

**SYLLABI FOR MASTER OF ENGINEERING IN CHEMICAL ENGINEERING WITH  
SPECIALIZATION IN ENVIRONMENTAL ENGINEERING  
EXAMINATIONS 2023-2025**

**MASTER OF ENGINEERING IN CHEMICAL ENGINEERING WITH  
SPECIALIZATION IN ENVIRONMENTAL ENGINEERING**

**SCHEME OF TEACHING AND EXAMINATION**

<b>Paper</b>	<b>Subject</b>	<b>Teaching Hrs. per Week</b>	<b>End Term</b>	<b>Mid Term</b>	<b>Total Marks</b>
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**SCHEME OF TEACHING AND EXAMINATION (2021-2023)**

Paper	Subject	Teaching Hrs. per Week	End Term	Mid Term	Total Marks
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**FIRST SEMESTER**

**Paper Title: MATHEMATICAL METHODS IN CHEMICAL ENGINEERING (Theory)**

**Paper Code : CHE 1.1**

**Max. Marks 50**

**Credits : 4**

**Time: 3 hours**

<b>Note for the Examiner</b>	Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions (2 to 9) will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term exam will be 3 hrs.
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**Course Objectives**

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**Unit III**





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<b>THEORY</b>	
<b>Note for the Examiner</b>	<b>Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions (2 to 9) will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term exam will be 3 hrs.</b>

**UNIT I**

**Introduction of various separation techniques : distillation, absorption, extraction, adsorption, membrane separation, ion exchange, etc.**

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3. Apply concepts of fluid dynamics and thermodynamics to solve problems.

**COURSE OUTCOMES:** By the end of the course, students should be able to:

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3

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Air pollution control technologies in industry and non industry sources.

Books: "Air Pollution Control Engineering" by X. B. ...

Reference: "Air Pollution Control Engineering" by ...

Books: "Air Pollution Control Engineering" by ...

**Paper Title: AIR POLLUTION CONTROL ENGINEERING (Theory)**

**Paper Code : CHE 1.6**

**Max. Marks 50**

**Credits : 4**

**Time: 3 hours**

**Course Duration: 45 Lectures of one hour each.**

**Note for the Examiner: Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions (2 to 9) will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term exam will be 3 hrs.**

**Unit I**

Introduction to air pollution  
 Mass balance and dispersion  
 Air quality index and standards

**Control Technologies**

Control technologies for particulate matter, gaseous pollutants, and noise.  
 Control technologies for air pollution in industry and non industry sources.  
 Control technologies for air pollution in urban areas.  
 Control technologies for air pollution in rural areas.  
 Control technologies for air pollution in coastal areas.  
 Control technologies for air pollution in mountainous areas.  
 Control technologies for air pollution in hilly areas.  
 Control technologies for air pollution in valley areas.

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*Air Pollution Meteorology* Air pollution meteorology is the study of the interaction between the atmosphere and the environment. It is a branch of meteorology that deals with the study of the atmosphere and its effects on the environment. It is a branch of meteorology that deals with the study of the atmosphere and its effects on the environment.

**Unit III**

*Automobile Emission Control*

Automobile emission control is the process of reducing the amount of pollutants that are emitted from a vehicle. It is a branch of environmental engineering that deals with the study of the atmosphere and its effects on the environment. It is a branch of environmental engineering that deals with the study of the atmosphere and its effects on the environment.



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Water Treatment Methods

**UNIT II**

Water Treatment Methods  
Coagulation, flocculation, sedimentation, filtration, disinfection, ion exchange, reverse osmosis, ultrafiltration, nanofiltration, membrane bioreactors, advanced oxidation processes, ozonation, activated carbon adsorption, and other emerging technologies.

**UNIT III**

Sludge and solid wastes treatment  
Sludge thickening, dewatering, stabilization, incineration, and landfilling. Solid waste management, recycling, and energy recovery.

**UNIT IV**

Air Pollution Control:  
Air quality monitoring, dispersion modeling, and control technologies for particulate matter, sulfur dioxide, nitrogen oxides, and volatile organic compounds.

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Department of Chemical Engineering, Anna University, Chennai-600 025

Course Code: CH 6601

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and Analytical Biochemistry, and Environmental Microbiology and Environmental Chemistry. The course covers the following topics: Environmental Microbiology, Environmental Chemistry, Environmental Engineering, and Environmental Management.

The course is designed to provide students with a comprehensive understanding of the environmental issues related to chemical engineering. The course is divided into two semesters. The first semester covers the topics of Environmental Microbiology and Environmental Chemistry. The second semester covers the topics of Environmental Engineering and Environmental Management.

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**POLYMER CHEMISTRY & CHARACTERIZATION**

Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest

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***Books Recommended:***

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**ALTERNATE ENERGY TECHNOLOGY**

**Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions (2 to 9) will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term e4. HenniAt**

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Non-union

**MACROMOLECULAR HYDRODYNAMICS**

Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions (2 to 9) will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term exam will be 3 hrs.

**Unit I**

Non-union



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**PROCESS DYNAMICS AND CONTROL**

**Paper Code : CHE 2.4                      Max. Marks 50                      Credits : 4                      Time: 3 hours**  
**Course Duration: 45 Lectures of one hour each.**

**Note for the Paper setter: Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions (2 to 9) will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term**





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1. Environmental Engineering (1000) - 30 marks  
2. Environmental Engineering (1000) - 30 marks

3. Environmental Engineering (1000) - 30 marks

4. Environmental Engineering (1000) - 30 marks

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**Unit III**

**Environmental Impact Assessment**

**Treatment and disposal techniques:**

and in accordance with  
Landfilling and incineration of solid waste  
Municipal solid waste recycling and reuse  
Bioremediation of contaminated sites  
Phytoremediation of contaminated sites  
Landfilling and incineration of solid waste  
Municipal solid waste recycling and reuse  
Bioremediation of contaminated sites  
Phytoremediation of contaminated sites

**Books Recommended**

1. Environmental Pollution Control Engineering  
2. Introduction to environmental Engg  
3. Integrated Solid Waste Management Engineering Principle and Management  
4. Sanitary Landfill Design Handbook  
5. Solid Waste Engineering  
6. Basic Hazardous Waste Management  
7. Hospital Waste Management



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*Electron Microscopy* Introduction to Electron Microscopy, C. J. Barakat, Academic Press, 1998.  
*Atomic force microscopy AFM*- Introduction to Atomic Force Microscopy, R. W. Carpick, Springer, 2007.

**Books Recommended:**

- 1. *Environmental Microbiology*, M. T. Madigan, J. M. Martinko, & J. Park, Elsevier, 2012.
- 2. *Microbiology: Principles and Applications*, M. T. Madigan, J. M. Martinko, & J. Park, Elsevier, 2012.
- 3. *Microbiology: An Introduction*, M. T. Madigan, J. M. Martinko, & J. Park, Elsevier, 2012.
- 4. *Microbiology: Principles and Applications*, M. T. Madigan, J. M. Martinko, & J. Park, Elsevier, 2012.
- 5. *Microbiology: An Introduction*, M. T. Madigan, J. M. Martinko, & J. Park, Elsevier, 2012.

**2. PROJECT MANAGEMENT**

**SECTION-A**

1. *Project Management: The Managerial Process*, M. R. Meredith & S. J. Mantel, McGraw-Hill, 2003.  
 2. *Project Management: The Managerial Process*, M. R. Meredith & S. J. Mantel, McGraw-Hill, 2003.  
 3. *Project Management: The Managerial Process*, M. R. Meredith & S. J. Mantel, McGraw-Hill, 2003.  
 4. *Project Management: The Managerial Process*, M. R. Meredith & S. J. Mantel, McGraw-Hill, 2003.  
 5. *Project Management: The Managerial Process*, M. R. Meredith & S. J. Mantel, McGraw-Hill, 2003.

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1. Environmental Engineering  
 2. Environmental Engineering  
 3. Environmental Engineering  
 4. Environmental Engineering  
 5. Environmental Engineering  
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 10. Environmental Engineering

**3. OPTIMIZATION TECHNIQUES**

**SECTION-A**

1. Linear Programming  
 2. Non-Linear Programming  
 3. Dynamic Programming  
 4. Goal Programming  
 5. Network Programming  
 6. Integer Programming  
 7. Multi-Objective Programming  
 8. Stochastic Programming  
 9. Simulation  
 10. Meta-Heuristics

**SECTION-B**

1. Genetic Algorithms  
 2. Particle Swarm Optimization  
 3. Ant Colony Optimization  
 4. Tabu Search  
 5. Simulated Annealing  
 6. Differential Evolution  
 7. Evolutionary Algorithms  
 8. Hybrid Optimization  
 9. Evolutionary Multi-Objective Optimization  
 10. Evolutionary Multi-Criteria Optimization

**Books Recommended:**

1. Linear Programming  
 2. Non-Linear Programming  
 3. Dynamic Programming  
 4. Goal Programming  
 5. Network Programming  
 6. Integer Programming  
 7. Multi-Objective Programming  
 8. Stochastic Programming  
 9. Simulation  
 10. Meta-Heuristics

**4. SAFETY & HAZARDS**

**SECTION-A**

1. Hazard Identification  
 2. Risk Assessment  
 3. Safety Management  
 4. Process Safety  
 5. Environmental Safety  
 6. Occupational Safety  
 7. Safety Culture  
 8. Safety Audits  
 9. Safety Training  
 10. Safety Investigation

**Paper Title: OPEN ELECTIVE(Theory)**

**Paper Code : CHE 3.1**

**Max. Marks 50**

**Credits : 4**

**Time: 3 hours**

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**Course Duration: 45 Lectures of one hour each.**

**Unit 1**

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Chromatography and its applications  
In this course, students will learn about the principles and applications of chromatography. The course covers the following topics:  
1. Introduction to chromatography  
2. Types of chromatography  
3. Factors affecting chromatography  
4. Applications of chromatography  
5. Instrumentation of chromatography  
6. Quality control and assurance  
7. Environmental monitoring and control  
8. Case studies and projects  
9. Laboratory exercises  
10. Assignments and quizzes  
11. Final examination

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M. Engg. in Chemical Engineering with Specialization in Environmental Engineering  
 Examination on 1<sup>st</sup> year end on 14<sup>th</sup> April 2025

<b>Title</b>	<b>PROJECT MANAGEMENT</b>			<b>Credits</b>	1
<b>Max.Marks</b>	<b>End term 50</b>	<b>Mid-term 50</b>	<b>Practical --</b>	<b>Elective</b>	N
<b>Pre requisites</b>					
<b>Course Objectives</b>	To understand the project management process, to identify the project objectives, to develop a project plan, to monitor and control the project, to evaluate the project performance, to identify the project risks, to manage the project resources, to communicate effectively, to work in a team, to manage the project budget, to manage the project quality, to manage the project safety, to manage the project environment, to manage the project health and safety, to manage the project risk, to manage the project communication, to manage the project stakeholder, to manage the project change, to manage the project closure.				
<b>Course Outcomes</b>	1. To understand the project management process, to identify the project objectives, to develop a project plan, to monitor and control the project, to evaluate the project performance, to identify the project risks, to manage the project resources, to communicate effectively, to work in a team, to manage the project budget, to manage the project quality, to manage the project safety, to manage the project environment, to manage the project health and safety, to manage the project risk, to manage the project communication, to manage the project stakeholder, to manage the project change, to manage the project closure.				
<b>Note for the Examiner</b>	<b>Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions (2 to 9) will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term exam will be 3 hrs.</b>				
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N. S. M. Engg. in Chemical Engineering with Specialization in Environmental Engineering  
 Examination on 1<sup>st</sup> year end on 14<sup>th</sup> April 2025

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Course Objectives: This course aims to equip students with the knowledge and skills to identify workplace hazards, assess risks, implement effective hazard controls, and promote safety in various industries. Students will understand toxic c56)6.041(}180- us





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