# PERIYAR UNIVERSITY

## Salem-636 011

**(NAAC 'A$^{++}$' Grade – NIRF Rank 59)**

## DEPARTMENT OF ENVIRONMENTAL SCIENCE

## FIVE YEAR INTEGRATED

## M.Sc. ENVIRONMENTAL SCIENCE

**[Choice Based Credit System (CBCS)]**

**[TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION]**

# OBE SYLLABUS

***(Effective from the academic year 2023-2024 and thereafter)***

**FIVE YEAR INTEGRATED M.Sc. ENVIRONMENTAL SCIENCE**

**OBE REGULATIONS AND SYLLABUS**
**TANSCHE PRESCRIBED SYLLABUS**

*(with effect from the academic year 2023-2024 onwards)*

## 1. Preamble

Continual population growth and improved living standards continue to exert significant strain on our environment. The advent of industrialization and urbanisation has triggered a spectrum of environmental issues spanning air, water, and soil contamination, energy shortages, land degradation, deforestation, biodiversity loss, global warming, and climate change. Given these critical challenges, it is imperative to approach environmental problems through a scientific lens in today's world. Consequently, there exists a crucial need to cultivate a new cadre of skilled professionals in the multidisciplinary realm of Environmental Science. By implementing integrated degree programmes, we aim to equip the next generation of graduates with the necessary expertise to tackle and resolve these global environmental crises.

## 2. General Graduate Attributes

1. ***Environmental Knowledge***

   Apply the basic knowledge of environmental components and its interactions and to conceptualize the domains towards environmental protection and to visualize the environmental management perspectives

2. ***Critical Thinking Skills***

   To critically analyze and evaluate the environment related issues and their sustainable management

3. ***Problem Solving Skills***

   Identify, analyze and assess the complex environmental issues and to apply the knowledge to solve the issues

4. ***Technical Skills***

   To acquire and equip with technical knowledge on critical environmental problems and to devise technical strategies for the betterment of the environment

5. ***Use of Modern Tools***

   To acquire the knowledge and working experience on modern tools in terms of instrumentation, softwares and research methods which can be used to assess the environmental quality

6. ***Research Skills***

   Improve the research-oriented skills by involving the basic, applied and field-based research works

7. ***Individual and Team Work***

   To develop the skills to work individually as well as a team in a proposed project work in order to manage the task

8. ***Project Management***

To manage and coordinate specific environmental work, tasks or projects and to apply specific principles and methodologies to carry out environmental projects

9. ***Societal and Environmental Concern***

To have appealing concern over the environment and its well-being, and to apply the acquired knowledge and skills for the societal upliftment and environmental protection

10. ***Environmental Management***

To improve to undertake and manage environment related works and to develop a leadership quality and capacity to manage a team for carrying out assigned tasks

11. ***Innovation and Entrepreneurship***

To apply the acquired skills and knowledge in the field of environmental science and to initiate small scale start-ups and upscale the process towards entrepreneurship

**3. Programme Specific Qualification Attributes**

- **Knowledge and understanding level (K1 and K2)**

Students will be able to understand the basic components of ecology and environment, chemistry of pollutants and their toxic effects, biodiversity and natural resources and their process for sustainable development.

- **Application level (K3)**

Students will be capable of applying microbes, plants and animals for potential environmental cleanup and green energy production, and to generate value-added products through waste recycling.

- **Analytical level (K4)**

Students will be able to analyze the environmental quality parameters and to address the issues of different environmental compartments.

- **Evaluation capability level (K5)**

Students can acquire the capability of evaluating the responsible factors for environmental related issues and can be able to apply the acquired knowledge in providing solutions.

- **Scientific or synthesis level (K6)**

Students will be able to synthesize or develop new processes, products and to formulate new scientific tools related to sustainable environmental management.

## 4. Vision

- Create and maintain excellence in Environmental Science and contribute knowledge and effort in bringing up rich posterity in environmental sustainability.

## 5. Programme Objectives and Outcomes

### Programme Educational Objectives (PEOs)

Graduates of Integrated M.Sc. Environmental Science program will be

| | |
|---|---|
| PEO1 | Utilizing domain knowledge to understand the environment and to provide solutions for the development of society. |
| PEO2 | Applying research and acquired skills with a rich set of communication and leadership skills to sustain in the environment. |
| PEO3 | Expressing constant development in their specialized career through life-long learning, appreciating human values and ethics. |

### Programme Outcomes (PO)

After successful completion of the Five years Integrated M.Sc. Environmental Science Programme, the students are expected to have

| | |
|---|---|
| PO1 | Deep knowledge in natural resources, ecosystem and their biogeochemical processes, biodiversity, Geographic Information Systems (GIS) and their importance, various elements of climate change and environmental clearance procedures. |
| PO2 | Good understating in toxicological properties of environmental pollutants and their impact on environment, environmental remediation bioprocess, occupational diseases, nanomaterials and their toxicity. |
| PO3 | Capability in applying microbes, plants and animals for potential environmental cleanup and energy production, and to generate value added products through waste recycling and other sustainable environmental management practices. |
| PO4 | Acquire more knowledge and proficiency in Environmental Impact Assessment, (EIA), pollution monitoring and management. |
| PO5 | Skills in methods used for environmental cleanup, EIA process, GIS to monitor the environmental issues and critically analyzing the global climate change. |
| PO6 | Expertise to become an environmental consultant / manager at local, regional and national level industry / institution /organizations. |
| PO7 | Capability to become an entrepreneur in the field of EIA, GIS, waste management and waste recycling, natural product development, and environmental safety trainer. |
| PO8 | Qualification to be employed as a researcher / scientist / faculty in Colleges / Universities / Government sectors / Research and Development organizations. |

## 6. Candidate's eligibility for admission

Candidate who has passed in Higher Secondary Examinations with science subjects (Physics, Chemistry, Mathematics/ Biology/ Botany/ Zoology/ Agriculture/ Microbiology/ Computer Science or any other Life Science subjects or any other Examination as equivalent thereto under the Board of Higher Secondary Education, Government of Tamil Nadu / CBSE / ICSE or any other boards equivalent thereto shall be eligible for admission to Five years Integrated M.Sc. Degree Programme in Environmental Science.

## 7. Duration of the programme

The duration of the Integrated M.Sc. Environmental Science shall be over a period of **Five Years** from the commencement of the course. Undergraduate degree shall be awarded after the successful completion of three years (up to VI Semester).

## 8. Curriculum structure for each semester as per courses alignment

The curriculum for the Integrated M.Sc. Environmental Science Degree Programme shall comprise the following courses according to the syllabus and books prescribed from time to time.

| | |
|---|---|
| Part - I | Tamil / Other languages |
| Part - II | Communicative & Foundation English |
| Part - III | 1. Core Courses |
| | 2. Allied Courses |
| | 3. Major Elective Courses |
| | 4. Research Projects |
| | 5. Credit Seminar |
| | 6. Field Studies |
| Part - IV | 1. Non-Major Elective Courses |
| | 2. Skill Based Elective Courses |
| | 3. Industry Oriented Self-Learning Courses |
| | 4. Environmental Studies (UGC mandatory course) |
| | 5. SWAYAM/ MOOC Courses |
| | 6. Value Education |
| | 7. Human Rights |
| Part - V | Extension Activities (NSS / NCC / Sports / YRC and other co- and extracurricular activities offered under Part V) |

**Semester-wise Courses**

| **Semester I** | | **Semester II** | |
|---|---|---|---|
| **S.No.** | **Courses** | **S.No.** | **Courses** |
| 1.1 | Language - Tamil I | 2.1 | Language - Tamil II |
| 1.2 | English I | 2.2 | English II |
| 1.3 | Core Course – CC I | 2.3 | Core Course – CC II |
| 1.4 | Core Practical Course – CL I | 2.4 | Core Practical Course – CL II |
| 1.5 | Allied Course – AC I | 2.5 | Allied Course – AC II |
| 1.6 | Allied Practical Course - AL I | 2.6 | Allied Practical Course – AL II |
| 1.7 | Ability Enhancement Compulsory Course – AECC I | 2.7 | Ability Enhancement Compulsory Course – AECC II |
| 1.8 | Skill Enhancement Course- SEC | 2.8 | Skill Enhancement Course – |

| | | | |
|---|---|---|---|
| | I | | SEC II |
| **Semester III** | | **Semester IV** | |
| 10.5 | Language - Tamil III | 4.1 | Language - Tamil IV |
| 3.2 | English III | 4.2 | English IV |
| 3.3 | Core Course – CC III | 4.3 | Core Course - CC IV |
| 3.4 | Core Practical Course – CL III | 4.4 | Core Practical - CL IV |
| 3.5 | Allied Course – AP III | 4.5 | Allied Course - CC IV |
| 3.6 | Allied Practical Course – AL III | 4.6 | Allied Practical Course – AL IV |
| 3.7 | Ability Enhancement Compulsory Course - AECC III | 4.7 | Ability Enhancement Compulsory Course - AECC IV |
| 3.8 | Skill Enhancement Course III | 4.8 | Skill Enhancement Course IV |
| 3.9 | UGC Mandatory Course | 4.9 | UGC Mandatory Course |
| **Semester V** | | **Semester VI** | |
| 5.1 | Core Course – CC V | 6.1 | Core Course – CC VIII |
| 5.2 | Core Course – CC VI | 6.2 | Core Course – CC IX |
| 5.3 | Core Course – CC VII | 6.3 | Core Course – CC X |
| 5.4 | Core Project Work & Viva-Voce | 6.4 | Core Practical Course – CL VI |
| 5.5 | Core Practical Course – CL V | 6.5 | Elective Course – EC II - Discipline Specific Elective II |
| 5.6 | Elective Course – EC I - Discipline Specific Elective I | 6.6 | Extension Activity I |
| 5.7 | Value Education Course | 6.7 | Professional Competency Skill Course |
| 5.8 | Summer Internship /Industrial Training | | |
| **Semester VII** | | **Semester VIII** | |
| 7.1 | Core Course – CC XI | 8.1 | Core Course – CC XIV |
| 7.2 | Core Course – CC XII | 8.2 | Core Course – CC XV |
| 7.3 | Core Course – CC XIII | 8.3 | Core Course – CC XVI |
| 7.4 | Core Practical Course – CL VII | 8.4 | Core Practical Course VIII |
| 7.5 | Elective Course – EC III - Discipline Specific Elective III | 8.5 | Non-Major Elective Course - NME IV – (SWAYAM) |
| 7.6 | Ability Enhancement Compulsory Course - AECC V | 8.6 | Ability Enhancement Compulsory Course – AECC VI |
| 7.7 | Skill Enhancement Course - SEC V | 8.7 | Skill Enhancement Course – SEC VI |
| | | 8.8 | Human Rights |
| **Semester IX** | | **Semester X** | |
| 9.1 | Core Course – CC XVII | 10.1 | Core Course - CC XX |
| 9.2 | Core Course – CC XVIII | 10.2 | Core Course - CC XXI |
| 9.3 | Core Course - CC XIX | 10.3 | Core Course - Industrial Training |
| 9.4 | Non-Major Elective Course – NME IV | 10.4 | Core Project Work & Viva - Voce |
| 9.5 | Core Course – Industry Specific | 10.5 | Ability Enhancement Compulsory Course - AECC VIII |
| 9.6 | Ability Enhancement Compulsory Course VII | 10.6 | Skill Enhancement Course VIII |
| 9.7 | Skill Enhancement Course VII | 10.7 | Extension Activity – II |
| 9.8 | Internship / Industrial Activity | 10.8 | Credit Seminar |

# 09. CBCS - Scheme of Examinations (Semester-wise structure)

| S. No. | Part | Course Code | Course Title | Credits | Contact Hrs/ Week | Internal Marks | External Marks | Total Marks |
|---|---|---|---|---|---|---|---|---|
| 1.1 | I | 23UPEVS2T01 | Language - Tamil I | 3 | 6 | 25 | 75 | 100 |
| 1.2 | II | 23UPEVS2E01 | English I | 3 | 4 | 25 | 75 | 100 |
| 1.3 | III | 23UPEVS2C01 | Core Course - CC I - Earth Ecology & Environment | 4 | 5 | 25 | 75 | 100 |
| 1.4 | III | 23UPEVS2CL1 | Core Practical Course - CL I - Core Practical I | 4 | 5 | 40 | 60 | 100 |
| 1.5 | III | 23UPEVS2A01 | Allied Course - AC I - Allied Chemistry I | 3 | 4 | 25 | 75 | 100 |
| 1.6 | III | 23UPEVS2AL1 | Allied Practical Course - AL I - Allied Practical - I | 2 | 2 | 40 | 60 | 100 |
| 1.7 | IV | 23UPEVS2AE1 | Ability Enhancement Compulsory Course (AECC) - Soft Skill I | 2 | 2 | 25 | 75 | 100 |
| 1.8 | IV | 23UPEVS2SE1 | Skill Enhancement Course I - Foundation | 2 | 2 | 25 | 75 | 100 |
| | | | Sub Total | **23** | **30** | **230** | **570** | **800** |
| **II Semester** | | | | | | | | |
| 2.1 | I | 23UPEVS2T02 | Language – Tamil II | 3 | 6 | 25 | 75 | 100 |
| 2.2 | II | 23UPEVS2E02 | English II | 3 | 4 | 25 | 75 | 100 |
| 2.3 | III | 23UPEVS2C02 | Core Course - CC II - Environmental Chemistry | 4 | 5 | 25 | 75 | 100 |
| 2.4 | III | 23UPEVS2CL2 | Core Practical Course - CL II -Core Practical II | 4 | 5 | 40 | 60 | 100 |
| 2.5 | III | 23UPEVS2A02 | Allied Course - AC II - Allied Chemistry-II | 3 | 4 | 25 | 75 | 100 |
| 2.6 | III | 23UPEVS2AL2 | Allied Practical Course - AL II - Allied Practical II | 2 | 2 | 40 | 60 | 100 |
| 2.7 | IV | 23UPEVS2AE2 | Ability Enhancement Compulsory Course (AECC) - Soft Skill II | 2 | 2 | 25 | 75 | 100 |
| 2.8 | IV | 23UPEVS2SE2 | Skill Enhancement Course - SEC II - NME | 2 | 2 | 25 | 75 | 100 |
| | | | Sub Total | **23** | **30** | **230** | **570** | **800** |
| **III Semester** | | | | | | | | |
| 3.1 | I | 23UPEVS2T03 | Language - Tamil III | 3 | 6 | 25 | 75 | 100 |
| 3.2 | II | 23UPEVS2E03 | English III | 3 | 4 | 25 | 75 | 100 |
| 3.3 | III | 23UPEVS2C03 | Core Course - CC III - Environmental Microbiology | 4 | 4 | 25 | 75 | 100 |
| 3.4 | III | 23UPEVS2CL3 | Core Practical Course - CL III - Core Practical III | 4 | 5 | 40 | 60 | 100 |
| 3.5 | III | 23UPEVS2A03 | Allied Course - AC III - Allied Botany | 3 | 4 | 25 | 75 | 100 |
| 3.6 | III | 23UPEVS2AL3 | Allied Practical Course - AL III - Allied Practical III | 2 | 2 | 40 | 60 | 100 |
| 3.7 | IV | 23UPEVS2AE3 | Ability Enhancement Compulsory Course (AECC) - Soft Skill III | 2 | 2 | 25 | 75 | 100 |
| 3.8 | IV | 23UPEVS2SE3 | Skill Enhancement Course - SEC III - Entrepreneurial Skill | 1 | 2 | 25 | 75 | 100 |
| 3.9 | IV | 23UPEVS2EVS | UGC Mandatory Course - Environmental Studies | - | 1 | - | - | - |
| | | | Sub Total | **22** | **30** | **230** | **570** | **800** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **IV Semester** | | | | | | | | |
| 4.1 | I | 23UPEVS2T04 | Language - Tamil IV | 3 | 6 | 25 | 75 | 100 |
| 4.2 | II | 23UPEVS2E04 | English IV | 3 | 4 | 25 | 75 | 100 |
| 4.3 | III | 23UPEVS2C04 | Core Course - CC IV - Environmental Biochemistry & Toxicology | 4 | 5 | 25 | 75 | 100 |
| 4.4 | III | 23UPEVS2CL4 | Core Practical Course - CL IV - Core Practical IV | 4 | 5 | 40 | 60 | 100 |
| 4.5 | III | 23UPEVS2A04 | Allied Course AC IV- Allied Zoology | 3 | 3 | 25 | 75 | 100 |
| 4.6 | III | 23UPEVS2AL4 | Allied Practical Course - AL IV - Allied Practical IV | 2 | 2 | 40 | 60 | 100 |
| 4.7 | IV | 23UPEVS2AE4 | Ability Enhancement Compulsory Course (AECC) - Soft Skill IV | 2 | 2 | 25 | 75 | 100 |
| 4.8 | IV | 23UPEVS2SE4 | Skill Enhancement Course IV - NME | 2 | 2 | 25 | 75 | 100 |
| 4.9 | IV | 23UPEVS2EVS | UGC Mandatory Course - Environmental Studies | 2 | 1 | 25 | 75 | 100 |
| | | | Sub Total | **25** | **30** | **255** | **645** | **900** |
| **V Semester** | | | | | | | | |
| 5.1 | III | 23UPEVS2C05 | Core Course - CC V - Biodiversity & Conservation | 4 | 5 | 25 | 75 | 100 |
| 5.2 | III | 23UPEVS2C06 | Core Course - CC VI - Environmental Pollution | 4 | 5 | 25 | 75 | 100 |
| 5.3 | III | 23UPEVS2C07 | Core Course - CC VII - Waste Management | 4 | 5 | 25 | 75 | 100 |
| 5.4 | III | 23UPEVS2P01 | Core Project I - Project with Viva-Voce | 4 | 5 | 25 | 75 | 100 |
| 5.5 | III | 23UPEVS2CL5 | Core Practical Course - CL V - Core Practical V | 4 | 5 | 40 | 60 | 100 |
| 5.6 | III | 23UPEVS2E01 | Elective Course - EC I - Discipline Specific Elective I | 2 | 3 | 25 | 75 | 100 |
| 5.7 | IV | 23UPEVS2VEC | Value Education Course - Yoga | 2 | 2 | 25 | 75 | 100 |
| 5.8 | III | 23UPEVS2I01 | Summer Internship / Industrial Training I | 2 | - | - | 100 | 100 |
| | | | Sub Total | **26** | **30** | **190** | **610** | **800** |
| **VI Semester** | | | | | | | | |
| 6.1 | III | 23UPEVS2C08 | Core Course - CC VII - Environmental Analytical Techniques | 4 | 6 | 25 | 75 | 100 |
| 6.2 | III | 23UPEVS2C09 | Core Course - CC IX - Biostatistics & Environmental Modeling | 4 | 6 | 25 | 75 | 100 |
| 6.3 | III | 23UPEVS2C10 | Core Course - CC X - Energy & Environment | 4 | 6 | 25 | 75 | 100 |
| 6.4 | III | 23UPEVS2CL6 | Core Practical Course - CL VI - Core Practical VI | 4 | 5 | 40 | 60 | 100 |
| 6.5 | III | 23UPEVS2E02 | Elective Course - EC II - Discipline Specific Elective II | 2 | 5 | 25 | 75 | 100 |
| 6.6 | IV | 23UPEVS2X01 | Extension Activity I | 1 | - | - | 100 | 100 |
| 6.7 | IV | 23UPEVS2PCS | Professional Competency Skill Course | 2 | 2 | 25 | 75 | 100 |
| | | | Sub Total | **21** | **30** | **165** | **535** | **700** |
| | | | **UG TOTAL CREDITS** | **140** | | **1300** | **3500** | **4800** |

| S. No. | Part | Course Code | Course Title | Credits | Contact Hrs/ Week | Internal Marks | External Marks | Total Marks |
|---|---|---|---|---|---|---|---|---|
| | | | **VII Semester** | | | | | |
| 7.1 | III | 23UPEVS2C11 | Core Course - CC XI - Natural Resources Management | 4 | 5 | 25 | 75 | 100 |
| 7.2 | III | 23UPEVS2C12 | Core Course - CC XII - Environmental Impact Assessment | 4 | 6 | 25 | 75 | 100 |
| 7.3 | III | 23UPEVS2C13 | Core Course - CC XIII - Environmental Biotechnology | 4 | 5 | 25 | 75 | 100 |
| 7.4 | III | 23UPEVS2CL7 | Core Practical Course - CL VII - Core Practical VII | 4 | 6 | 40 | 60 | 100 |
| 7.5 | III | 23UPEVS2E03 | Elective Course - EC III - Discipline Specific Elective III | 2 | 4 | 25 | 75 | 100 |
| 7.6 | IV | 23UPEVS2AE5 | Ability Enhancement Compulsory Course (AECC) - Soft Skill V | 2 | 2 | 25 | 75 | 100 |
| 7.7 | IV | 23UPEVS2SE5 | Skill Enhancement Course V | 2 | 2 | 25 | 75 | 100 |
| | | | **Sub Total** | **22** | **30** | **190** | **510** | **700** |
| | | | **VIII Semester** | | | | | |
| 8.1 | III | 23UPEVS2C14 | Core Course - CC XIV - Environmental Health & Safety | 4 | 5 | 25 | 75 | 100 |
| 8.2 | III | 23UPEVS2C15 | Core Course - CC XV - Remote Sensing & GIS | 4 | 5 | 25 | 75 | 100 |
| 8.3 | III | 23UPEVS2C16 | Core Course - CC XVI - Pollution Control Strategies | 4 | 5 | 25 | 75 | 100 |
| 8.4 | III | 23UPEVS2CL8 | Core Practical Course - CL VIII - Core Practical VIII | 4 | 6 | 40 | 60 | 100 |
| 8.5 | III | 23UPEVS2N01 | Non-Major Elective Course NME I - (SWAYAM Course) | 2 | 3 | 25 | 75 | 100 |
| 8.6 | IV | 23UPEVS2AE6 | Ability Enhancement Compulsory Course (AECC) - Soft Skill VI | 2 | 2 | 25 | 75 | 100 |
| 8.7 | IV | 23UPEVS2SE6 | Skill Enhancement Course VI | 2 | 2 | 25 | 75 | 100 |
| 8.8 | IV | 23UPPGC1H01 | Human Rights | 1 | 2 | 25 | 75 | 100 |
| | | | **Sub Total** | **23** | **30** | **215** | **585** | **800** |
| | | | **IX Semester** | | | | | |
| 9.1 | III | 23UPEVS2C17 | Core Course - CC XVII - Climate Change & Current Issues | 4 | 5 | 25 | 75 | 100 |
| 9.2 | III | 23UPEVS2C18 | Core Course - CC XVIII - Research Methodology | 5 | 5 | 25 | 75 | 100 |
| 9.3 | III | 23UPEVS2C19 | Core Course - CC XIX - Disaster Management | 4 | 4 | 25 | 75 | 100 |
| 9.4 | III | 23UPEVS2N02 | Non-Major Elective Course NME II | 2 | 3 | 25 | 75 | 100 |
| 9.5 | III | 23UPEVS2ISM | Core Course - Industry Specific Module | 4 | 4 | 25 | 75 | 100 |
| 9.6 | IV | 23UPEVS2AE7 | Ability Enhancement Compulsory Course (AECC)-Soft skill-VII | 2 | 2 | 25 | 75 | 100 |
| 9.7 | IV | 23UPEVS2SE7 | Skill Enhancement Course VII -Term Paper & Seminar Presentation | 2 | 2 | 25 | 75 | 100 |
| 9.8 | III | 23UPEVS2I02 | Internship / Industrial Activity II | 2 | 5 | - | 100 | 100 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | **Sub Total** | **25** | **30** | **175** | **625** | **800** |
| | | | **X Semester** | | | | | |
| 10.1 | III | 23UPEVS2C20 | Core Course - CC XX - Environmental Law & Policies | 4 | 4 | 25 | 75 | 100 |
| 10.2 | III | 23UPEVS2C21 | Core Course - CC XXI - Environmental Audit & Quality Systems | 4 | 4 | 25 | 75 | 100 |
| 10.3 | III | 23UPEVS2IT3 | Core Course - Industrial Training | 3 | - | - | 100 | 100 |
| 10.4 | III | 23UPEVS2P02 | Core Project Work & Viva - Voce | 6 | 17 | 40 | 60 | 100 |
| 10.5 | IV | 23UPEVS2AE8 | Ability Enhancement Compulsory Course (AECC) - Soft Skill-VIII | 2 | 2 | 25 | 75 | 100 |
| 10.6 | IV | 23UPEVS2SE8 | Skill Enhancement Course VIII - Professional Competency | 2 | 2 | 25 | 75 | 100 |
| 10.7 | IV | 23UPEVS2X02 | Extension Activity II | 1 | - | - | 100 | 100 |
| 10.8 | III | 23UPEVS1CS1 | Credit Seminar | 1 | 1 | 50 | - | 50 |
| | | | **Sub Total** | **23** | **30** | **190** | **560** | **750** |
| | | | **PG Total Credits** | **93** | | **770** | **2280** | **3050** |
| | | | **Total I – X Semester** | **233** | | **2070** | **5780** | **7850** |

**10 Examinations**

- Examinations are conducted at the end of every Semester.
- The examination for the Odd Semester (I, III, V, VII and IX) will be held in November/December and the Even Semester (II, IV, VI, VIII and X) will be held in the month of April/May of every academic year.
- Candidates failing in any subject (both theory, practical and skill) will be permitted to appear for such failed subjects in the same syllabus structure at subsequent examinations within next 5 years. Failing which, the candidate has to complete the course in the existing syllabus structure at the time of examination.
- The practical examinations for major and allied courses will be held at the end of each semester.

## 11. Requirements for proceeding to subsequent semesters

- A candidate shall be permitted to appear for the University examinations for any semester (practical/theory) if he / she secures not less than 75% of attendance in the number of working days during the semester.
- Candidates shall register their names for the First semester examination after the admission in the PG courses.
- Candidates shall be permitted to proceed from the First Semester up to the Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current semester subjects.
- Candidates shall be eligible to proceed to the subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Syndicate from time to time. Provided in case of candidate earning less than 50% of attendance in any one of the semesters due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Head of the Institution, shall be permitted to proceed to the next semester and to complete the course of study. Such candidate shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

## 12. Scheme for Evaluation and Attainment Rubrics

Evaluation will be done on a continuous basis and will be evaluated four times during the course work. The first evaluation will be in the 7$^{th}$ week, the second in the 11$^{th}$ week, third in the 16$^{th}$ week and the end - semester examination in the 19$^{th}$ week. Evaluation may be by objective type questions, short answers, essays or a combination of these, but the end semester examination is a University theory examination with prescribed question paper pattern.

**Attainment Rubrics for Theory Courses**

***Internal*** *(Max. Marks - 25)*

| Attendance | Seminar | Assignment | Internal/Cycle Test | Total |
|---|---|---|---|---|
| 5 | 5 | 5 | 10 | 25 |

***External (Max. Marks - 75)***

***Question Paper Pattern (Theory)***

| Section | Approaches | Mark Pattern | K Level |
|---|---|---|---|
| A | One Word<br>(Answer all questions) | 20 x 1 = 20<br>(Multiple Choice Questions) | K1, K2<br>K3, K4<br>K5, K6 |
| B | 100 to 200 words<br>(Answer any three out of five questions) | 3 x 5 = 15<br>(Analytical Type Questions) | |
| C | 500 to 1000 words<br>(Answer all five questions) | 5 x 8 = 40<br>(Essay Type Questions) | |

***Attainment Rubrics for Practical Courses***

*Internal (Max. Marks - 40)*

| Attendance | Practical Test | Periodical Performance/Observation | Total Marks |
|---|---|---|---|
| 5 | 25 | 10 | 40 |

*External (Max. Marks - 60)*

| Major Experiment | Minor Experiment | Spotters | Record | Viva-Voce | Total Marks |
|---|---|---|---|---|---|
| 20 | 15 | 15 | 5 | 5 | 60 |

***Attainment Rubrics for Research Project***

*Internal (Max. Marks - 50)*

| | |
|---|---|
| Performance/Skills/ Attendance | 50 Marks |

*External (Max. Marks - 100)*

| | |
|---|---|
| Viva-Voce Presentation | 25 Marks |
| Dissertation | 75 Marks |

**14. Passing Minimum**

- There shall be no passing minimum for internal marks.
  For external examination, passing minimum shall be of 50% (38 Marks out of 75 Marks) prescribed for the course.
- In the aggregate (External + Internal) the passing minimum shall be of 50% for each course / practical/ project and viva-voce.

- Grading shall be based on overall marks obtained (Internal + External) in the respective courses.

**15. Classification of Successful Candidates**

- Candidates who obtain 75% of the marks in the aggregate shall be declared to have passed the examination in **First Class with Distinction** provided they pass all the examinations prescribed for the course at the first appearance.

- Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in **First Class.**

- All other successful candidates securing below 60% shall be declared to have passed in the **Second Class.**

**16. Grading System**

Evaluation of performance of students is based on ten-point scale grading system as given below.

| **Ten Point Scale** | | | |
|---|---|---|---|
| **Grade of Marks** | **Grade points** | **Letter Grade** | **Description** |
| 90-100 | 9.0-10.0 | O | Outstanding |
| 80-89 | 8.0-8.9 | D+ | Excellent |
| 75-79 | 7.5-7.9 | D | Distinction |
| 70-74 | 7.0-7.4 | A+ | Very Good |
| 60-69 | 6.0-6.9 | A | Good |
| 50-59 | 5.0-5.9 | B | Average |
| 00-49 | 0.0 | U | Re-Appear |
| ABSENT | 0.0 | AAA | Absent |

| Course Code | Course Name | category | L | T | P | S | Credits | Ins.Hrs | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | CIA | External | Total |
| 23UFTA01 | பொதுத்தமிழ் -1 | Supportive | Y | - | - | - | 3 | 6 | 25 | 75 | 100 |

# பொதுத்தமிழ் -1 (semester-I)

| | | | |
|---|---|---|---|
| **Pre-Requisite** | பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும் | | |
| **Learning Objectives** | | | |
| **The Main Objectives of this Course are to :** | | | |
| • முதலாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ் மொழி இலக்கியங்களை அறிமுகம் செய்தல்<br>• தற்கால இலக்கியப் போக்குகளையும் இலக்கணங்களையும் மாணவர் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்<br>• தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை<br>• மேற்கொள்ளுதல் | | |
| **Expected Course Outcomes** | | | |
| **On the Sucessful completion of the Course,Students will be able to** | | | |
| இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர் | | | |
| **CO 1** | பாரதியார் காலந்தொட்டு தற்காலப் புதுக்கவிதைகள் வரை கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன் பெறுதல்.. | | **K1;K2** |
| **CO 2** | புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர் | | **K2** |
| **CO 3** | இக்கால இலக்கிய வகையினைக் கற்பதன் மூலம் படைப்பாக்கத் திறனைப் பெறுவர் | | **K4** |
| **CO 4** | மொழியறிவோடு சிந்தனைத்திறன் அதிகரித்தல் | | **K3** |
| **CO 5** | தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்கவும் அறிந்து கொள்ளுதல் | | **K4** |
| **K1 - Remember; K2 - Undestand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create** | | | |
| **Unit -I** | மரபுக் கவிதை | | **18 hours** |
| **1. பெ. சுந்தரனார் - தமிழ்த் தெய்வ வணக்கம்**<br>**2. பாரதிதாசன் - சிறுத்தையே வெளியில் வா**<br>**3. கவிமணி - புத்தரும் சிறுவனும்** | | | |

| | | |
|---|---|---|
| **4. முடியரசன் – மொழி உணர்ச்சி**<br>**5. கண்ணதாசன் – ஆட்டனத்தி ஆதிமந்தி - ஆதிமந்தி புலம்பல்**<br>**6. சுரதா – துறைமுகம் (வினாத்தாள்)**<br>**7. தமிழ் ஒளி – கடல்** | | |
| **Unit -II** | **புதுக்கவிதை** | **18 hours** |
| **1. அப்துல் ரகுமான் - வீட்டுக்கொரு மரம் வளர்ப்போம்**<br>**2. ஈரோடு தமிழன்பன் – சென்ரியூ கவிதைகள்**<br>(1.கல்லூரியிலிருந்து – ப.15, 2. சிலைக்கு வெளியே – ப.40, 3. அயர்ந்த தூக்கத்தில் – ப.55,<br>4. தொட்டிமீன் – ப.86, 5. தண்டனைகளை வைத்து - ப.100)(மேற்கண்ட தொடங்கும் கவிதைகள்)<br>**3. வைரமுத்து - பிற்சேர்க்கை**<br>**4. மு.மேத்தா – வாழைமரம்**<br>**5. அறிவுமதி – வள்ளுவம் பத்து**<br>**6. ந.முத்து க்குமார் - ஆனந்த யாழை மீட்டுகிறாய்**<br>**7. சுகிர்தராணி – சபிக்கப்பட்ட முத்தம்**<br>**8. இளம்பிறை - நீ எழுத மறுக்கும் எனது அழகு** | | |
| **Unit -III** | **சிறுகதைகள்** | **18 hours** |
| **1. வாய்ச்சொற்கள் - ஜெயகாந்தன் (மாலை மயக்கம் தொகுப்பு)**<br>**2. கடிதம் - புதுமைப்பித்தன்**<br>**3. கரு - உமாமகேஸ்வரி**<br>**4. முள்முடி – தி.ஜானகிராமன்**<br>**5. சிதறல்கள் – விழி.பா.இதயவேந்தன்**<br>**6. காகித உறவு– சு.சமுத்திரம்**<br>**7. வீட்டின் மூலையில் சமையல் அறை - அம்பை**<br>**8. (மொழிபெயர்ப்புக்கதை) ஆண்டன் செக்காவ் – நாய்க்காரச் சீமாட்டி, சந்தியா பதிப்பகம்** | | |
| **Unit -IV** | **பாடம் சார்ந்த இலக்கிய வரலாறு** | **18 hours** |
| **1. 20-ஆம் நூற்றாண்டு கவிஞர் பெருமக்கள்** | | |

| | | |
|---|---|---|
| **2. கவிதையின் வகையும், வளர்ச்சியும்**<br>**3. தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்**<br>**4. தமிழ்ச் சிறுகதையின் தோற்றமும் வளர்ச்சியும்**<br>**5. மொழிபெயர்ப்புகள் தோற்றமும் வளர்ச்சியும்** | | |
| **Unit -V** | **மொழித்திறன்போட்டித் தேர்வு** | **18 hours** |
| **1. பொருள் பொதிந்த சொற்றொடர் அமைத்தல்**<br>**2. ஓர் எழுத்து ஒரு மொழி**<br>**3. வேற்றுமை உருபுகள்**<br>**4. திணை, பால், எண், இடம்**<br>**5. கலைச்சொல்லாக்கம், மொழிபெயர்ப்பு**<br>**(குறிப்பு : அலகு 4, 5 ஆகியன போட்டித் தேர்வு நோக்கில் நடத்தப்பட வேண்டும்)** | | |
| **Total Lecture Hours** | | **90 hours** |

| **Reference Books** | |
|---|---|
| • | தமிழ் இலக்கிய வரலாறு – சிற்பி.பாலசுப்பிரமணியன் |
| • | புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல் |
| • | வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு – எஃப்.பாக்கியமேரி |

# General English I

| Semester | Paper Code | Marks | Hours/Weeks | T | P | Credit |
|---|---|---|---|---|---|---|
| I | 23UPEVS2E01 | 100 | 4 | **4** | - | 3 |

## Curriculum/Course Objectives (CO)

| | |
|---|---|
| CO1 | To enable learners to acquire the linguistic competence necessarily required in various life situations. |
| CO2 | To help them understand the written text and able to use skimming, scanning skills |
| CO3 | To assist them in creative thinking abilities |
| CO4 | To enable them become better readers and writers |
| CO5 | To assist them in developing correct reading habits, silently, extensively and intensively |

**UNIT- I Poetry**

1. A Patch of Land - Subramania Bharati
2. The Sparrow - Paul Laurence Dunbar
3. A Nation's Strength – Ralph Waldo Emerson
4. Love Cycle - Chinua Achebe

**UNIT - II Prose**

1. JRD - Harish Bhat
2. Us and Them - David Sedaris
3. From Dress Your Family in Corduroy and Denim
4. Uncle Podger Hangs a Picture - Jerome K Jerome

**UNIT III- Short Stories**

1. The Faltering Pendulum- Bhabani Bhattacharya
2. How I Taught my Grandmother to Read- Sudha Murthy
3. The Gold Frame- R.K. Laxman

**UNIT -IV Language Competency**

1. Vocabulary : Synonyms, Antonyms, Word Formation
2. Appropriate use of Articles and Parts of Speech
3. Error correction

**UNIT V- English for Workplace**

1. Self - introduction,
2. Greetings
3. Introducing others
4. Listening for General and Specific Information
5. Listening to and Giving Instructions/ Directions

## Text books (Latest Editions)

I. Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi: Sahitya Akademi, 1967
II. How I taught my Grandmother to Read and other Stories, Murthy, Sudha,Penguin Books, India, 2004

**WebResources**

1. A patch of land by Subramania Bharati translated by Usha Rajagoplan : https://books.google.co.in/books?id=iSHvOmXuvLMC&printsec=frontcover&dq=subramania+bharati+poems&hl=en&newbks=1&newbks_redir=0&source=gb_mobile_search&sa=X&redir_esc=y#v=onepage&q=subramania%20bharati%20poems&f=false
2. The Sparrow by Paul Laurence Dunbar https://poets.org/poem/sparrow-0
3. A Nation's Strength by Emerson https://poets.org/poem/nations-strengt h
4. Love cycle by Chinua Achebe : https://www.best-poems.net/chinua-achebe/love-cycle.html
5. JRD by Harish Bhat https://www.tata.com/newsroom/heritage/coffee-tea-jrd-tata-stories

**CORE COURSE – I**
**EARTH ECOLOGY AND ENVIRONMENT**

| Semester | Paper Code | Marks | Hours/Week | T | P | Credit |
|---|---|---|---|---|---|---|
| I | 23UPEVS2C01 | 100 | 5 | 5 | 0 | 4 |

**Course Objectives**

The purpose of this course is to make the students to understand the basic information about the earth and environment. They will also learn about the interactions between the components of our environment, ecology and also about environmental issues and its sustainability.

**Course Outcomes**

On the successful completion of the course, students will be able to

**CO1** Understand the principles, scope and components of the earth and environment

**CO2** Know the basic concepts of ecology and ecosystems, factors and its interaction along with its succession processes

**CO3** Understands the interrelation between the earth environment & man and concept of biodiversity, its types, values , and its conservation methods.

**CO4** Learns about various environmental issues and environmental sustainability.

**CO5** Apply the knowledge of basic ecology in field studies.

**Mappings of course outcomes with programme outcomes**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | * | | | | | | | * |
| CO2 | * | | | * | * | | * | |
| CO3 | | | * | | * | | | |
| CO4 | * | | * | * | | * | | * |
| CO5 | * | | | | | * | * | |

**CORE COURSE – I**
**EARTH ECOLOGY AND ENVIRONMENT**

**UNIT I Earth and Environment** Contact Hours 8

Definition, Principles and Scope of Environmental Science. Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere. Earth as an eco-system. Interaction between Earth, Man and Environment (K1, K2, K3)

**UNIT II Ecology** Contact Hours 8

Scope, basic concepts in ecology, levels of ecology. Abiotic factors-Temperature, Light, Precipitation - Topographic and Edaphic Factors. Biotic Factors – Introduction to population ecology and community ecology – Ecological Interactions – Ecological Succession. (K1, K2, K3)

**UNIT III Ecosystem** Contact Hours 12

Ecosystem-Introduction, kinds- structure and function. Energy flow in ecosystem, food chain and food webs, pyramids of energy, biomass and numbers. Major ecosystems - pond, grassland, forest, desert, cropland etc. productivity of different ecosystems - primary productivity in terrestrial ecosystems, secondary productivity. Biogeochemical cycles in ecosystems-carbon, nitrogen, sulfur and phosphorous. (K1, K2, K3)

**UNIT IV Biodiversity** Contact Hours 12

Biodiversity and its conservation: Definition, types, importance of biodiversity and threats to biodiversity. Concept and basis of identification of 'Hotspots'; hotspots in India. Measures of biodiversity. Strategies for biodiversity conservation: in situ, ex situ and in vitro conservation. (K1, K2, K3)

**UNIT V Environmental Issues and Awareness** Contact Hours 10

Global Environmental Issues - Biodiversity loss, Climate change, Ozone layer depletion. Sea level rise. International efforts for environmental protection. National Action Plan on Climate Change. Sustainable Development Goals - 2030. (K4, K5, K6)

**Text Books**


1. Sharma P.D. (2017) Ecology and Environment.13th Edition Rastogi Publications Ltd.
2. Rana S.V.S. (2009) Essentials of Ecology and Environmental Science. Prentice Hall Publishers Ltd.
3. Pratibha Singh, Anoop Singh & Piyush Malaviya (2009) Text Book of Environment & Ecology – Excel Publishers.


**Reference Books**


1. Singh J.S., Singh S.P. & Gupta S.R. (2014) Ecology, Environmental Science & Conservation S Chand Publishing Co
2. Sharma P.D. (2012) Environmental Biology. Deep and Deep Publications
3. Odum, E. P. & Barrett, G. W. (2005). Fundamentals of ecology. 5th ed. Belmont, CA: Thomson Brooks/Cole.
4. Pranav Kumar (2017) Fundamentals of Ecology and Environment. Second Edition Pathfinder Publications.

5 Madhab Chandra Dash (2018) Readings In Ecology And Environmental Science, Gen Next Publications.

6 Singh H.R. & Neeraj Kumar (2012). Ecology and Environmental Science, Vishal Publications

**Web References**

1. http://archive.mu.ac.in/myweb_test/M.A.Part%20-%20II%20-%20Paper%20VII .pdf
2. http://dspace.vpmthane.org:8080/jspui/bitstream/123456789/4202/1/FC%20Sem%202%20THE%20CONCEPT%20OF%20ECOLOGY%20AND%20ENVIRONMENT.pdf
3. https://shodhganga.inflibnet.ac.in/bitstream/10603/68238/6/06_chapter%201.pdf
4. http://rvskvv.net/images/Environmental-Science_23.04.2020.pdf
5. https://www.environmentalscience.org/ecology
6. http://environment-ecology.com/what-is-environment/669-environment.html
7. https://www.nationalgeographic.org/topics/resource-library-human-impacts-environment/?q=&page=1&per_page=25

**CORE PRACTICAL – I**

**EARTH ECOLOGY AND ENVIRONMENT**

| Semester | Paper Code | Marks | Hours/Week | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| I | 23UPEVS2CP1 | 100 | 5 | 0 | 0 | 5 | 4 |

1. Community Structure Study
2. Determination of % Frequency, Density and Abundance
3. Line Transect Study
4. Determination of Diversity Indices
5. Determination of the Biomass of a particular area
6. Determination of Plankton Biomass of a pond
7. Study of the characteristics of different types of soil

## ALLIED COURSE – I

## CHEMISTRY I

## Chemistry - I (Inorganic, Organic, Physical-I)

| Semester | Paper Code | Marks | Hours/Week | T | P | Credit |
|---|---|---|---|---|---|---|
| I | 23UPEVS2A01 | 100 | 4 | 4 | 0 | 3 |

**UNIT-IChemical Bonding**

**1.1** Types of Bonding- Ionic Bond, covalent Bond and coordinate bond Molecular Orbital Theory-bonding, antibonding and nonbonding orbitals. M.O. diagrams of Hydrogen, Helium, Nitrogen, discussion of bond order and magnetic properties.

**1.2**. Hydrides-classification and characteristics - preparation, properties and uses of Borazole, $NaBH_4$ and $LiAlH_4$.

**UNIT-II Nuclear Chemistry**

**2.1**Natural radioactivity-radioactive series including Neptunium series-Group displacement law.

**2.2** Nuclear Binding energy, mass defect-Calculations.

**2.3** Nuclear Fission and Nuclear Fusion-differences – Stellar energy.

**2.4** Nuclear reactors, Applications of radioistopes-C-14 dating, rock dating.

**UNIT-III Basic Concepts of Organic Chemistry**

**3.1** Covalent Bond-Orbital Overlap-Hybridisation – Geometry of Organic molecules-Methane,

**3.2** Ethylene and Acetylene Electron displacement Effects: Inductive, Resonance, Hyper conjugative & steric effects. Their effect on the properties of compounds.

**3.3** Stereoisomerism: Symmetry-elements of symmetry- cause of optical activity, Tartaric acid. Racemisation. Resolution. Geometrical isomerism of Maleic and Fumaric acids.

**UNIT-IVAromatic compounds**

**4.1** Aromatic compounds-Aromaticity-Huckel's rule

**4.2** Electrophilic substitution in Benzene-Mechanism of Nitration, Halogenation-Alkylation, Acylation.

**4.3** Isolation, preparation,properties and structure of Naphthalene Haworth_s synthesis.

**4.4** Heterocyclic compounds:- Preparation, properties and uses of Furan, Thiophene,Pyrrole.

**UNIT-V**

**Polymer Chemistry**

**5.1**Basic concepts: Monomer, polymerization, degree of polymerization, repeat units. Classification of Polymers-addition and condensation polymers, natural and synthetic, based on structure, inorganic and organic, thermoplastic and thermosettingresin.

**5.2**.Preparation, properties and uses of Poly olefins-polythene, PTFE, Freons, PVC, polypropylene andpolystyrene.

**5.3** Natural and synthetic rubbers-Constitution of natural rubber, Buna-N ,Buna -S, Neoprene, Polyurethane and silicone rubbers

## ALLIED COURSE – I

## CHEMISTRY I

## Chemistry - I (Inorganic, Organic, Physical-I)

. **Reference books :**


1. Soni.P.L, Text Book of Inorganic Chemistry,Sultan Chand&Sons.
2. Bhal.B.S. and Arun Bhal ,A Text Book of OrganicChemistry
3. PuriB.R , L.R. Sharma and Pathania,PhysicalChemistry
4. V.R Gowrikar,N.V.Viswanathan :PolymerScience

## ALLIED PRACTICAL COURSE – I

## CHEMISTRY PRACTICAL - I

| Semester | Paper Code | Marks | Hours/Week | T | P | Credit |
|---|---|---|---|---|---|---|
| I | 23UPEVS2AP1 | 100 | 2 | 0 | 2 | 2 |

### I. TITRIMETRY

a) Estimation of Sodium hydroxide - Standard sodiumcarbonate.
b) Estimation of Hydrochloric acid-Standard Oxalicacid.
c) Estimation of Ferrous sulphate –Standard Mohr'sSalt.
d) Estimation of Oxalic Acid – Standard FerrousSulphate.
e) Estimation of Ferrous iron using diphenylamine as internalindicator.

**TEXT BOOKS AND REFERENCE BOOKS**


1. V. Venkateswaran, R. Veerasamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, ISBN: 9788180547768, 8180547760, Edition: 2012
2. A O. Thomas, Practical Chemistry
3. Raj K Bansal, Laboratorary Manual Of Organic Chemistry

## Ability Enhancement Compulsory Course

## English for Life Science

| Semester | Paper Code | Marks | Hours/Week | T | P | Credit |
|---|---|---|---|---|---|---|
| I | 23UPEVS2AE1 | 100 | 2 | 2 | 0 | 2 |

**OBJECTIVES:**

- To develop the language skills of students by offering adequate practice in professional contexts.
- To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- To focus on developing students' knowledge of domain specific registers and the required language skills.
- To develop strategic competence that will help in efficient communication
- To sharpen students' critical thinking skills and make students culturally aware of the target situation.

**LEARNING OUTCOMES:**

- Recognise their own ability to improve their own competence in using the language
- Use language for speaking with confidence in an intelligible and acceptable manner
- Understand the importance of reading for life
- Read independently unfamiliar texts with comprehension
- Understand the importance of writing in academic life
- Write simple sentences without committing error of spelling or grammar

(Outcomes based on guidelines in UGC LOCF – Generic Elective)

NB: All four skills are taught based on texts/passages.

**UNIT 1: COMMUNICATION**

Listening: Listening to audio text and answering questions

- Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

**UNIT 2: DESCRIPTION**

Listening: Listening to process description.-Drawing a flow chart.

## Ability Enhancement Compulsory Course

## English for Life Science

Speaking: Role play (formal context)

Reading: Skimming/ScanningReading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition-3

Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

**UNIT 3: NEGOTIATION STRATEGIES**

Listening: Listening to interviews of specialists / Inventors in fields

(Subject specific)

Speaking: Brainstorming. (Mind mapping).

Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

**UNIT 4: PRESENTATION SKILLS**

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations

Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

**UNIT 5: CRITICAL THINKING SKILLS**

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading : Comprehension passages –Note making.

Comprehension: Motivational article on Professional Competence,

Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

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**SKILL ENHANCEMENT COURSE I - FOUNDATION**

**ENGLISH COMMUNICATION**

| Semester | Paper Code | Marks | Hours/Week | T | P | Credit |
|---|---|---|---|---|---|---|
| I | 23UPEVS2SE1 | 100 | 2 | 2 | - | 2 |

**UNIT 1: Introduction**

Communication - Types of communication (Horizontal, Vertical, Interpersonal, Grapevine), Uses of Communication, Inter-cultural communication, Communication today: Distinct features of Indianisation, alternative texts of language learning, Global English and English in the print and electronic media in India.

**UNIT 2: Language Learning - Four Skills**

Listening-Passive and active, Speaking effective, intelligibility and clarity. Methods and techniques of reading such as skimming, scanning and searching for information; Reading to understand the literal, metaphorical and suggested meaning of a passage. Identifying the tone (admiring, accusatory, ironical, sympathetic, evasive, indecisive, ambiguous, neutral etc.) of the writer and view-points.

Cohesive and Coherent writing

**UNIT 3: Grammatical Skills**

Doing exercises like filling in the blanks, correcting errors, choosing correct forms out ofalternative choices, joining clauses, rewriting sentences as directed, and replacing indicated sections with single words / opposites / synonyms, choosing to use correct punctuation marks, getting to understand and use formal and informal styles, learning to understand the usages of officialese, sexism, racism, jargon.

**UNIT 4: Composition Skills**

Learning to understand information structure of the sentence such as topic-focus relationship; strategies of thematization, postponement, emphasis, structural compression (deletion of redundant parts, nominalization, cleft and pseudo-cleft sentences, elliptical structures etc.), Logical Connectors between sentences, Methods of developing a paragraph, structure of an essay and methods of developing an essay

**UNIT 5: Exercises in Written Communication**

Précis writing; Note-taking skills; Writing reports; Guidelines and essentials of official correspondence for making enquiries, complaintsand replies; Making representations; writing letters of application for jobs; writing CV, writingletters to the editor and social appeals in the form of letters/pamphlets.

**SKILL ENHANCEMENT COURSE I - FOUNDATION**

**ENGLISH COMMUNICATION**

**Reference Books**:


1. Ways of Reading: Advanced reading Skills for Students of English Literature. Martin Montgomery et al. London: Routledge, 2007.
2. Applying Communication Theory for Professional Life: A Practical Introduction. Dainton and Zelley, http://tsime.uz.ac.zw/claroline/backends/download.php?url=L0ludHJvX3RvX2NvbW11bmljYXRpb25fVGhlb3J5LnBkZg%3D%3D&cidReset=true&cidReq=MBA563
3. Literature and the art of Communication, Cambridge University Press.
4. Vistas and Visions. Orient Black Swan (writing and grammar exercises at the end of lessons are recommended) From Remapping An Anthology for Degree Classes, ('WritingSkills'), Orient Black Swan.
5. Indian English through Newspapers (Chapter 4,5 and 6), Concept, New Delhi,2008.
6. Contemporary Communicative English, S Chand
7. Technical Communication: A Reader Centred Approach. P.V. Anderson. Wadsworth, Cengage Publications

**LANGUAGE COURSE – II**

**TAMIL II**

# இடைக்கால இலக்கியமும் சிறுகதையும்

| Semester | Paper Code | Marks | Hours/Week | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| II | 23UPEVS2T02 | 100 | 6 | 6 | 0 | 0 | 3 |

**பாடநோக்கம்:**

சமய இலக்கியங்களையும் சிற்றிலக்கியங்களையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல் மொழித்திறனையும் சிறு கதை இலக்கிய வடிவத்தையும் மாணவர்க்கு உணர்த்துதல்.

**பயன்கள்:**

1. தமிழ் மொழியின் வளத்தையும் சிறப்பையும் அறிந்து கொள்ளுதல்.
2. சிறுகதை இலக்கியம் அறிமுகப்படுத்தப் படுவதன் மூலம் படைப்பாற்றல் திறன் வளர்தல்.
3. இலக்கணங்களைக் கற்பதன் மூலம் போட்டித் தேர்வுகளில் பங்கேற்று வேலை வாய்ப்பினைப் பெறுதல்.

**அலகு–1: சமய இலக்கியங்கள்**

அ) திருஞானசம்பந்தர் – தேவாரம்– இரண்டாம் திருமுறை
பொது – 'வேயுறு தோளிபங்கன்' எனத் தொடங்கும் பதிகம்

ஆ) ஆண்டாள் – திருப்பாவை (11–20 பாடல்கள்)

இ) திருமூலர் – திருமந்திரம் (இளமை நிலையாமை) 10 பாடல்கள்

ஈ) இராமலிங்க அடிகள் – திருவருட்பா முதல் திருமுறை சென்னைக் கந்த கோட்டம் (1, 6, 7, 8, 9) (5 பாடல்கள்)

உ) குணங்குடி மஸ்தான் சாகிபு – பராபரக்கண்ணி (1–10 பாடல்கள்)

ஊ) கண்ணதாசன் – இயேசு காவியம்– பாரச்சிலுவை (8 பாடல்கள்)

**அலகு–2: சிற்றிலக்கியங்கள்**

அ) முத்தொள்ளாயிரம் – சேரன் 10, 11, 12 பாடல்கள்
சோழன்–25, 26, 27 பாடல்கள்
பாண்டியன்–51, 52, 53 பாடல்கள்

ஆ) நந்திக்கலம்பகம் – 23, 61, 64,68 (4 பாடல்கள்)

இ) முத்துக்குமாரசாமிப்பிள்ளைத் தமிழ்– அம்புலிப் பருவம் (1–5 பாடல்கள்)

ஈ) அழகர்கிள்ளை விடு தூது – (1–15 கண்ணிகள்)

உ) கலிங்கத்துப்பரணி –பேய் முறைப்பாடு (213–232)

ஊ) அபிராமி அந்தாதி – 1–5 பாடல்கள்

# LANGUAGE COURSE – II

## TAMIL II

## இடைக்கால இலக்கியமும் சிறுகதையும்

**அலகு–3: சிறுகதை**

சிறுகதைத் தொகுப்பு (தேர்ந்தெடுக்கப்பட்ட சிறுகதைகள்)

1. புதுமைப்பித்தன் – செல்லம்மாள்
2. கு.அழகிரிசாமி – அன்பளிப்பு
3. ஜெயகாந்தன் – குருபீடம்
4. ராஜம்கிருஷ்ணன் – வேலி
5. பாவண்ணன் – நெருப்புத்திருவிழா
6. அசோகமித்திரன் – கணவன், மகள், மகன்
7. பிரபஞ்சன் – அப்பாவு கணக்கில் 35 ரூபாய்
8. பூமணி – ஆழம்
9. பெருமாள் முருகன் – நீர் விளையாட்டு
10. சந்தியூர் கோவிந்தன் – தாத்தாவின் ஞாபகங்கள்

**அலகு–4: இலக்கிய வரலாறு**

அ) பன்னிரு திருமுறைகள்
ஆ) நாலாயிரத் திவ்வியப் பிரபந்தம்
இ) திருமடங்களின் தமிழ்ப்பணி
ஈ) இலக்கண நூல்கள்
உ) உரையாசிரியர்கள்
ஊ) சிற்றிலக்கியங்கள்
எ) பதினெண் சித்தர்கள்

**பார்வை நூல்கள்**

1. தமிழ் இலக்கிய வரலாறு – தெ.பொ.மீ
2. தமிழ் இலக்கிய வரலாறு – முனைவர் மது.ச.விமலானந்தம்
   அபிராமி பதிப்பகம்
   78, கொடிமரத் தெரு, இராயபுரம்
   சென்னை–600 013.
3. புதிய தமிழ் இலக்கிய வரலாறு– பதிப்பாசிரியர்கள்
   சிற்பி, நீலபத்மநாபன் (தொகுதி–2)

**அலகு–5: மொழித்திறன்**

அ) பகுபத உறுப்பிலக்கணம்
ஆ) ஆகுபெயர்
இ) தன்வினை, பிறவினை, செய்வினை, செயப்பாட்டு வினை, நேர்கூற்று, அயற்கூற்று
ஈ) உடம்படுமெய்
உ) மயங்கொலிச் சொற்கள்
ஊ) நேர்காணல்
எ) விண்ணப்பம், அலுவலகக் கடிதம் எழுதுதல்

**பார்வை நூல்கள்:**

1. அ.கி.பரந்தாமனார் – 'நல்லதமிழ் எழுத வேண்டுமா ?'
2. புலவர் கே. இளைய பெருமாள். – 'தமிழில் பிழையின்றி எழுதுவது எப்படி ?'
   வானதி பதிப்பகம், 23–இ, தீனதயாளு தெரு
   தி.நகர், சென்னை–17.
3. டாக்டர். பொற்கோ – 'தமிழில் நாமும் தவறில்லாமல் எழுதலாம்'
   பூம்பொழில் வெளியீடு
   6 வது குறுக்குத் தெரு,
   அடையாறு, சென்னை–20.
4. வெ.இறையன்பு – I.A.S. வழிகாட்டி

**LANGUAGE COURSE – II**

**TAMIL II**

# இடைக்கால இலக்கியமும் சிறுகதையும்

**ENGLISH COURSE – II**

**COMMUNICATIVE ENGLISH- II**

| Semester | Paper Code | Marks | Hours/Week | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| II | 23UPEVS2E02 | 100 | 4 | 4 | 0 | 0 | 3 |

| | |
|---|---|
| **Unit I** | (18 hours) |
| 1. | Listening and Speaking |
| a. | Listening and responding to complaints (formal situation) |

b. Listening to problems and offering solutions (informal)
2. Reading and writing
a. Reading aloud (brief motivational anecdotes)
b. Writing a paragraph on a proverbial expression/motivational idea.
3. Word Power/Vocabulary
a. Synonyms & Antonyms
4. Grammar in Context

| | |
|---|---|
| a. | Adverbs |
| b. | Prepositions |
| **Unit II** | (20 hours) |

1. Listening and Speaking
a. Listening to famous speeches and poems
b. Making short speeches- Formal: welcome speech and vote of thanks.
Informal occasions- Farewell party, graduation speech
2. Reading and Writing
a. Writing opinion pieces (could be on travel, food, film / book reviews or on any contemporary topic)
b. Reading poetry
b.i. Reading aloud: (Intonation and Voice Modulation)
b.ii. Identifying and using figures of speech - simile, metaphor, personification etc.
3. Word Power
a. Idioms & Phrases
4. Grammar in Context

| | |
|---|---|
| a. | Conjunctions and Interjections |
| **Unit III** | (18 hours) |
| 1. | Listening and Speaking |
| a. | Listening to Ted talks |

b. Making short presentations – Formal presentation with PPT, analytical presentation of graphs and reports of multiple kinds
c. Interactions during and after the presentations
2. Reading and writing

**ENGLISH COURSE – II**

**COMMUNICATIVE ENGLISH- II**

a. Writing emails of complaint
b. Reading aloud famous speeches
3. Word Power
a. One Word Substitution
4. Grammar in Context
a. Sentence Patterns
5

| | |
|---|---|
| **Unit IV** | (16 hours) |
| 1. | Listening and Speaking |
| a. | Participating in a meeting: face to face and online |

b. Listening with courtesy and adding ideas and giving opinions during the meeting and making concluding remarks.
2. Reading and Writing
a. Reading visual texts – advertisements
b. Preparing first drafts of short assignments
3. Word Power
a. Denotation and Connotation
4. Grammar in Context:

| | |
|---|---|
| a. | Sentence Types |
| **Unit V** | (18 hours) |
| 1. | Listening and Speaking |
| a. | Informal interview for feature writing |
| b. | Listening and responding to questions at a formal interview |
| 2. | Reading and Writing |
| a. | Writing letters of application |
| b. | Readers‟ Theatre (Script Reading) |
| c. | Dramatizing everyday situations/social issues through skits. (writing scripts and performing) |
| 3. | Word Power |
| a. | Collocation |
| 4. | Grammar in Context |
| a. | Working With Clauses |

**Prescribed Textbook: Communicative English - Semester – II by TANSCHE**

**CORE COURSE – II**

**ENVIRONMENTAL CHEMISTRY**

| Semester | Paper Code | Marks | Hours/Week | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| II | 23UPEVS2C02 | 100 | 5 | 5 | 0 | 0 | 4 |

**Course Objectives**

The purpose of this course is to develop an understanding the basics of chemistry in relevance to environment and such as, solutions preparation, chemical reactions and their effects on the environment, to provide students with an understanding of the fundamental chemical processes occurred on environment.

**Course Outcomes**

On the successful completion of the course, students will be able to

CO1 Have knowledge of basic theories and problems of Environmental chemistry

CO2 Describe important chemical reactions and cyclic processes of chemical species in the atmosphere, hydrosphere and in lithosphere

CO3 Demonstrate knowledge of chemical principles of various fundamental environmental phenomena

CO4 To analyze chemical processes involved in air, water and soil environmental problems

CO5 Know the different types of toxic and hazardous substances and analyze their toxicological information

**Mappings of course outcomes with programme outcomes**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | * | | * | | | | | * |
| CO2 | | * | | * | | * | | |
| CO3 | * | * | | * | | * | * | * |
| CO4 | * | * | | * | | | | |
| CO5 | | * | | | | * | | * |

## CORE COURSE – II

## ENVIRONMENTAL CHEMISTRY

**UNIT I Fundamentals of Environmental Chemistry** Contact Hours 14

Environmental Chemistry: Definition, Concept and Scope. Elements - Atomic structure, Atomic number, Atomic mass, electronic configuration, periodic properties of elements, types of chemical bonds. Preparation of Standard Solutions – Molarity, Molality, Normality, Percent and ppm (mg/l) Solutions- Stoichiometry (K1, K2) - Gibb's Free energy - Chemical Potential - Chemical Equilibria - Acid-base theories - pH and pOH and Buffer Solutions (K3) - Solubility and Solubility Product - Solubility of Gases in Water - The Carbonate System - Unsaturated and Saturated Hydrocarbons - Radionuclides (K4)

**UNIT II Atmospheric Chemistry** Contact Hours 12

Atmosphere: Structure and Composition - Particles, Ions and Radicals (K2) - Tropospheric Chemistry: Formation of Inorganic and Organic Particulate Matter (K3, K4) - Chemistry of Air Pollutants: $SO_2$, NOx, $CO_2$ (Acid Rain, Photochemical Smog, Greenhouse Effect, Global Warming) (K4). Stratospheric Chemistry: Chapman Mechanism and catalytic process of ozone destruction - Role of CFCs in ozone depletion, NOx, halogen cycles (K4).

**UNIT III Aquatic Chemistry** Contact Hours 12

Formation of Water (K1) - Sources and Types o f Water Resource (K1) - Hydrological Cycle - Unique Properties of Water (K2) - Role of Water in the Environment (K3)- Physical, Chemical and Biological Properties of Water – temperature, colour, odour, total dissolved solids and total suspended solids, alkalinity, acidity and hardness - Phenomenon of Eutrophication (K4) - Concept of DO, BOD, COD - Chemistry of metals in aqueous systems - metal complex formation and chelation - Types of reactions in various water bodies including marine environment (K4, K5)

**UNIT IV Soil Chemistry** Contact Hours 12

Soil: Nature, Formation, Types (K1 & K2) - Physicochemical Properties of Soil: Soil Structure, Texture (K3 & K4), Inorganic and organic components of soil, Chemical properties of saline, acidic and alkaline soils (K5), Macro and Micronutrients in soil and their functions, Relation between organic carbon and organic matter, C/N Ratio, NPK in soil, Chemical reactions in soil (K5)

**UNIT V Pollutant Chemistry** Contact Hours 10

Pesticides: Classification, Degradation, Analysis - Pollution due to Pesticides – DDT and Endosulphan, Hydrocarbons: Classification, Hydrocarbon Decay (K3) - Effects on Macro and Microorganisms (K4) – Toxic effects of heavy metals - Ar, Cd, Pb & Hg

**Text Books**


1. De, A.K. (2017) Environmental Chemistry, Eighth Edition, New Age International Publishers.
2. Sharma, B.K. (2019) Environmental Chemistry, Goel Publishing House Ltd., Meerut, UP.

3. Balram Pani, (2017) Text Book of Environmental Chemistry, I.K. International Publishing House PVT. Ltd.
4. Girard J.E. (2015) Principles of Environmental Chemistry.
5. Rao, C.S. (2018) Environmental Pollution Control Engineering, 3rd Edition, New Age International (P) Ltd Publishers.

**Reference Books**

1. Manahan, S.E. (2009) Fundamentals of Environmental Chemistry, 9th Edition, Boca Raton: CRC Press LLC
2. Eugene, R. Weiner (2000) Applications of Environmental Chemistry, CRC Press, LLC
3. Ahluwalia, V.K. (2015) Environmental Pollution and health, The Energy and Resource Institute (TERI)
4. Vanloon, G.W. and Duffy S.J. (2011) Environmental Chemistry a global perspective, 3rd Edition, Oxford University Press
5. Ibanez, J. G., Hernandez-Esparza, M., Doria-Serrano, C., Fregoso-Infante, A., and Singh, M.M. (2007). Environmental Chemistry. Springer Press

**Web References**

1. https://ocw.mit.edu/courses/1-84j-atmospheric-chemistry-fall-2013/pages/lecture-notes/
2. http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/chemistry/04.environmental_chemistry/01.atmosphere/et/5503_et_et.pdf
3. http://www.fao.org/docrep/field/003/AC172E/AC172E04.htm
4. https://static1.squarespace.com/static/580d5051cd0f68322963dc55/t/5ec569f1b2ae022884f7338c/1589996020800/Water+Chemistry.pdf
5. http://agriinfo.in/?page=topic&superid=5&topicid=174

**COREPRACTICAL – II**

**ENVIRONMENTAL CHEMISTRY**

| Semester | Paper Code | Marks | Hours/Week | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| II | 23UPEVS2CL2 | 100 | 5 | 0 | 0 | 5 | 4 |

1. Measurement of Soil and water pH
2. Measurement of Alkalinity
3. Measurement of Acidity
4. Estimation of Total solids
5. Estimation of Soil moisture content
6. Estimation of Soil specific gravity
7. Determination of Soil particle size

## ALLIED COURSE – II

## CHEMISTRY II

## Chemistry - II (Inorganic, Organic, Physical-II)

| Semester | Paper Code | Marks | Hours/Week | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| II | 23UPEVS2A02 | 100 | 4 | 4 | 0 | 0 | 3 |

**UNIT-I**

**Co-ordination chemistry**

**1.1** Definition of terms- classification of ligands-NomenclatureChelation- Examples. Chelate effect- explanation.Werner's theory-conductivity and precipitation studies. Sidgwick's theory-Effective Atomic Number concept.

**1.2** Pauling's theory-postulates-Application to octahedral, square planar and tetrahedral complexes. Pauling's theory and magnetic properties of complexes. Merits and demerits of Pauling's theory

**1.3** Biological role of Haemoglobin and Chlorophyll (Elementary idea of structure and functions).

**UNIT-II**

**Carbohydrates & Aminoacids**

**2.1** Carbohydrates: Classification, preparation and properties of Glucose and Fructose-Properties of Starch, Cellulose and derivatives of Cellulose. Inter conversion of Glucose to Fructose and vice versa.

**2.2** Amino Acids-classification, preparation and properties of Glycine and Alanine.

**UNIT-III**

**Pharmaceutical chemistry**

**3.1** Chemotherapy: Preparation, uses and mode of action of sulpha drugs-prontosil, sulphadiazine and sulphafurazole. Uses of penicillin, chloramphenicol and streptomycin, Definition and one example each for-analgesics, antipyretics, tranquilizers, sedatives, hypnotics, local anaesthetics and general anaesthetics . Cause and treatment of diabetes, cancer andAIDS.

**UNIT-IV**

**4.1** Photochemistry: Grotthus-Draper law and Stark-Einstien's law of photochemical equivalence. Quantum yield. Example for photochemical reactions- Hydrogen-Chlorine reaction (elementary idea only) Photosynthesis. Phosphorescence and Fluorescence.

**4.2** Phase Rule: Phase rule and the definition of terms in it. Application of phase rule to water system. Reduced phase rule and its application to a simple eutetic system (Pb-Ag) Freezing mixtures.

## ALLIED COURSE – II

## CHEMISTRY II

## Chemistry - II (Inorganic, Organic, Physical-II)

**UNIT-V**

**5.1** Electro Chemistry- Kohlrausch law -measurement of conductance, pH determination. Conductometic titrations. Galvanic cells-EMF-standard electrode potentials, reference electrodes.

**5.2** Corrosion: Methods of prevention.

**Reference books :**


1. Soni.P.L, Text Book of Inorganic Chemistry, Sultan Chand & Sons.
2. Puri and Sharma, Text book of Inorganic Chemistry-Vishalpublishing
3. Soni.P.L. Text Book of Organic Chemistry, Sultan Chand andSons.
4. Jain.M.K, Principles of Organic Chemistry-Vishal publishing Co.
5. Kundu and Jain, Physical Chemistry, S. Chand.
6. Puri, Sharma and Pathania, Text-book of Physical Chemistry, Vishal Publishingco

## ALLIED PRACTICAL COURSE – II

## CHEMISTRY PRACTICAL - II

| Semester | Paper Code | Marks | Hours/Week | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| II | 23UPEVS2AL2 | 100 | 2 | 0 | 0 | 2 | 2 |

**II. OrganicAnalysis:**

a) Detection of elements- nitrogen, sulphur andhalogens.

b) Detection of aliphatic oraromatic.

c) Detection of whether saturated or unsaturatedcompounds.

Preliminary tests and detection of functional groups, phenols, aromaticamines, aromatic acids, Urea , benzamide &carbohydrate.

**TEXT BOOKS AND REFERENCE BOOKS**


1. V. Venkateswaran, R. Veerasamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, ISBN: 9788180547768, 8180547760, Edition: 2012
2. A O. Thomas, Practical Chemistry
3. Raj K Bansal, Laboratorary Manual Of Organic Chemistry