO9: exhibit competence in educational, industrial and research pursuits that contribute towards the holistic development of self and community.

PSO10: display proactive approach towards sustainable environment through green laboratory practices.

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2

DEPARTMENT OF CHEMISTRY

PROGRAMME SPECIFIC OUTCOMES

On successful completion of the programme the students will be able to

PSO1: acquire in-depth knowledge of the fundamental concepts in all disciplines of chemistry.

PSO2: disseminate the basics of chemistry and advanced topics and analytical skills in organic, inorganic and physical chemistry.

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SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI -2

DEPARTMENT OF CHEMISTRY

PO-PSO MAPPING MATRIX:

PSOs / POs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
PO1	X									
PO2		X								
PO3			X							
PO4				X						
PO5					X					
PO6						X				
PO7							X			
PO8								X		
PO9									X	
PO10										X