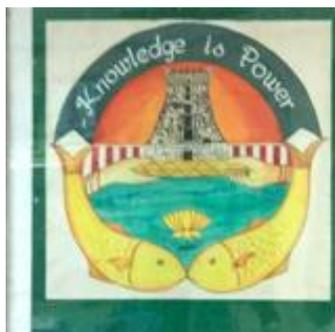


Sri Meenakshi Government Arts College For Women (A)

Madurai-02



Department Of Chemistry

Syllabus For

B.Sc., CHEMISTRY

Based on TANSICHE

From

2024 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 Coordinator, 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, photocalorimeter 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, greenchemistry and nanochemistry. 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 8th January 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 UNDERGRADUATE PROGRAMME

| | |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Programme: | B.Sc. Chemistry |
| Programme Code: | |
| Duration: | 3 Years (UG) |
| Programme Outcomes: | <p>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</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p> <p>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</p> <p>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.</p> |

| | |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.</p> <p>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.</p> <p>PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.</p> <p>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.</p> <p>PO 13: Moral and ethical awareness/reasoning: Ability to embrace 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 demonstrating the 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.</p> <p>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.</p> <p>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.</p> |
| <p>Programme Specific Outcomes:</p> | <p>On successful completion of Bachelor of Physics with Computer Applications programme, the student should be able to:</p> <p>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.</p> <p>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</p> |

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 | Credit | Hrs |
|-------------|--------|-----------|-------------|--------|-----------|-------------|--------|-----------|--------|--------|-----------|--------|--------|-----------|--------|--------|-----|
| LC1 | 3 | 6 | LC2 | 3 | 6 | LC3 | 3 | 6 | LC4 | 3 | 6 | CC9 | 5 | 5 | CC13 | 5 | 6 |
| ELC1 | 3 | 6 | ELC2 | 3 | 6 | ELC3 | 3 | 6 | ELC3 | 3 | 6 | CC10 | 5 | 5 | CC14 | 5 | 6 |
| CC1 | 5 | 5 | CC3 | 5 | 5 | CC5 | 4 | 5 | CC7 | 4 | 4 | CC11 | 3 | 6 | CC15 | 3 | 6 |
| CC2 | 3 | 3 | CC4 | 3 | 3 | CC6 | 3 | 3 | CC8 | 3 | 3 | CC12 | 4 | 4 | DSEC3 | 3 | 5 |
| GEC1 | 4 | 4 | GEC3 | 4 | 4 | GEC4 | 4 | 4 | GEC6 | 4 | 4 | DSEC1 | 3 | 4 | DSEC4 | 3 | 5 |
| 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 | 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 | 30 |

B.Sc Chemistry 2023-2024
Question paper pattern

| Section A (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 | TOT |
| I | LC1 | U231A1/ U231H1 | Tamil/Hindi | 6 | 3 | 3 | 25 | 75 | 100 |
| II | ELC1 | U232A1 | English | 6 | 3 | 3 | 25 | 75 | 100 |
| III | CC1(T) | U23CC1 | General Chemistry I | 5 | 5 | 3 | 25 | 75 | 100 |
| | CC2(P) | U23CC2P | Quantitative Inorganic Estimation (titremetry) and Inorganic Preparations | 3 | 3 | 3 | 25 | 75 | 100 |
| | GEC1(T) | U23GP17 | Allied Physics I | 4 | 4 | 3 | 25 | 75 | 100 |
| | GEC 2(P) | U23GP18P | Allied Physics Practical - I | 2 | - | - | - | - | - |
| IV | SEC1(T)/ NM | U23SEC1 | Food Chemistry | 2 | 2 | 3 | 25 | 75 | 100 |
| | | U23SEC2 | Role of Chemistry in Daily Life | | | | | | |
| IV | | U23FC1 | Fundamentals of chemistry | 2 | 2 | 3 | 25 | 75 | 100 |
| TOTAL | | | | 30 | 22 | | | | 700 |

SEMSESTER II

| Part | Course | Course | Title of the course | Hrs/ credi | Exam | Marks |
|------|--------|--------|---------------------|---------------|------|-------|
|------|--------|--------|---------------------|---------------|------|-------|

| | type | code | | week | ts | hrs | 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 compounds | 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 | Course code | Title of the course | Hrs/ cred | Exam hrs | Marks |
|------|--------|-------------|---------------------|--------------|----------|-------|
|------|--------|-------------|---------------------|--------------|----------|-------|

| | Type | | | week | its | | INT | EXT | TOT |
|------------|------------------------|----------------------------|------------------------------------------------|-----------|-----------|----------|-----------|-----------|------------|
| I | LC3 | U231A3 / U231H3 | Tamil/Hindi | 6 | 3 | 3 | 25 | 75 | 100 |
| II | ELC3 | U232A3 | English | 6 | 3 | 3 | 25 | 75 | 100 |
| III | CC5 (T) | U23CC5 | General Chemistry III | 5 | 4 | 3 | 25 | 75 | 100 |
| | CC6 (P) | U23CC6P | Qualitative Inorganic Analysis | 3 | 3 | 3 | 25 | 75 | 100 |
| | GEC 4(T) | U23GM14 | Allied Mathematics – Paper I | 4 | 4 | 3 | 25 | 75 | 100 |
| | 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 | 100 |
| | SEC5(T)/ NM | U23SEC6 | Pesticide Chemistry/NM | 2 | 2 | 3 | 25 | 75 | 100 |
| | EVS | U23EVS1 | Environmental studies | 1 | - | - | - | - | - |
| | | TOTAL | | 30 | 20 | | | | 700 |

SEMESTER IV

| Part | Course Type | Course CODE | Title of the course | Hrs/ week | credits | Exam hrs | Marks | | |
|------|----------------|--------------------|-------------------------------------------|-----------|-----------|-----------|-------|-----|------------|
| | | | | | | | INT | EXT | TC |
| I | LC 4 | U231A4 / U231H4 | Tamil/Hindi | 6 | 3 | 3 | 25 | 75 | 100 |
| II | ELC 4 | U232A4 | English | 6 | 3 | 3 | 25 | 75 | 100 |
| III | CC7 (T) | U23CC7 | General Chemistry IV | 4 | 4 | 3 | 25 | 75 | 100 |
| | CC8(P) | U23CC8P | Physical Chemistry Practical I | 3 | 3 | 3 | 25 | 75 | 100 |
| | GEC 6(T) | U23GM15 | Allied Mathematics - paper II | 4 | 4 | 3 | 25 | 75 | 100 |
| | GEC 6(T) | U23CZ27 | Allied Zoology- II | | | | | | |
| | GEC 5(T) | U23GM16 | Allied Maths | 2 | 2 | 3 | 25 | 75 | 100 |
| | GEC 5 (P) | U23GZ26P | Allied Zoology Practical | | | | | | |
| IV | SEC6(T) | U23SEC7 | Instrumental Methods of Chemical Analysis | 2 | 2 | 3 | 25 | 75 | 100 |
| IV | SEC7(T)/ NM | U23SEC8 | Forensic Science / NM | 2 | 2 | 3 | 25 | 75 | 100 |
| IV | EVS | U23EVS1 | Environmental Studies | 1 | 2 | 3 | 25 | 75 | 100 |
| | | TOTAL | | | 30 | 25 | | | 900 |

SEMESTER V

| Part | Course Type | Course code | Title of the course | Hrs/ week | credits | Exam hrs | Marks | | |
|------|-------------|-------------|---------------------------------------------------|-----------|-----------|----------|-------|-----|------------|
| | | | | | | | INT | EXT | TOT |
| III | CC9 (T) | U23CC9 | Organic Chemistry I | 5 | 5 | 3 | 25 | 75 | 100 |
| | CC10(T) | U23CC10 | Inorganic Chemistry | 5 | 4 | 3 | 25 | 75 | 100 |
| | CC11(P) | U23CC11P | Gravimetric Analysis and Water Analysis | 6 | 4 | 6 | 25 | 75 | 100 |
| | CC12(P) | U23CC12P | Organic Estimation and Natural Products isolation | 4 | 4 | 6 | 25 | 75 | 100 |
| | DSEC1 | U23DC01 | Industrial chemistry | 4 | 3 | 3 | 25 | 75 | 100 |
| | DSEC 2 | U23DC02 | BioChemistry | 4 | 3 | 3 | 25 | 75 | 100 |
| IV | | U23SIC1 | Summer internship/Industrial training | - | 2 | - | - | -- | 100 |
| V | | U23VE1 | Value Education | 2 | 2 | 3 | 25 | 75 | 100 |
| | | | TOTAL | 30 | 27 | | | | 800 |

SEMESTER VI

| Part | Course Type | Course Code | Title of the course | Hrs/ week | credits | Exam hrs | Marks | | |
|------|-------------------------------|--------------|---------------------------------------|--------------|-----------|-------------|-------|-----|------------|
| | | | | | | | INT | EXT | TOT |
| III | CC13 (T) | U23CC13 | Organic Chemistry II | 6 | 5 | 3 | 25 | 75 | 100 |
| | CC14(T) | U23CC14 | Physical chemistry | 6 | 4 | 3 | 25 | 75 | 100 |
| | CC15(P) | U23CC15P | Physical chemistry practical II | 6 | 4 | 6 | 25 | 75 | 100 |
| | DSEC3 | U23DC03 | Fundamentals of spectroscopy | 5 | 3 | 3 | 25 | 75 | 100 |
| | DSEC 4 | | | | | | | | |
| | DSEC 4A | U23DC04 | Nano Science | 5 | 3 | 3 | 25 | 75 | 100 |
| | DSEC 4B | U23DC05 | Polymer Science | | | | | | |
| | DSEC 4C | U23DC06 | Pharmaceutical Chemistry | | | | | | |
| IV | | U23EAC | Extension Activity | - | 1 | - | - | - | 100 |
| IV | Professional Competency Skill | U23PCC1 | chemistry for Competitive examination | 2 | 2 | 3 | 25 | 75 | 100 |
| | | TOTAL | | 30 | 22 | | | | 700 |

**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 methods 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**

| | | | | |
|---------------------------|----------------------------|-------------------|----------------------|---------------|
| itle of the course | GENERAL CHEMISTRY I | | Course code | U23CC1 |
| Paper No. | CC1(T) | | Category | Core |
| Year | I | Semester I | Credits | 5 |
| Instructional | Lecture | Tutorial | Lab. Practice | Total |

| | | | | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---|------------------------------------------|
| hrs/week | 4 | 1 | - | 5 |
| Prerequisites | Higher Secondary Chemistry | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human values |
| Objectives of the course | <p>The course aims at giving an overall view of the</p> <ul style="list-style-type: none"> • 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 | <p>Atomic structure and Periodic trends</p> <p>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;</p> <p>Numerical problems involving the core concepts.</p> | | | |
| Unit 2 | <p>Introduction to Quantum mechanics</p> <p>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</p> | | | |

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|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>Ψ^2.Modern Periodic Table</p> <p>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.</p> <p>Problems involving the core concepts</p> |
| Unit 3 | <p>Structure and Bonding I</p> <p>Ionic Bond</p> <p>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.</p> <p>Covalent Bond</p> <p>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.</p> <p>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.</p> |
| Unit4 | <p>Structure and Bonding II</p> <p>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⁺, O₂⁻, O₂²⁻, N₂, NO, HF, CO; magnetic characteristics, comparison of VB and MO theories.</p> <p>Coordinate bond: Definition, Formation of BF₃, NH₃, NH₄⁺, H₃O⁺ properties</p> <p>Metallic bond-electron sea model, VB model; Band theory-mechanism of conduction in solids; conductors, insulator, semiconductor – types, applications of semiconductors</p> <p>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.</p> |
| Unit 5 | <p>Basic Concepts in Organic Chemistry and Electronic Effects</p> <p>Types of bond cleavage – heterolytic and homolytic; arrow pushing in organic</p> |

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>reactions; reagents and substrates; types of reagents - electrophiles, nucleophiles, free radicals; reaction intermediates – carbanions, carbocations, carbenes, arynes and nitrynes.</p> <p>Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects.</p> <p>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.</p> <p>Hyperconjugation - stability of alkenes, bond length, orienting effect of methyl group, dipole moment of aldehydes and nitromethane.</p> <p>Types of organic reactions- addition, substitution, elimination and rearrangements.</p> |
| 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 | <ol style="list-style-type: none"> 1. Madan, R. D. and Sathya Prakash, <i>Modern Inorganic Chemistry</i>, 2nded.; S. Chand and Company: New Delhi, 2003. 2. Rao, C.N. R. <i>University General Chemistry</i>, Macmillan Publication: New Delhi, 2000. 3. Puri, B. R. and Sharma, L. R. <i>Principles of Physical Chemistry</i>, 38thed.; Vishal Publishing Company: Jalandhar, 2002. 4. Bruce, P. Y. and Prasad K. J. R. <i>Essential Organic Chemistry</i>, Pearson Education: New Delhi, 2008. 5. Dash UN, Dharmarha OP, Soni P.L. <i>Textbook of Physical Chemistry</i>, Sultan Chand & Sons: New Delhi, 2016 |
| Reference Books | <ol style="list-style-type: none"> 1. Maron, S. H. and Prutton C. P. <i>Principles of Physical Chemistry</i>, 4thed.; The Macmillan Company: New York, 1972. 2. Lee, J. D. <i>Concise Inorganic Chemistry</i>, 4th ed.; ELBS William Heinemann: London, 1991. 3. Gurudeep Raj, <i>Advanced Inorganic Chemistry</i>, 26thed.; Goel Publishing House: |

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| | <p>Meerut, 2001.</p> <p>4. Atkins, P.W. & Paula, J. <i>Physical Chemistry</i>, 10th ed.; Oxford University Press:New York, 2014.</p> <p>5. Huheey, J. E. <i>Inorganic Chemistry: Principles of Structure and Reactivity</i>, 4th ed.; Addison, Wesley Publishing Company: India,1993.</p> |
| Website and e-learning source | <p>1) https://onlinecourses.nptel.ac.in</p> <p>2) http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm</p> <p>3) http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html</p> <p>4) https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding</p> <p>5) https://www.chemtube3d.com/</p> |
| <p>Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to</p> | |
| 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 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 | | | |

Nature of the course

| | | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|--|
| Relevant to global need | | Employability oriented | | Addresses Professional ethics | |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization | |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability | |
| Relevant to Local need | | | | Addresses Human values | |

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|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objectives of the course | <p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> • laboratory safety • handling glasswares • Quantitative estimation • Preparation of inorganic compoundspreparation of inorganic compounds |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Course Outline

| | |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit 1 | <p>CHEMICAL LABORATOERY 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.</p> <p>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.</p> <p>Principle of Quantitative Estimations(Volumetric) Equivalent weight of an acid. base. salt. reducing agent. oxidizing agent: concept</p> |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Estimation : 15 marks (Procedure-5, Experiment – 10) Error up to 2% - 10 marks 3% - 8 marks 4% - 6 marks >4 – 5 marks</p> <p>Preparation :10 marks Procedure-3: Preparation -7</p> | <p>Estimation : 50 marks (Procedure-10, Experiment -40) Error up to 2% - 40 marks 3% - 30 marks 4% - 20 marks >4 – 15 marks</p> <p>Preparation : 15 marks (Procedure 5 ; Preparation 10)</p> <p>Record :10 marks</p> |

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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>This course aims at giving an overall view of the</p> <ul style="list-style-type: none"> ● Types of food ● Food adulteration and poisons ● Food additives and preservation | | | |
| Course Outline | | | | |
| Unit 1 | <p>Food Adulteration</p> <p>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.</p> | | | |
| Unit 2 | <p>Food Poison</p> <p>Food poisons - natural poisons (alkaloids - nephrotoxin) - pesticides, (DDT, BHC, Malathion) -Chemical poisons - First aid for poison consumed victims.</p> | | | |

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| Unit 3 | Food Additives Food additives -artificial sweeteners – Saccharin - Cyclamate 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 | <ol style="list-style-type: none"> 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 publishing house, 2010. 4. Food Chemistry, Dr. L. Rakesh Sharma, Evincepub publishing, 2022. 5. Food processing and preservation, G. Subbulakshmi, Shobha A Udipi, Padmini S Ghugre, New age international publishers, second edition, 2021. |
| Reference Books | <ol style="list-style-type: none"> 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 |

| | |
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| | 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, Cyclamate 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 | | | |

Nature of the course

| | | | | | |
|---------------------------|--|----------------------------|--|------------------------------------------|--|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics | |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization | |
| Relevant to Regional need | | Skill development oriented | | Addresses Environment and Sustainability | |
| Relevant to Local need | | | | Addresses Human Values | |

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

Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved

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 | FUNDAMENTALS OF CHEMISTRY | | 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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>This course aims at strengthen an overall view of</p> <ul style="list-style-type: none"> • 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 chemistry | | | |
| | 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 | Physical Chemistry | | | |
| | Fundamental particles of an atom- some uncommon fundamental particles - positrons – neutrinos - pions – isotopes and isobars- electromagnetic radiation – quantum numbers – significance and types – shapes of s,p,d and f orbitals – Electronic configuration – Aufbau principle – Pauli's exclusion principle – Hund's rule of maximum multiplicity. | | | |
| 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 - | | | |

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 | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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)

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 |

| | | | | |
|-------------------------------|--------------------------------------------------------------------------|--------------------|----------------------|----------------|
| Title of the course | QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS | | Course code | U23CC4P |
| Paper No. | CC4 (P) | | Category | Core |
| Year | I | Semester II | Credits | 3 |
| Instructional hrs/week | Lecture | Tutorial | Lab. Practice | Total |
| | - | - | 3 | 3 |
| Prerequisites | | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

| | |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objectives of the course | <p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> • laboratory safety • handling glass wares • analysis of organic compounds • preparation of organic compounds |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Course Outline

| | |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit 1 | <p>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</p> |
| Unit 2 | <p>Qualitative Organic Analysis</p> <p>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</p> <p>Confirmation of functional groups</p> <ul style="list-style-type: none"> • monocarboxylic acid, dicarboxylic acid • monohydric phenol, polyhydric phenol • aldehyde, ketone, ester • carbohydrate (reducing and non-reducing sugars) • primary, secondary, tertiary amine • monoamide, diamide, thioamide • anilide, nitro compound <p>Preparation of derivatives for functional groups</p> |
| Unit 3 | |

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 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p data-bbox="224 1108 760 1171">Analysis - 15 Marks (Report with suitable procedure)</p> <p data-bbox="224 1209 565 1241">Aromatic/Aliphatic : 2 marks</p> <p data-bbox="224 1272 634 1304">Saturation/unsaturated : 2 marks</p> <p data-bbox="224 1335 509 1367">Elements test : 3 marks</p> <p data-bbox="224 1398 565 1430">Functional groups: 6 marks</p> <p data-bbox="224 1461 477 1493">Derivative : 2 marks</p> <p data-bbox="224 1524 483 1556">Preparation :10 marks</p> <p data-bbox="224 1587 570 1619">[Pocedure - 3 ; Preparation -7]</p> | <p data-bbox="782 1146 1372 1178">Analysis : 50 Marks (Report with suitable procedure)</p> <p data-bbox="782 1209 1143 1241">Aromatic/Aliphatic : 5 marks</p> <p data-bbox="782 1272 1192 1304">Saturation/unsaturated : 5 marks</p> <p data-bbox="782 1335 1084 1367">Elements test : 10 marks</p> <p data-bbox="782 1398 1143 1430">Functional groups: 25 marks</p> <p data-bbox="782 1461 1036 1493">Derivative : 5 marks</p> <p data-bbox="782 1524 1042 1556">Preparation :15 marks</p> <p data-bbox="782 1587 1177 1619">[PROCEDURE -5: PREPARATION :10]</p> <p data-bbox="782 1650 1013 1682">Record :10 marks</p> |

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 | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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

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 CLRRRELATION 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 | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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 | <p>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.</p> |
| Unit 2 | <p>Hair Care Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner – types – ingredients</p> <p>Dental care Tooth pastes – ingredients – mouth wash</p> |
| Unit 3 | <p>FACE MAKE UP COSMETICS Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eye shadow, concealers, rouge</p> |
| Unit4 | <p>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</p> |
| Unit 5 | <p>BEAUTY TREATMENTS Facials - types – advantages – disadvantages; face masks – types; bleach - types – advantages – disadvantages; shaping the brows; eyelash tinting; perming</p> |

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 |

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 | | | |
| Nature of the course | | | | |
| | Relevant to global need | Employability oriented | | Addresses Professional Ethics |
| | Relevant to National need | Entrepreneurship oriented | | Addresses Gender Sensitization |
| | Relevant to Regional need | Skill evelopment oriented | | Addresses Environment and Sustainability |
| | Relevant to Local need | | | Addresses Human Values |
| Objectives of the course | <p>This course aims to provide a comprehensive knowledge on</p> <ul style="list-style-type: none"> • 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. <p>preparation and properties of phenols and alcohols.</p> | | | |
| Course Outline | | | | |
| Unit 1 | <p>Gaseous state</p> <p>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.</p> <p>Real gases: Deviations from ideal gas behaviour, (Andrew’s and Amagat’s plots); compressibility factor, Z, and its variation with pressure for different</p> | | | |

| | |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>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</p> <p>- 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.</p> |
| Unit 2 | <p>Liquid and Solid State</p> <p>Properties of Liquids- Surface tension, viscosity and their applications. Crystalline and amorphous – differences - geometry, isotropy and anisotropy, melting point; isomorphism, polymorphism.</p> <p>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</p> <p>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 concepts Defects in solids - stoichiometric and nonstoichiometric defects. Liquid crystals – classification and applications.</p> |
| Unit 3 | <p>Nuclear Chemistry</p> <p>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 $t_{1/2}$ and radioactive series.</p> <p>Isotopes – uses – tracers – determination of age of rocks by radiocarbon dating. (Problems to be worked out)</p> <p>Nuclear energy; nuclear fission and fusion – major nuclear reactors in India; radiation hazards, disposal of radioactive waste and safety measures.</p> |
| Unit4 | <p>Halogen derivatives</p> <p>Aliphatic halogen derivatives</p> <p>Nomenclature and classes of alkyl halides – isomerism, physical properties, Chemical reactions. Nucleophilic substitution reactions – SN^1, SN^2 and SN^i mechanisms with stereochemical aspects and effect of solvent.</p> <p>Di, Tri & Tetra Halogen derivatives: Nomenclature, classification, preparation, properties and applications.</p> <p>Aromatic halogen compounds</p> <p>Nomenclature, preparation, properties and uses</p> <p>Mechanism of nucleophilic aromatic substitution – benzyne intermediate.</p> <p>Aryl alkyl halides</p> <p>Nomenclature, benzyl chloride – preparation – preparation properties and uses</p> <p>Alcohols: Nomenclature, classification, preparation, properties, use; conversions – ascent and descent of series; test for hydroxyl groups. Oxidation of diols by</p> |

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | periodic acid and lead tetraacetate. |
| Unit 5 | <p>Phenols</p> <p>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.</p> <p>Resorcinol, quinol, picric acid – preparation, properties and uses.</p> <p>Aromatic alcohols</p> <p>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.</p> <p>Thiols: Nomenclature, structure, preparation and properties.</p> |
| 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 | <ol style="list-style-type: none"> 1. B.R. Puri, L.R. Sharma, M.S. Pathania; <i>Principles of Physical Chemistry</i>, 46th edition, Vishal Publishing, 2020. 2. B.R. Puri, L.R. Sharma and K.C. Kalia, <i>Principles of Inorganic Chemistry</i>, Milestone Publishers and Distributors, New Delhi, thirtieth edition, 2009. 3. 4. P.L. Soni and Mohan Katyal, <i>Textbook of Inorganic Chemistry</i>, Sultan Chand & amp; Sons, twentieth edition, 2006. 4. M. K. Jain, S. C. Sharma, <i>Modern Organic Chemistry</i>, Vishal Publishing, fourth reprint, 2003. 5 S.M. Mukherji, and S.P. Singh, <i>Reaction Mechanism in Organic Chemistry</i>, Macmillan India Ltd., third edition, 1994. |
| Reference Books | <ol style="list-style-type: none"> 1. T. W. Graham Solomons, <i>Organic Chemistry</i>, John Wiley & amp; Sons, fifth edition, 1992. 2. A. Carey Francis, <i>Organic Chemistry</i>, Tata McGraw-Hill Education Pvt., Ltd., New Delhi, seventh edition, 2009. 3. I. L. Finar, <i>Organic Chemistry</i>, Wesley Longman Ltd, England, sixth edition, 1996 4. P. L. Soni, and H. M. Chawla - <i>Text Book of Organic Chemistry</i>, New Delhi, Sultan Chand & Sons, twenty ninth edition, 2007. 5. J.D. Lee, <i>Concise Inorganic Chemistry</i>, 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/103106071 Nuclear industries and safety https://nptel.ac.in/courses/104106119 s 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 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 | QUALITATIVE INORGANIC ANALYSIS | Course code | U23CC6P |
|---------------------|---------------------------------------|--------------------|----------------|

| | | | | |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|------------------------------------------|
| course | | | | |
| 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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| 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 <ol style="list-style-type: none"> 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 Course Contribution to Pos | 3 | 3 | 3 | 3 | 3 |

SCHEME OF EVALUATION

| Internal 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 | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

| | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objectives of the course | <p>The course aims at providing training to</p> <ul style="list-style-type: none"> • develop entrepreneur skills in students • to provide hands on experience to prepare and develop products develop start ups |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Course Outline

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|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit 1 | <p>Food Chemistry</p> <p>Food adulteration-contamination of food items with clay stones, water and toxic chemicals -Common adulterants.</p> <p>Food additives, Natural and synthetic anti-oxidants, glazing agents (hazardous effect), food colourants, Preservatives, leavening agents, Baking powder and baking soda, yeast, MSG, vinegar.</p> <p>Dyes</p> <p>Classification – Natural, synthetic dyes and their characteristics – basic methods and principles of dyeing</p> |
| Unit 2 | <p>Hands on Experience (Students can choose any four)</p> <p>Detection of adulterants in food items like coffee, tea, pepper, chilli powder, turmeric powder, butter, ghee, milk, honey etc., by simple techniques.</p> <p>Testing of water samples using testing kit.</p> <p>Dyeing – cotton fabrics with natural and synthetic dyes Printing – tie and dye, batik.</p> |

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| 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, 1 st Edition,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 |

SCHEME OF EVALUATION

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

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

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|----------------------------|-------------------------------|---------------------|----------------------|--------------------------|
| 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 | Lecture | Tutorial | Lab. Practice | Total |

| | | | | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------|------------------------------------------|
| hrs/week | 2 | ---- | ---- | 2 |
| Prerequisites | Fundamentals in chemistry | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>This course aims to providing the students</p> <ul style="list-style-type: none"> • 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. <p>knowledge on choice of alternate and eco-friendly pesticides.</p> | | | |
| Course Outline | | | | |
| Unit 1 | <p>Introduction: History of pesticides. Chemistry of Pesticides: Brief introduction to classes of pesticides (Chemical class, targets), structures, chemical names, physical and chemical properties.</p> <p>Toxicity of pesticides: Acute and chronic toxicity in mammals, birds, aquatic species etc. Methods of analysis of pesticides.</p> | | | |
| UNIT II | <p>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.</p> <p>Organophosphates and Phosphothionates: Acephate, Chlorpyriphos, Monocrotophos, and parathion-methyl. Organochlorine – Endosulfan, heptachlor; Carbamate: Cartap hydrochloride, Methomyl, Propoxur</p> | | | |
| Unit III | <p>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.</p> | | | |
| UNIT IV | <p>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</p> | | | |

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| | 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 | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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**

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|-------------------------------|-----------------------------|--------------------|----------------------|---------------|
| 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 | | | |
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Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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 (C_p & C_v); 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

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| | <p>third law.</p> <p>Thermodynamics III</p> <p>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.</p> <p>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</p> |
| Unit 3 | <p>General Characteristics of d-block elements</p> <p>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</p> |
| Unit4 | <p>Ethers, Thio ethers and Epoxides</p> <p>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.</p> <p>Reactions of epoxides with alcohols, ammonia derivatives and LiAlH₄ Thioethers - nomenclature, structure, preparation, properties and uses.</p> <p>Aldehydes and Ketones</p> <p>Nomenclature, 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 – Ponnordorf Verley reduction, reduction with LiAlH₄ and NaBH₄</p> <p>Addition reactions of unsaturated carbonyl compounds: Michael addition.</p> |
| Unit 5 | <p>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</p> <p>Reactions of dicarboxylic acids, hydroxy acids and unsaturated acids</p> <p>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</p> <p>Active methylene compounds: Keto – enol tautomerism. Preparation and</p> |

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| | <p>synthetic applications of diethyl malonate and ethyl acetoacetate</p> <p>Halogen substituted acids – nomenclature; preparation by direct halogenation, iodination from unsaturated acids, alkyl malonic acids</p> <p>Hydroxy acids – nomenclature; preparation from halo, amino, aldehydic and ketonic acids, ethylene glycol, aldol acetaldehyde; reactions – action of heat on →, and +hydroxy acids.</p> |
| 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 | Gain the knowledge in physical and organic chemistry |
| Recommended text | <ol style="list-style-type: none"> 1. B.R. Puri and L.R. Sharma, <i>Principles of Physical Chemistry</i>, Shoban Lal Nagin Chand and Co., thirty three edition, 1992. 2. K. L. Kapoor, <i>A Textbook of Physical chemistry</i>, (volume-2 and 3), Macmillan, India Ltd, third edition, 2009. 3. P.L. Soni and Mohan Katyal, <i>Textbook of Inorganic Chemistry</i>, Sultan Chand & Sons, twentieth edition, 2006. 4. M. K. Jain, S. C. Sharma, <i>Modern Organic Chemistry</i>, Vishal Publishing, fourth reprint, 2003. 5. S.M. Mukherji, and S.P. Singh, <i>Reaction Mechanism in Organic Chemistry</i>, Macmillan India Ltd., third edition, 1994. |
| Reference Books | <ol style="list-style-type: none"> 1. Maron, S. H. and Prutton C. P. <i>Principles of Physical Chemistry</i>, 4thed.; The Macmillan Company: Newyork,1972. 2. Lee, J. D. <i>Concise Inorganic Chemistry</i>, 4th ed.; ELBS William Heinemann: London,1991. 3. Gurudeep Raj, <i>Advanced Inorganic Chemistry</i>, 26thed.; Goel Publishing House: Meerut, 2001. 4. Atkins, P.W. & Paula, J. <i>Physical Chemistry</i>, 10th ed.; Oxford University Press:New York, 2014. 5. Huheey, J. E. <i>Inorganic Chemistry: Principles of Structure and Reactivity</i>, 4th ed; Addison Wesley Publishing Company: India,1993. |
| Website and e-learning source | <p>MOOC components</p> <p>https://nptel.ac.in/courses/112102255 Thermodynamics</p> <p>https://nptel.ac.in/courses/104101136 Advanced transition metal chemistry</p> |
| <p>Course Learning outcomes (For Mapping with POs and PSO s)</p> <p>On Completion of the course the students should be able to</p> | |

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| 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**

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|-------------------------------|-----------------------------------------|--------------------|----------------------|----------------|
| 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 | | | |
| Nature of the course | | | | |

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|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>The course aims at providing an understanding of</p> <ul style="list-style-type: none"> the laboratory experiments in order to understand the concepts of physical changes in chemistry the rates of chemical reactions <p>colligative properties and adsorption isotherm</p> | | | |
| Course Outline | | | | |
| Unit 1 | <p>Chemical kinetics</p> <p>1 Determination of rate constant of acid catalysed hydrolysis of an ester(methyl acetate).</p> <p>2. Determination of order of reaction between iodide and persulphate (initial rate method).</p> <p>3. Polarimetry: Determination of rate constant of acid catalysed inversion of cane sugar</p> <p>Thermochemistry</p> <p>4.Determination of heat of neutralisation of a strong acid by a strong base</p> <p>5.Determination of heat of hydration of copper sulphate.</p> | | | |
| Unit 2 | <p>Electrochemistry – Conductance measurements</p> <p>6.Determination of cell constant</p> <p>7. Determination of molar conductance of strong electrolyte</p> <p>8.Determination of dissociation constant of acetic acid</p> <p>Colorimetry</p> <p>9.Determination of concentration of copper sulphate solution (demonstration only)</p> | | | |
| Unit 3 | <p>UNIT III</p> <p>Colligative property</p> <p>10.Determination of molecular weight of an organic compound by Rast method using naphthalene or diphenyl as solvent</p> <p>Adsorption</p> <p>11.Construction of Freundlich isotherm for the adsorption of acetic acid on activated charcoal. .(Demonstration only)</p> | | | |
| Skills acquired from this course | Gain the knowledge about chemical kinetics, Thermochemistry, Electro chemistry, colligative property and adsorption | | | |
| Recommended text | 1. Sindhu, P.S. <i>Practicals in Physical Chemistry</i> , Macmillan India : New Delhi, 2005. | | | |

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| | 2. Khosla, B. D.Garg,V. C.; Gulati, A.; <i>Senior Practical Physical Chemistry</i> , R.Chand : New Delhi, 2011. 3 Gupta, Renu, <i>Practical Physical Chemistry</i> , 1 st 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 | Experiment : 40 |
| Result : 10 | Result : 25 |
| | Record : 10 |

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

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|-------------------------------|--------------------------------------------------|--------------------|----------------------|----------------|
| 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 | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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 coulometry- 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,

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| | <p>factors affecting TGA/DTA, Thermal analysis of silver nitrate, calcium oxalate and calcium acetate</p> <p>DSC- Principle, Instrumentation and applications.</p> <p>Electroanalytical methods: polarography - principle, instrumentation and applications. Derivative polarography- Cyclic Voltammetry - principle.</p> |
| Unit 5 | <p>Separation and purification techniques</p> <p>Classification, principle, Factors affecting - Solvent Extraction – Liquid - Liquid Extraction,</p> <p>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.</p> |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | <p>Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved)</p> |
| Skills acquired from this course | <p>Obtain the knowledge about various instrumental methods</p> |
| Recommended text | <ol style="list-style-type: none"> 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, 6th edn., Prentice Hall of India Private Ltd., New Delhi, 1993 |
| Reference Books | <ol style="list-style-type: none"> 1. D. A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5th edn., 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 | <ol style="list-style-type: none"> 1. http://www.epa.gov/rpdweb00/docs/marlap/402-b-04-001b-14-final.pdf 2. http://eric.ed.gov/?id=EJ386287 |

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| | 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

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|-----------------------------|-------------------------|--------------------|----------------|
| Title of the vcourse | FORENSIC SCIENCE | Course code | U23SEC8 |
|-----------------------------|-------------------------|--------------------|----------------|

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| 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 | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objectives of the course | <p>This course aims at giving an overall view of</p> <ul style="list-style-type: none"> • crime detection through analytical instruments • forgery and its detection <p>medical aspects involved</p> |
| Course Outline | |
| Unit 1 | <p>Poisons</p> <p>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.</p> |
| Unit 2 | <p>Crime Detection</p> <p>Accidental explosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs - possible explosives (gelatin sticks and RDX) - metal detector devices and other security measures for VVIP-composition of bullets and detecting powder</p> |

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| | burns. |
| Unit 3 | <p>Forgery and Counterfeiting</p> <p>Documents - different types of forged signatures - simulated and traced forgeries - inherent signs of forgery methods - writing deliberately modified</p> <p>- 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.</p> |
| Unit4 | <p>Tracks and Traces</p> <p>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</p> |
| Unit 5 | <p>Medical Aspects</p> <p>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.</p> |
| 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 | Obtain knowledge about Forensic science |
| Recommended text | <ol style="list-style-type: none"> 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 |

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| | <p>(College Version), Sopfestein, Printice hall, eighth edition,2003</p> <p>2. Suzanne Bell, Forensic Chemistry, Pearson, second international edition, 2014.</p> <p>3. Jay Siegel, Forensic chemistry: Fundamentals and applications, Wiley-Blackwell, first edition, 2015.</p> <p>4. Max M. Houck & Jay A. Segal, (2006) Fundamentals of Forensic Science, Elsevier Academic press.</p> <p>5 Henry C. Lee, Timothy Palmbach, Marilyn T. Miller, (2006) Henry Lee's CrimeSicene Book Elsevier Academic press.</p> |
| Website and e-learning source | <p>1. http://www.library.ucsb.edu/ist/03-spring/internet.html</p> <p>2 http://www.wonder howto.com/topic/forensic-science/</p> |
| <p>Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to</p> | |
| 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 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

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|-----------------------------------|--|--|--|--|--|
| Course Contribution to Pos | | | | | |
|-----------------------------------|--|--|--|--|--|

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

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|-------------------------------|------------------------------------|-------------------|----------------------|---------------|
| Title of the course | ORGANIC CHEMISTRY –I | | Course code | U23CC9 |
| Paper No. | CC9 (I) | | 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 | | | |
| Nature of the course | | | | |

| | | | | |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>This course aims to provide an understanding of</p> <ul style="list-style-type: none"> • 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 | <p>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</p> | | | |
| Unit 2 | <p>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</p> | | | |

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| | <p>properties; reactions - reduction of nitrobenzene in different medium, Electrophilic substitution reactions, TNT.</p> <p>Amines: Aliphatic amines</p> <p>Nomenclature, isomerism, preparation – Hofmann's degradation reaction, Gabriel's phthalimide synthesis, Curtius Schmidt rearrangement.</p> <p>Physical properties, reactions – alkylation, acylation, carbylamine reaction, Mannich reaction, oxidation, basicity of amines.</p> |
| Unit 3 | <p>UNIT III</p> <p>Chemistry of Nitrogen Compounds – II</p> <p>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 –</p> <p>Diazonium compounds</p> <p>Diazomethane, Benzene diazonium chloride - preparations and synthetic applications.</p> <p>Dyes</p> <p>Theory of colour and constitution; classification based on structure and application; preparation – Martius yellow, aniline yellow, methyl orange, alizarin, indigo, malachite green.</p> <p>Industry oriented content</p> <p>Dyes Industry, Food colour and additives</p> |
| Unit4 | <p>UNIT IV</p> <p>Heterocyclic compounds</p> <p>Nomenclature and classification. General characteristics - aromatic character and reactivity.</p> <p>Five-membered heterocyclic compounds</p> <p>Pyrrole – preparation - from succinimide, Paal Knorr synthesis; reactions – reduction, basic character, acidic character, electrophilic substitution reactions, ring opening.</p> <p>Furan – preparation from mucic acid and pentosan; reactions – hydrogenation, reaction with oxygen, Diels Alder reactions, formation of thiophene and pyrrole; Electrophilic substitution reaction</p> <p>Thiophene synthesis - from acetylene; reactions –reduction; oxidation; electrophilic substitution reactions.</p> |
| Unit 5 | <p>UNIT V</p> <p>Six-membered heterocyclic compounds</p> <p>Pyridine – synthesis - from acetylene, Physical properties; reactions - basic character, oxidation, reduction, electrophilic substitution reactions; nucleophilic substitution- uses</p> <p>Condensed ring systems</p> |

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| | <p>Quinoline – preparation - Skraup synthesis and Friedlander’s synthesis; reactions – basic nature, reduction, oxidation; electrophilic substitutions; nucleophilic substitutions – Chichibabin reaction</p> <p>Isoquinoline – preparation by the Bischler – Napieralski reaction, reduction, oxidation; electrophilic substitution.</p> |
| <p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p> | <p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p> |
| <p>Skills acquired from this course</p> | <p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills</p> |
| <p>Recommended text</p> | <p>1.M.K. Jain, S.C.Sharma, Modern Organic Chemistry, Vishal Publishing, fourth reprint, 2009.</p> <p>2.S.M. Mukherji, and S.P. Singh, Reaction Mechanism in Organic Chemistry, Macmillan India Ltd., third edition, 2009.</p> <p>3. ArunBahl and B.S. Bahl, Advanced organic chemistry, New Delhi, S.Chand& Company Pvt. Ltd., Multicolour edition, 2012.</p> <p>4.P. L.Soni and H. M. Chawla, Text Book of Organic Chemistry, Sultan Chand & Sons, New Delhi, twenty ninth edition, 2007.</p> <p>5..C.N.Pillai, Text Book of Organic Chemistry, Universities Press (India) Private Ltd., 2009.</p> |
| <p>Reference Books</p> | <p>1.R. T. Morrison and R. N. Boyd, Organic Chemistry, Pearson Education, Asia, sixth edition, 2012.</p> <p>2. T.W.Graham Solomons, Organic Chemistry, John Wiley & Sons, eleventh edition, 2012.</p> <p>3. A. Carey Francis, Organic Chemistry, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, seventh edition, 2009.</p> <p>4. I. L. Finar, Organic Chemistry, Vol. (1& 2), England, Wesley Longman Ltd, sixth edition, 2006.</p> <p>5. J. A. Joule, and G. F. Smith, Heterocyclic Chemistry, Wiley, Fifth Edition, 2010.</p> |
| <p>Website and e-learning source</p> | <p>1. www.epgpathshala.nic.in</p> <p>2. www.nptel.ac.in</p> <p>3. http://swayam.gov.in</p> <p>4. Virtual Textbook of Organic Chemistry</p> |
| <p>Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to</p> | |

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**

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| Title of the course | INORGANIC CHEMISTRY | | Course code | U23CC10 |
| Paper No. | CC10 (T) | | Category | Core |
| Year | III | Semester V | Credits | 4 |
| Instructional hrs/week | Lecture | Tutorial | Lab. Practice | Total |
| | 4 | 1 | | 5 |
| Prerequisites | General Chemistry I , II, III and IV | | | |
| Nature of the course | | | | |

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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- Teller 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

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|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>bonding in carbonyls of Ni, Fe, Cr, Co, Mn, Ru and Os. EAN rule as applied to metal carbonyls.</p> <p>Ferrocene-Methods of preparation, physical and chemical properties</p> |
| Unit 3 | <p>Inner transition elements (Lanthanoids and Actinoids)</p> <p>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.</p> |
| Unit 4 | <p>Inorganic polymers</p> <p>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 polyphosphonitrilic chloride,) – industrial applications of inorganic compounds.</p> <p>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 polyphosphonitrilic chloride,) – industrial applications of inorganic compounds.</p> <p>Industrial Applications of Inorganic Compound</p> <p>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.</p> |
| Unit 5 | <p>Unit V</p> <p>Bio inorganic chemistry</p> <p>Essentials and trace elements : role of Na⁺,K⁺,Mg²⁺ in biological systems .effect of excessintake of metal ions –trace elements Cd ,Pb,Hg,</p> <p>Metal ion transport and storage</p> <p>Iron-storage-transport-transferrin and ferritin., iron-porphyrins-myoglobin,haemoglobin-oxygen transport</p> <p>Metllo enzymes</p> <p>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.</p> |
| Extended Professional Component (is a part of internal component only,Not to | <p>Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved</p> |

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| 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 | <ol style="list-style-type: none"> 1. Puri B R, Sharma L R, Kalia K C (2011), Principles of Inorganic Chemistry, 31th Edition, 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. |
| | <ol style="list-style-type: none"> 1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nd ed., S.Chand and Company, New Delhi. 2. Gopalan R, (2009) <u>Inorganic Chemistry for Undergraduates</u>, Ist Edition, University Press (India) Private Limited, Hyderabad 3. Sivasankar B, (2013) <u>Inorganic Chemistry</u>. Ist Edition, Pearson, Chennai 4. Alan G. Sharp (1992), <u>Inorganic Chemistry</u>, 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 | <ol style="list-style-type: none"> 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 | |
| <p>CO1: explain isomerism, Werner's Theory and stability of chelate complexes</p> <p>CO2: discuss crystal field theory, magnetic properties and spectral properties of complexes.</p> <p>CO3: explain preparation and properties of metal carbonyls</p> <p>CO4: give a comparative account of the characteristics of lanthanoids and actinoids</p> <p>CO5: explain properties and uses of inorganic polymers of silicon, sulphur, boron and phosphorous</p> | |

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 |

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

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| Title of the course | GRAVIMETRIC ANALYSIS AND WATER ANALYSIS | | Course code | U23CC11P |
| Paper No. | CC11 (P) | | Category | Core |
| Year | III | Semester V | Credits | 4 |
| Instructional hrs/week | Lecture | Tutorial | Lab. Practice | Total |
| | 1 | - | 5 | 6 |
| Prerequisites | Theoretical knowledge on Gravimetric analysis and water analysis practical | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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| Objectives of the course | <p>the course aims to provide knowledge on</p> <ul style="list-style-type: none"> • Conditions for good precipitations • Careful precipitation and weighing • Techniques for Potable water analysis |
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Course Outline

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| Unit 1 | <p>Principles of Gravimetric analysis</p> <p>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.</p> |
| Unit 2 | <p>GRAVIMETRIC ANALYSIS</p> <p>Estimation of Calcium as oxalate</p> |

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| | <p>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</p> |
| Unit 3 | <p>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)</p> |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | <p>Questions related to the above topics,</p> |
| Skills acquired from this course | <p>Knowledge, , Analytical ability for carry out the Gravimetric analysis and preparation of coordination complexes</p> |
| Recommended text | <p>Reference Books: 1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, 2nd ed.; Sultan Chand & Sons: New Delhi, 1997. 2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; <i>An advanced course in Practical Chemistry</i>, 3rd ed.; New Central Book Agency: Kolkata, 2007.</p> |
| Reference Books | <p>1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; 2) <i>Vogel's Textbook of Quantitative Chemical Analysis</i>, 6th ed.; Pearson Education Ltd: New Delhi, 2000.</p> |
| Website and e-learning source | <p>Web References: 1) http://www.federica.unina.it/agraria/analytical-chemistry/volumetric- analysis</p> |

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| | 1) 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 determination |
| 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 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Gravimetric analysis : 15 marks (Procedure : 5 Experiment : 10)</p> <p>Error up to 2% - 10 marks</p> <p style="padding-left: 40px;">3% - 8 marks</p> <p style="padding-left: 40px;">4% - 6 marks</p> <p style="padding-left: 40px;">>4 - 5 marks</p> <p>Water Analysis :10 [Procedure:3 ; Experiment -7]</p> <p>Error up to 2% - 7 marks</p> <p style="padding-left: 40px;">3% - 6 marks</p> <p style="padding-left: 40px;">4% - 5 marks</p> <p style="padding-left: 40px;">>4 - 4 marks</p> | <p>Gravimetric analysis: 40 marks (Procedure-10 ; Experiment : 30)</p> <p>Error Up to 2% - 30 marks</p> <p style="padding-left: 40px;">3% - 20 marks</p> <p style="padding-left: 40px;">4 % - 10 marks</p> <p style="padding-left: 40px;">>4% - 8 marks</p> <p>Water Analysis : 25 (Procedure -5: Experiment - 20)</p> <p>Error up to 2% - 20 marks</p> <p style="padding-left: 40px;">3% - 15 marks</p> <p style="padding-left: 40px;">4% - 10 marks</p> <p style="padding-left: 40px;">>4% - 8 marks</p> <p>Record :10</p> |

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

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|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|------------------------------------------|
| 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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | the course aims to provide knowledge on <ul style="list-style-type: none"> • 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 Urea 7. Estimation formaldehyde |
| 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 caffeine 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 4 th 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 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Organic Estimation : 15 marks (Procedure - 5 : Experiment - 10)</p> <p>Error up to 2% - 10 marks</p> <p> 3% - 8 marks</p> <p> 4% - 6 marks</p> <p> >4 - 4 marks</p> <p>Natural product Isolation :10 marks [Procedure-3 ; Experiment -7]</p> | <p>Organic Estimation : 40 marks Procedure-10 : : Experiment - 30)</p> <p>Error Up to 2% - 30 marks</p> <p> 3% - 20 marks</p> <p> 4 % - 10 marks</p> <p> >4% - 8 marks</p> <p>Natural product Isolation : 25 marks Procedure -10: Isolation :15</p> <p>Record :10</p> |

**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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | This course is designed to provide knowledge on <ul style="list-style-type: none"> • 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 | <p>Survey of Indian Industries and mineral resources in India</p> <p>Fuels: Classification, characteristics of fuels. Solid fuels: coal - classification; analysis of coal- proximate analysis and ultimate analysis; calorific value-determination, carbonisation of coal.</p> <p>Liquid fuels: Petroleum - characteristics; Gasoline aviation petrol- knocking in internal combustion engines, antiknock agents; unleaded petrol-octane number, cetane number</p> <p>Gaseous fuel: advantages over solid and liquid fuels; water gas, producer gas, carburetted water gas - preparations – uses</p> <p>Natural gas: LPG-composition, advantages, application; gobar gas- production, composition, advantages, application. Propellants – rocket fuels (basic idea)</p> |
| Unit 2 | <p>Cosmetics</p> <p>Skin care: powders, ingredients; creams and lotion-cleansing, moisturising, all purpose shaving cream, sunscreen; make up preparations</p> <p>Dental care: tooth pastes – ingredients.</p> <p>Hair care: shampoos-types, ingredients; conditioners-types, ingredients.</p> <p>Perfumes: natural-plant origin-parts of the plant used, chief constituents;</p> <p>Soaps and Detergents</p> <p>Soaps-properties, manufacture of soap-batch process; types-transparent soap, toilet soap, powder soap and liquid soap – ingredients.</p> <p>Detergents-definition, properties-cleansing action; soaplessdetergents- anionic, cationic and non-ionic (general idea only); uses of detergents as surfactants. Biodegradability of soaps and detergents.</p> |
| Unit 3 | <p>Sugar Industry</p> <p>Manufacture from sugar cane; recovery of sugar from molasses; testing and estimation of sugar.</p> <p>Food Preservation and processing</p> <p>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.</p> |
| Unit4 | <p>Abrasives</p> <p>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.</p> <p>Leather Industry</p> <p>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.</p> <p>Paper Industry</p> <p>Manufacture of pulp - mechanical, chemical processes; sulphate pulp, rag pulp; manufacture of paper- beating, refining, filling, sizing, colouring, calendaring; cardboard.</p> |
| Unit 5 | <p>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,</p> |

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| | <p>selection of lubricants.</p> <p>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.</p> <p>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</p> |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | <p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p> |
| Skills acquired from this course | <p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p> |
| Recommended text | <ol style="list-style-type: none"> 1. Sharma, B.K. <i>Industrial Chemistry</i>, 9th ed.; Goel Publishing House: Meerut, 1998. 2. Wilkinson, J.B.E. Moore, R.J. <i>Harry's Cosmeticology</i>, 7th ed.; Chemical Publishers : New York, 1982. 3. Alex V. Ramani, <i>Food Chemistry</i>, MJP publishers: Chennai, 2009. 4. Jayashree Ghosh, <i>Applied Chemistry</i>, S. Chand : New Delhi, 2006. Srilakshmi, B. <i>Food Science</i>, 4th ed.; New Age International Publication, 2005. |
| Reference Books | <ol style="list-style-type: none"> 1. Jain, P.C.; Jain, M. <i>Engineering Chemistry</i>, 16th ed.; Dhanapet Rai: Delhi, 1992 2. George Howard, <i>Principles and Practice of Perfumes and Cosmetics</i>, Stanley Therones, Cheltenham: UK, 1987. 3. Thankamma Jacob, <i>Foods, Drugs and Cosmetics - A Consumer Guide</i>, Macmillan : London, 1997. 4. ShankuntalaManay, N.; Shadaksharaswamy, M. <i>Food Facts and Principles</i>, 3rd ed.; New Age Publication, 2008. 5..Neeraj Pandey, KhushdeepDharni, <i>Intellectual Property Rights</i>, PHI Learning, 2014. |
| Website and e-learning source | |
| <p>Course Learning outcomes (For Mapping with POs and PSO s) On Completion of the course the students should be able to</p> | |

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|-------------|---------------------------------------------------------------------------------------------------|
| CO 1 | summarize the properties of fuels which include petroleum, water gas, natural gas and propellents |
| CO2 | evaluate 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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | The course aims at providing knowledge on <ul style="list-style-type: none"> • 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 | | | |

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| | <ul style="list-style-type: none"> • biochemistry of nucleic acids and lipids • metabolism of lipids |
| Course Outline | |
| Unit 1 | <p>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</p> |
| Unit 2 | <p>Peptides and Proteins Amino acids – nomenclature, classification – essential and Non-essential; Synthesis - Gabriel Phthalimide, Strecker; properties – zwitter ion and isoelectric point, electrophoresis and reactions Peptides – peptide bond – nomenclature – synthesis of simple peptides – solution and solid phase. Determination of structure of peptides, N-terminal analysis – Sanger’s & Edmann method; C terminal analysis - Enzymic method. Proteins – classification based on composition, functions and structure; properties and reactions – colloidal nature, coagulation, hydrolysis, oxidation, denaturation, renaturation; colour tests for proteins. Structure of proteins – primary, secondary, tertiary and quaternary. .</p> |
| Unit 3 | <p>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 regulation. Vitamins as coenzymes – functions of TPP, lipoic acid, NAD, NADP FMN, FAD, pyridoxal phosphate, CoA, folic acid, biotin, cyanocobalamin</p> |
| Unit 4 | <p>Nucleic 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).</p> |
| Unit 5 | <p>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.</p> |

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| 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 | <ol style="list-style-type: none"> 1. . Bahl, B. S.; Bhal, A. <i>Advanced Organic Chemistry</i>, 3rd ed.; S. Chand: New Delhi, 2003. 2. Jain, M.K.; Sharma, S.C. <i>Modern Organic Chemistry</i>, Vishal Publications: New Delhi, 2017. 3. Shanmugam, A. <i>Fundamentals of Biochemistry for Medical Students</i>, 6th ed.; Published by the author, 1999. 4. Veerakumari, L. <i>Biochemistry</i>, 1st ed.; MJP Publications: Chennai, 2004. 5. Jain, J. L.; <i>Fundamentals of Biochemistry</i>, 2nd ed.; S.Chand: New |
| Reference Books | <ol style="list-style-type: none"> 1. Conn, E. E.; Stumpf, P. K. <i>Outline of Biochemistry</i>, 5th ed.; Wiley Eastern: New Delhi, 2002. 2. West, E. S.; Todd, W. R.; Mason, H. S.; Van Bruggen, J. T. <i>Text Book of Biochemistry</i>, 4th ed.; Macmillan: New York, 1970. 3. Lehninger, A. L. <i>Principles of Biochemistry</i>, 2nd ed.; CBS Publisher: Delhi, 1993. 4. Rastogi, S. C. <i>Biochemistry</i>, 2nd ed.; Tata McGraw-Hill: New Delhi, 2003. 5. Chatterjea, M. N.; Shinde, R. <i>Textbook of Medical Biochemistry</i>, 5th ed.; Jaypee Brothers: New Delhi, 2002. |
| Website and e-learning source | <ol style="list-style-type: none"> 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 | | | |
| Nature of the course | | | | |
| Objectives of the course | This course aims at providing knowledge on <ul style="list-style-type: none"> • 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 | | | | |

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|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit 1 | <p>Alkaloids Classification, isolation, general properties- Hofmann Exhaustive Methylation; Structure elucidation – Coniine, piperine, nicotine.</p> <p>Terpenes: Classification, Isoprene rule, isolation and structural elucidation of Citral, alpha terpineol, Menthol, Geraniol and Camphor</p> |
| Unit 2 | <p>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.</p> <p>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.</p> <p>Disaccharides – sucrose, lactose, maltose - preparation, properties and uses (no structural elucidation).</p> <p>Polysaccharides – Source, constituents and biological importance of homopolysaccharides- starch and cellulose, heteropolysaccharides – hyaluronic acid, heparin.</p> |
| Unit 3 | <p>Molecular rearrangements: Molecular Rearrangement: Type of rearrangements, Mechanism for Benzidine, Favorskii, Claisen, Fries, Hofmann, Curtius, Schmidt and Beckmann, Pinacol-pinacolone rearrangement</p> |
| Unit 4 | <p>Special reagents in organic synthesis AIBN, 9BBN, BINAP/BINOL, BOC, DABCO, DCC, DIBAL, DMAP, NBS/NCS, NMP, PCC, TBHP, TEMPO</p> <p>Organometallic compounds in Organic Synthesis Preparation, Properties and applications: Grignard Reagents, Organo Lithium Compounds, Ziegler – Natta, Wilkinson, Metal Carbonyl, Zeiss's Salt</p> |
| Unit 5 | <p>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.</p> |
| <p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination)</p> | <p>Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved)</p> |

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| question paper) | |
| Skills acquired from this course | Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills |
| Recommended text | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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 learning 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

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| Title of the course | PHYSICAL CHEMISTRY | | Course code | U23CC14 |
| Paper No. | CC14(T) | | Category | Core |
| Year | III | Semester VI | Credits | 4 |
| Instructional hrs/week | Lecture | Tutorial | Lab. Practice | Total |
| | 5 | 1 | | 6 |
| Prerequisites | General Chemistry I,II,III and IV | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>The course aims at providing an overall view of</p> <ul style="list-style-type: none"> • 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 | <p>Chemical equilibrium</p> <p>Law of mass action – thermodynamic derivation – relationship between K_p and K_c – application to the homogeneous equilibria – dissociation of PCl_5 gas, N_2O_4 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</p> |
| Unit 2 | <p>Phase rule</p> <p>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)</p> <p>Binary liquid mixtures</p> <p>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.</p> |
| Unit 3 | <p>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</p> <p>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.</p> <p>Colloids and Surface Chemistry</p> <p>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</p> <p>Macromolecules: Molecular weight of Macromolecules - average molecular weight, Determination of Molecular weight of molecules</p> |
| Unit4 | <p>Chemical Kinetics</p> <p>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.</p> <p>Photochemistry</p> <p>Laws of photo chemistry – Lambert – Beer, Grotthus – Draper and Stark – Einstein. Quantum efficiency. Photochemical reactions – rate law – Kinetics of H_2-Cl_2, H_2-Br_2, comparison between thermal and photochemical</p> |

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| | <p>reactions.</p> <p>Fluorescence –phosphorescence- applications- - chemiluminescence and photosensitisation .</p> |
| Unit 5 | <p>UNIT V</p> <p>ELECTRO CHEMISTRY</p> <p>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.</p> <p>Galvanic Cells and Applications</p> <p>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,</p> <p>Applications of EMF measurements –Determination of activity coefficient of electrolytes</p> <p>Industrial component</p> <p>Fuel cells – H₂-O₂ cell – efficiency of fuel cells. corrosion –, types and methods of prevention.</p> |
| Extended Professional Component (is a part of internal component only,Not to be included in the external examination question paper) | <p>Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved</p> |
| Skills acquired from this course | <p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills</p> |
| Recommended text | <ol style="list-style-type: none"> 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, |

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| | ShobanLalNagin Chand and CO., 1986. |
| Reference Books | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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 Langmuir adsorption 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

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|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|------------------------------------------|
| Title of the course | PHYSICAL CHEMISTRY PRACTICAL II | | Course code | U23CC15P |
| Paper No. | CC15(P) | | Category | Core |
| Year | III | Semester VI | Credits | 4 |
| Instructional hrs/week | Lecture | Tutorial | Lab. Practice | Total |
| | | 1 | 5 | 6 |
| Prerequisites | Theoretical knowledge on physical chemistry | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | This course aims at providing <ul style="list-style-type: none"> • basic principles of physical chemistry experiments • hands on experience in carrying out the experiments | | | |
| Course Outline | | | | |
| Unit 1 | Phase diagrams <ol style="list-style-type: none"> 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 | | | |

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| | <p>– water system</p> <p>4. Effect of an electrolyte on miscibility temperature of phenol – water system</p> <p>5. Determination of concentration of sodium chloride using phenol- sodium chloride system</p> |
| Unit 2 | <p>Distribution law</p> <p>6. Determination of the distribution coefficient of iodine between carbon tetrachloride and water.</p> <p>7. Determination of equilibrium constant of the reaction</p> $I_2 + I \rightleftharpoons I_3$ <p>8. Determination of concentration of the given potassium iodide solution using the above equilibrium constant.</p> |
| Unit 3 | <p>Electrochemistry</p> <p>9. Conductometric titration of hydrochloric acid against sodium hydroxide</p> <p>10. Potentiometric titration of ferrous ion against potassium dichromate using quinhydrone electrode.</p> |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | <p>Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved)</p> <p>Electrochemistry</p> |
| Skills acquired from this course | <p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills</p> |
| Recommended text | <p>1. Sindhu, P.S. <i>Practicals in Physical Chemistry</i>, Macmillan India : New Delhi, 2005.</p> <p>2. Khosla, B. D. Garg, V. C.; Gulati, A. <i>Senior Practical Physical Chemistry</i>, R. Chand : New Delhi, 2011.</p> <p>3. Gupta, Renu, <i>Practical Physical Chemistry</i>, 1st Ed.; New Age International : New Delhi, 2017</p> |
| Reference Books | <p>4. J. Rajaram and J.C. Kuriacose, <i>Chemical Thermodynamics</i>, Pearson, 1st edition, 2013.</p> <p>5. Keith J. Laidler, <i>Chemical kinetics</i>, third edition, Pearson, 2003.</p> <p>6. P. W. Atkins, and Julio de Paula, <i>Physical Chemistry</i>, Oxford University press, seventh edition, 2002.</p> <p>7. K. L. Kapoor, <i>A Textbook of Physical Chemistry</i>, Macmillan</p> |
| Website and e-learning source | <p>https://www.vlab.co.in/broad-area-chemical-sciences</p> |

| 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 |
|----------------------------|---------------------------|

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| | 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

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|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|------------------------------------------|
| 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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>This course is designed to provide knowledge on</p> <ul style="list-style-type: none"> • 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. | | | |

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| | <p>Application of dipole moments in the study of organic and inorganic molecules.</p> <p>Magnetic permeability, volume susceptibility, mass susceptibility and molar susceptibility; diamagnetism, paramagnetism – determination of magnetic susceptibility using Guoy balance, ferromagnetism, anti ferromagnetism</p> <p>Microwave spectroscopy</p> <p>Rotation spectra – diatomic molecules (rigid rotator approximation) selection rules – determination of bond length, effect of isotopic substitution – instrumentation and applications</p> |
| Unit 2 | <p>Vibrational spectra-diatomic molecules-harmonic oscillator and anharmonic oscillator, vibration-rotation 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 -isotopic shift-application of IR spectra to simple organic and inorganic molecules-group frequencies.</p> <p>Raman spectroscopy</p> <p>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</p> |
| Unit 3 | <p>Ultraviolet and Visible spectroscopy</p> <p>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 – $\sigma - \sigma^*$, $\pi - \pi^*$, $n - \sigma^*$, $n - \pi^*$ transitions.</p> <p>Applications of UV-Woodward – Fieser rules as applied to conjugated dienes and α, β – unsaturated ketones. Elementary Problems.</p> <p>Colorimetry - principle and applications (estimation of Fe^{3+})</p> |
| Unit4 | <p>Nuclear magnetic resonance spectroscopy</p> <p>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.</p> |
| Unit 5 | <p>Mass spectroscopy</p> <p>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</p> <p>Solving structure elucidation problem using multiple spectroscopic data(NMR, IR and UV-VIS)</p> |
| Extended | <p>Questions related to the above topics from various competitive examinations</p> |

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| Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | (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 | <ol style="list-style-type: none"> 1. Gopalan, R.; Subramaniam, P. S.; Rengarajan, K. <i>Elements of Analytical Chemistry</i>; S Chand: New Delhi, 2003. 2. Usharani, S. <i>Analytical Chemistry</i>, 1sted.; Macmillan: India, 2002. 3. Banwell, C.N.; Mc Cash, E. M. <i>Fundamentals of Molecular Spectroscopy</i>, 4th ed.; Tata McGraw Hill, New Delhi, 2017. 4. U.N.Dash, <i>Analytical Chemistry Theory and Practice</i>, Sultan Chand & Sons, 2nd Ed., 2005 <p>B.K.Sharma, <i>Spectroscopy</i>, 2nd ed., Goel Publishing House, 2011.</p> |
| Reference Books | <ol style="list-style-type: none"> 1. Srivastava, A. K.; Jain, P. C. <i>Chemical Analysis an Instrumental Approach</i>, 3rded.; S.Chand, New Delhi, 1997. 2. Robert D Braun. <i>Introduction to Instrumental Analysis</i>; Mc.Graw Hill: New York, 1987. 3. Skoog, D. A.; Crouch, S. R.; Holler, F.J.; West, D. M. <i>Fundamentals of Analytical Chemistry</i>, 9thed.; Harcourt college Publishers: USA, 2013. 4. Madan, R. L.; Tuli, G. D. <i>Physical Chemistry</i>, 2nded.; S.Chand: New Delhi, 2005. 5. Puri, B. R.; Sharma, L. R.; Pathania, M.S. <i>Principles of Physical Chemistry</i>, 43rd ed.; Vishal Publishing: Delhi, 2008. |
| Website and e-learning source | <ol style="list-style-type: none"> 1. http://vallance.chem.ox.ac.uk/pdfs/SymmetryLectureNotes2004.pdf 2. http://chemistry.rutgers.edu/undergrad/chem207/SymmetryGroupTheory.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 |

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| | 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

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|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|------------------------------------------|
| 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 | | | |
| Nature of the course | | | | |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> • 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 | <p>Introduction to nanoscience</p> <p>Definition of terms – nanoscience, nanoparticles, clusters, quantum dots, nanostructures and nanocomposites. Electron behaviour in free space, bulk material and nanomaterials.</p> <p>Synthesis and stabilization of nanomaterials Top 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) -</p> | | | |

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| | <p>solvothermal synthesis, photochemical method, gamma radiolysis, sonochemical synthesis, electro deposition, sol-gel method, nanomaterials via chemical routes- solvents reducing agents, capping agents- stabilization of nanoparticles -electrostatic and steric stabilization, common stabilizers, nanoparticle growth in solution, nanoparticle growth in solution, templated growth, Langmuir-Blodgett(L-B) method, reverse micelles-emulsion method.</p> |
| Unit 2 | <p>Properties of materials on a nanoscale Optical properties of metal and semiconductor nanomaterials-surface plasmon resonance (SPR) surface resonance Raman spectra (SERS) quantum confinement effect, tuning of optical spectrum - magnetic properties- Fe₃O₄ particle, supermagnetic properties, electronic properties, chemical properties chemical process on the surface of nanoparticles, catalysis mechanical properties</p> |
| Unit 3 | <p>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 diffraction (XRD) (principle and block diagram only)</p> |
| Unit 4 | <p>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.</p> |
| Unit 5 | <p>UNIT V Applications of nano materials Biomedical applications-drug delivery, biolabelling-artificial implants, cancer treatments, 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) Nanotechnology in agriculture-fertilizer and pesticide nano materials for water purification, nano material in food and packaging materials, fabric industry Impacts of nanotechnology- human and environmental safety risks</p> |
| Extended Professional Component (is a part of internal component) | <p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p> |

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|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 | <ol style="list-style-type: none"> 1. Sulabha K. Kulkarni, <i>Nanotechnology: Principles and Practices</i>, Capital Publishing Co., New Delhi. 2. Pradeep. T, <i>Nano: The Essentials, Understanding Nanoscience and Nanotechnology</i>; Tata McGraw-Hill Publishing Company Limited, NewDelhi, 2007. 3. Shah. M.A.; Tokeer Ahmad, <i>Principles of Nanoscince and Nanotechnology</i>; Narosa Publishing House, New Delhi, 2010. 4. Murthy. B.S; Shankar. P, Baldev Raj.; Rath. B.B. JamesMurday, <i>Textbook of Nanoscience and Nanotechnology</i>;Universities press, India Ltd ,Hyderabad. 2012. |
| Reference Books | <ol style="list-style-type: none"> 1. Sharma. P.K., <i>Understanding Nanotechnology</i>; Vista International Publishing House, Delhi. 2008. 2. Charles P. Poole Jr.; Frank J. Owens. <i>Introduction to Nanotechnology</i>; A John Wiley & Sons, INC., Publication, 2003. 3. Viswanathan B., <i>Nano Materials</i>;Narosa Publishing House, New Delhi, 2009. 4. Edited by C.N.R. Rao; Mu"ller.A; Cheetham_ A.K.<i>Nanomaterials Chemistry Recent Developments and New Directions</i>, WILEY-VCH Verlag GMBH & Co.,KGaA, Darmstad. 5. ing Zhong Zhang, <i>Optical properties and spectroscopy of Nanomaterials</i>; World Scientific Publishing Pvt. Ltd., Singapore. |
| Website and e-learning source | <ol style="list-style-type: none"> 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 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 /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

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| 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 | | | |
| Nature of the course | | | | |
| | Relevant to global need | Employability oriented | | Addresses Professional Ethics |
| | Relevant to National need | Entrepreneurship oriented | | Addresses Gender Sensitization |
| | Relevant to Regional need | Skill evelopment oriented | | Addresses Environment and Sustainability |
| | Relevant to Local need | | | Addresses Human Values |
| Objectives of the course | <p>The course aims at providing an overall view of</p> <ul style="list-style-type: none"> • 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 | <p>Introduction</p> <p>Difference between polymer and macromolecule – classification – synthetic and natural, organic and inorganic, thermoplastic and thermosetting plasrics, elastomers, fibres and liquid resins</p> <p>Techniques of polymerization</p> <p>Bulk, solution, emulsion and suspension polymerization</p> | | | |
| Unit 2 | <p>Kinetics of polymerization</p> <p>Kinetics of condensation and addition polymerisation; ionic, free radical,</p> | | | |

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| | <p>copolymerisation and coordination polymerisation – reactivity ratios – block and graft copolymers.</p> <p>Characterisation of polymers</p> <p>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.</p> |
| Unit 3 | <p>Molecular Weight and Properties of Polymers</p> <p>Molecular Weight of Polymers-Number Average and Weight Average, Molecular</p> <p>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</p> <p>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</p> |
| Unit4 | <p>Reactions of Polymers-Hydrolysis, Acidolysis, Aminolysis, Addition and Substitution Reactions (One Example Each)</p> <p>Cyclisation, Cross-Linking and Reactions of Specific Functional Groups in the Polymer</p> <p>Polymer technology</p> <p>Processing of polymers – casting, thermoforming, moulding – extrusion, compression, blow moulding – foaming, lamination, reinforcing – processing of fibres – melt, wet and dry spinning.</p> |
| Unit 5 | <p>Speciality polymers</p> <p>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.</p> <p>Polymer Degradation</p> <p>Types of Degradation - Thermal, Mechanical, Ultra Sound, Photo radiation and chemical degradation methods.</p> <p>Rubber-Natural and Synthetic-Structure, Mechanism of Vulcanisation Biodegradable and Non-Biodegradable Polymers.</p> |
| Extended Professional Component | <p>Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved</p> |

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| (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 | <ol style="list-style-type: none"> 1. Gowariker V.R, N.V. Viswanthan and Jayadev Sreedhar. Polymer Science. New Delhi: New Age International, 2015 2. Misra G.S. Introductory Polymer Chemistry. New Delhi: Wiley Eastern, 2010. 3. Bahadur P and Sastry N V. Principles of Polymer Science. New Delhi: Narosa Publishing House, 2005 4. Ahluwalia, V.K. Anuradha Mishra, <i>Polymer Science A Text Book</i>, Ane Books India: New Delhi, 2008. 5. Morrison, R. R.; Boyd, R. N.; Bhattacharjee, S. K. <i>Organic Chemistry</i>, 7th ed.; Pearson: New Delhi, 2011. |
| Reference Books | <ol style="list-style-type: none"> 1. Billmeyer, F.W. Polymer Science. India: Wiley-Interscience, 2007. 2. Seymour, R. B.; Carraher Jr.C.E. <i>Polymer Chemistry: An Introduction</i>, Marcel Dckker Inc : New York, 1981. 3. Sinha, R. <i>Outlines of Polymer Technology</i>, Prentice Hall of India: New Delhi, 2000. 4. Joel R. Fried, <i>Polymer Science and Technology</i>, 3rd ed.; Prentice Hall of India: New Delhi, 2014. |
| Website and e-learning source | <ol style="list-style-type: none"> 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+weights+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 |

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

DEPARTMENT OF CHEMISTRY

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| 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 | | | |
| Nature of the course | | | | |
| | Relevant to global need | Employability oriented | | Addresses Professional Ethics |
| | Relevant to National need | Entrepreneurship oriented | | Addresses Gender Sensitization |
| | Relevant to Regional need | Skill evelopment oriented | | Addresses Environment and Sustainability |
| | Relevant to Local need | | | Addresses Human Values |
| Objectives of the course | <p>The course aims at providing an overall view of</p> <ul style="list-style-type: none"> • 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 | <p>Structure and pharmacological activity</p> <p>Effect of – unsaturation, chain length, isomerism; groups - halogens amino, nitro, nitrite, cyano, acidic, aldehydic, keto, hydroxyl and alkyl groups.</p> <p>Development of Drugs</p> <p>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.</p> <p>Structure and pharmacological activity</p> | | | |

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| | <p>Effect of – unsaturation, chain length, isomerism; groups - halogens amino, nitro, nitrite, cyano, acidic, aldehydic, keto, hydroxyl and alkyl groups.</p> <p>Development of Drugs</p> <p>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.</p> |
| Unit 2 | <p>Indian medicinal plants</p> <p>Some important Indian medicinal plants – tulsi, neem, kizhanelli, mango, semparuthi, adadodai, turmeric and thoothuvalai – uses.</p> <p>Common diseases and their treatment</p> <p>Causes, prevention and treatment of the following diseases:</p> <p>Insect borne diseases– malaria, filariasis, plague;Air borne diseases– diphtheria, whooping cough, influenza, measles, mumps, common cold, tuberculosis; Water borne diseases – cholera, typhoid , dysentery.</p> <p>Digestive system – jaundice; Respiratory system – asthma; Nervous system – epilepsy.</p> <p>Antibiotics</p> <p>Definition – classification – structure and therapeutic uses of chloramphenicol, penicillins , structure activity relationship of chloramphenicol ; therapeutic uses of ampicillin, streptomycin, erythromycin, tetracycline, rifamycin.</p> |
| Unit 3 | <p>Drugs for major diseases</p> <p>Cancer – common causes – chemotherapy – anti neoplastic agents - classification –adverse effects of cytotoxic agents ; alkylating agents – chlorambucil ; anti metabolites – methotrexate, fluorouracil ;Vinca alkaloids – vincristine, vinblastine.Diabetes– types –management of diabetes – insulin ; oral hypoglycemic agents -</p> <p>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.</p> |
| Unit4 | <p>Analgesics and antipyretic agents</p> <p>Classification – action of analgesics – narcotic analgesics –morphine; synthetic analgesics – pethidine, methadone; antipyretic analgesics – salicylic acid derivatives, indolyl derivatives, p-aminophenol derivatives.</p> <p>Anaesthetics</p> <p>Definition, characteristics, classification - general anaesthetics – volatile</p> |

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| | <p>anaesthetics – nitrous oxide, ethers, cyclopropane, chloroform, halothane, trichloro ethylene– storage, advantages and disadvantages ; non volatile anaesthetics – thiopental sodium ; local anaesthetics – requisites – advantages- esters – cocaine, benzocaine ; amides – lignocaine, cinchocaine.</p> <p>Blood and haematological agents</p> <p>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.</p> <p>Anaemia– causes, types and control – anti anaemic drugs.</p> |
| Unit 5 | <p>Clinical Chemistry</p> <p>Blood tests – blood count – complete haemogram – Hb, RBC, GTT, TC, DC, platelets, PCV, ESR; bleeding and clotting time – glucose tolerance test.</p> <p>Significance of clinical test</p> <p>Serum electrolytes–blood Glucose - orthotoluidine method; Renal functions tests - blood urea, creatinine; liver function tests - serum proteins, albumin globulin ratio, serum bilirubin, enzymes SGOT, SGPT; lipid profile – cholesterol, triglycerides, HDL, LDL, coronary risk index. Urine examination – pH, tests for glucose, albumin and bile pigment.</p> |
| 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 | <ol style="list-style-type: none"> Jayashree Ghosh, (1999), A text book of pharmaceutical chemistry, 2nd ed., S.Chand& company, New Delhi. Lakshmi S, (2004), Pharmaceutical chemistry, 3rd ed., Sultan chand& sons, Delhi. Tripathi K D, (2018), Essentials of medical pharmacology, 8th ed., Jaypee brothers medical publishers (P) Limited, New Delhi. Ashutosh Kar, (2018), Medicinal chemistry, 7th ed., New age |

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| | international (P) Limited, Publishers, New Delhi. |
| Reference Books | <p>Reference Books:</p> <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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 anesthetics, and physiological functions of plasma proteins |
| CO 5 | explain classification of analgesics and anesthetics, and physiological functions of plasma proteins |

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 |

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 |
| 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 |

DEPARTMENT OF CHEMISTRY

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|-------------------------------|----------------------------------------------------------|--------------------|----------------------|----------------|
| 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 | Proficiency in organic, inorganic and physical chemistry | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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)

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**

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------|----------------------|------------------------------------------|--------------|--------------------|----------------|-------------------------|--|------------------------|--|-------------------------------|---------------------------|--|---------------------------|--|--------------------------------|---------------------------|--|---------------------------|--|------------------------------------------|------------------------|--|--|--|------------------------|
| Title of the Course | CHEMISTRY FOR PHYSICAL SCIENCES I (FOR MATHEMATICS & PHYSICS STUDENTS) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Paper No. | GEC I (T) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Category | Generic Elective | Year Semester | I/II I/III | Credits | 4 | Course Code | U23GC20 | | | | | | | | | | | | | | | | | | | | |
| Instructional hours per week | Lecture | Tutorial | Lab Practice | | Total | | | | | | | | | | | | | | | | | | | | | | |
| | 4 | - | | | 4 | | | | | | | | | | | | | | | | | | | | | | |
| Prerequisites | Higher secondary chemistry | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Relevant to global need</td> <td style="width: 10%;"></td> <td style="width: 30%;">Employability oriented</td> <td style="width: 10%;"></td> <td style="width: 25%;">Addresses Professional Ethics</td> </tr> <tr> <td>Relevant to National need</td> <td></td> <td>Entrepreneurship oriented</td> <td></td> <td>Addresses Gender Sensitization</td> </tr> <tr> <td>Relevant to Regional need</td> <td></td> <td>Skill evelopment oriented</td> <td></td> <td>Addresses Environment and Sustainability</td> </tr> <tr> <td>Relevant to Local need</td> <td></td> <td></td> <td></td> <td>Addresses Human Values</td> </tr> </table> | | | | | | | | Relevant to global need | | Employability oriented | | Addresses Professional Ethics | Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization | Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability | Relevant to Local need | | | | Addresses Human Values |
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics | | | | | | | | | | | | | | | | | | | | | | | |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization | | | | | | | | | | | | | | | | | | | | | | | |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability | | | | | | | | | | | | | | | | | | | | | | | |
| Relevant to Local need | | | | Addresses Human Values | | | | | | | | | | | | | | | | | | | | | | | |

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| Objectives of the course | <p>This course aims to provide knowledge on the</p> <ul style="list-style-type: none"> • 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 | <p>UNIT I</p> <p>Chemical Bonding and Nuclear Chemistry</p> <p>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.</p> <p>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.</p> <p>Unit II</p> <p>Industrial Chemistry</p> <p>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.</p> <p>Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.</p> |

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| | <p>UNIT III</p> <p>Fundamental Concepts in Organic Chemistry</p> <p>Hybridization: Orbital overlap, hybridization and geometry of CH₄, C₂H₄, C₂H₂ and C₆H₆. Electronic effects: Inductive effect and consequences on K_a and K_b of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric- examples.</p> <p>Reaction mechanisms: Types of reactions–aromaticity (Huckel’s rule)</p> <p>– aromatic electrophilic substitution; nitration, halogenation, Friedel- Craft’s alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine</p> |
| | <p>UNIT IV</p> <p>Thermodynamics and Phase Equilibria</p> <p>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.</p> <p>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).</p> |
| <p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p> | <p>UNIT V</p> <p>Analytical Chemistry</p> <p>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</p> |

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| Skills acquired from this course | |
| Recommended Text | <ol style="list-style-type: none"> 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 ninth edition, 2007. |
| Reference Books | <ol style="list-style-type: none"> 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, fortyfourth edition, 2018. 7. B.K,Sharma,IndustrialChemistry;GOELpublishinghouse,Meerut,sixteenth edition, 2014. |
| Course Learning Outcomes (for Mapping with POs and PSOs) | |
| On completion of the course the students should be able to | |
| <p>CO 1: gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications.</p> <p>CO 2: evaluate the efficiencies and uses of various fuels and fertilizers</p> <p>CO 3: explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.</p> <p>CO 4: apply various thermodynamic principles, systems and phase rule.</p> <p>CO 5: explain various methods to identify an appropriate method for the separation of chemical</p> | |

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 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

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|-----------------------------------|--|--|--|--|--|
| Course Contribution to POs | | | | | |
|-----------------------------------|--|--|--|--|--|

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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|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|----------------|--------------|--------------------|-----------------|
| Title of the Course | CHEMISTRY PRACTICAL FOR PHYSICAL AND BIOLOGICAL SCIENCES (for Mathematics and Physics - I /IIYear) (for Botany and Zoology II Year) | | | | | | |
| Paper No. | GEC 2 (P) | | | | | | |
| Category | Generic Elective | Year | I/ II | Credits | 2 | Course Code | U23GC21P |
| | | Semester | I&II/ III&IV | | | | |
| Instructional hours per week | Lecture | Tutorial | Lab Practice | | Total | | |
| | - | - | 2 | | 2 | | |
| Prerequisites | Higher secondary | | | | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to | | | | Addresses Human |

| CO/PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------------------------------|--------------------------------------------------------------|------|------|------|------|
| Objectives of the course | This course aims to provide the knowledge on the | | | 3 | 3 |
| CO2 | • basics of preparation of solutions. | 3 | 3 | 3 | 3 |
| CO3 | • principles and practical experience of volumetric analysis | 3 | 3 | 3 | 3 |
| CO4 | • identification of organic functional groups | 3 | 3 | 3 | 3 |
| Weightage | 12 | 12 | 12 | 12 | 12 |
| Weighted percentage of | • determination of elements in organic compounds.. | | | | |
| Course Contribution to PSOs | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

VOLUMETRIC ANALYSIS

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid using standard oxalic acid.
1. Estimation of ferrous sulphate using standard Mohr's salt.
3. Estimation of oxalic acid using standard ferrous sulphate.
4. Estimation of potassium permanganate using standard

Level of correlation between PSO'S and CO'S

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

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 |

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

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|-------------------------------------|----------------------------------------------------------------------------------------|-----------------|---------------------|----------------|--------------|--------------------|----------------|
| Title of the Course | CHEMISTRY FOR PHYSICAL SCIENCES II (FOR MATHEMATICS & PHYSICS STUDENTS) | | | | | | |
| Paper No. | GEC 3 (T) | | | | | | |
| Category | Generic | Year | I/II | Credits | 4 | Course Code | U23GC22 |
| | Elective | Semester | II/IV | | | | |
| Instructional hours per week | Lecture | Tutorial | Lab Practice | | Total | | |
| | 4 | - | - | | 4 | | |
| Prerequisites | Chemistry for physical sciences -I | | | | | | |
| Nature of the course | | | | | | | |

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|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |
| Objectives of the course | <p>This course aims at providing knowledge on the</p> <ul style="list-style-type: none"> • 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 | | | |
| Course Outline | <p>UNIT I</p> <p>Co-ordination Chemistry and Water Technology</p> <p>Co-ordination Chemistry: Definition of terms-IUPAC Nomenclature - Werner's theory - EAN rule - Pauling's theory – Postulates - Applications to $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Co}(\text{CN})_6]^{3-}$ Chelation - Biological role of Haemoglobin and Chlorophyll (elementary idea) – Applications in qualitative and quantitative analysis.</p> <p>Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques-BOD, COD.</p> | | | |

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| | <p>Unit II</p> <p>Carbohydrates and Amino acids</p> <p>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.</p> <p>Amino acids: Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only).</p> |
| | <p>UNIT III</p> <p>Electrochemistry</p> <p>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.</p> |
| Extended Professional | <p>UNIT IV</p> <p>Kinetics and Catalysis</p> <p>Order and molecularity. Integrated rate expression for I and II (2A in 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.</p> <p>UNIT V</p> <p>Photochemistry</p> <p>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).</p> <p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> |

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| Component (is a part of internal component only, Not to be included in the external examination question paper) | (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 | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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 | |
| <p>Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to</p> <p>CO 1: write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology</p> <p>CO 2: explain the preparation and property of carbohydrate, amino acids and nucleic acids.</p> <p>CO 3: apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.</p> <p>CO 4: identify the reaction rate, order for chemical reaction and explain the purpose of a catalyst.</p> <p>CO 5: outline the various type of photochemical process.</p> | |

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 |

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

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|-------------------------------|------------------------------------------------------------------------------|---------------------|----------------------|----------------|
| Title of the course | CHEMISTRY FOR BIOLOGICAL SCIENCES-I (FOR ZOOLOGY/ 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 | | | |

Nature of the course

| | | | | |
|---------------------------|--|---------------------------|--|------------------------------------------|
| Relevant to global need | | Employability oriented | | Addresses Professional Ethics |
| Relevant to National need | | Entrepreneurship oriented | | Addresses Gender Sensitization |
| Relevant to Regional need | | Skill evelopment oriented | | Addresses Environment and Sustainability |
| Relevant to Local need | | | | Addresses Human Values |

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| Objectives of the course | <p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> • 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. |
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Course Outline

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| Unit 1 | <p>Chemical Bonding and Nuclear Chemistry</p> <p>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.</p> <p>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</p> |
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| | applications. |
| Unit 2 | <p>Industrial Chemistry</p> <p>Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required).</p> <p>Silicones: Synthesis, properties and uses of silicones.</p> <p>Fertilizers: Urea, ammonium sulphate, potassium nitrate NPK fertilizer, superphosphate, triple superphosphate.</p> |
| Unit 3 | <p>Fundamental Concepts in Organic Chemistry</p> <p>Hybridization: Orbital overlap hybridization and geometry of CH₄, C₂H₄, C₂H₂ and C₆H₆. Polar effects: Inductive effect and consequences of K_a and K_b of organic acids and bases, electronic, mesomeric, hyperconjugation and steric- examples and explanations.</p> <p>Reaction Mechanism: Types of reaction-aromaticity-aromatic electrophilic substitution, nitration, halogenation, Friedal Crafts alkylation and acylation.</p> <p>Heterocyclic compounds Preparation, properties of pyrrole, and pyridine</p> |
| Unit 4 | <p>Drugs and speciality chemicals</p> <p>Definition-structure and uses- Antibiotics-viz, penicilin, cholamphenicol and streptomycin, Anaesthetics viz., chloroform and ether, antipyretics viz., aspirin, paracetamol and ibuprofen. Artificial sweetner viz., saccharin, aspartame and cyclamate, Organic halogen compounds viz Freon, Teflon</p> |
| Unit 5 | <p>Analytical Chemistry</p> <p>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.</p> |
| Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper) | <p>Questions related to the above topics from various competitive examinations (UPSC/JAM/TNPSC and others to be solved)</p> |
| Skills acquired from this course | <p>Knowledge, Problem solving, Analytical ability, Professional</p> |

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|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 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 applications. |
| 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 |

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

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|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------|----------------|--------------|------------------------------------------|----------------|
| Title of the Course | CHEMISTRY FOR BIOLOGICAL SCIENCES II (FOR BOTANY AND ZOOLOGY STUDENTS) | | | | | | |
| Paper No. | GEC 5(T) | | | | | | |
| Category | Generic | Year | II | Credits | 4 | Course Code | U23GC24 |
| | Elective | Semester | IV | | | | |
| Instructional hours per week | Lecture | Tutorial | Lab Practice | | Total | | |
| | 4 | - | - | | 4 | | |
| Prerequisites | Chemistry for Biological Sciences I | | | | | | |
| Nature of the course | | | | | | | |
| Relevant to global need | | Employability oriented | | | | Addresses Professional Ethics | |
| Relevant to National need | | Entrepreneurship oriented | | | | Addresses Gender Sensitization | |
| Relevant to Regional need | | Skill evelopment oriented | | | | Addresses Environment and Sustainability | |
| Relevant to Local need | | | | | | Addresses Human Values | |
| Objectives of the course | This course aims to provide knowledge on <ul style="list-style-type: none"> • 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 | | | | | | |

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|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Course Outline | <p>UNIT I</p> <p>Co-ordination Chemistry and Water Technology</p> <p>Co-ordination Chemistry: Definition of terms - IUPAC Nomenclature - Werner's theory - EAN rule - Pauling's theory – Postulates - Applications to $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Co}(\text{CN})_6]^{3-}$ Chelation - Biological role of Hemoglobin and Chlorophyll (elementary idea) - Applications in qualitative and quantitative analysis.</p> <p>Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques – BOD and COD.</p> |
| | <p>Carbohydrates</p> <p>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.</p> |
| | <p>UNIT III</p> <p>Amino Acids and Essential elements of biosystem</p> <p>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.</p> |
| | <p>UNIT IV</p> <p>Electrochemistry</p> <p>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.</p> |
| | <p>UNIT V</p> |

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>Photochemistry</p> <p>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).</p> |
| <p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p> | <p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved</p> <p>(To be discussed during the Tutorial hours)</p> |
| <p>Skills acquired from this course</p> | <p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p> |
| <p>Recommended Text</p> | <ol style="list-style-type: none"> 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. |
| <p>Reference Books</p> | <ol style="list-style-type: none"> 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 scientific 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**

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