

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR

Teaching and Evaluation Scheme from Year 2022-23

Department of Civil Engineering

Minor Degree in Environmental Sustainability

Sr. No	Course Code	Name of the Course	Semester	Teaching Scheme Per Week			Credits	Total Marks	Evaluation scheme			
				Lecture Hours	Tutorial Hours	Practical Hours			Type	Max. Marks	Min. Marks for Passing	
1	201CEMIL221	Introduction to Environmental Sustainability	IV	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	201CEMIL337	Sustainable Sanitation	V	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	201CEMIP338	Sustainable Sanitation Lab	V	-	-	2	1	50	ISE	50	20	
4	201CEMIL339	Environmental Management Systems	VI	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	201CEMIL340	Waste Management	VI	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
6	201CEMIP341	Waste Management Lab	VI	-	-	2	1	25	ISE	25	10	
7	201CEMIL446	Occupational Health & Safety	VII	3	-	-	3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
8	201CEMIP447	Occupational Health & Safety Lab	VII	-	-	2	1	25	ISE	25	10	
Summary		Total		15	-	6	18	600				
		Total Credits		18			Total Marks		600			

ISE: In Semester Evaluation MSE: Mid Semester Examination ESE: End Semester Examination

Note 1 : Tutorials and practical shall be conducted in batches with batch strength not exceeding 20 students.

Note 2 : ESE will be conducted for 100 marks and converted to 50 Marks



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(An Autonomous Institute)
Department of Civil Engineering
Minor Degree in Environmental Sustainability
SEM-IV (Academic Year-2022-23)

Course Plan

Course Title: Introduction to Environmental Sustainability	
Course Code: 201CEMIL221	Semester: IV
Teaching Scheme: L-T-P : 3-0-0	Credits: 3
Evaluation Scheme: ISE + MSE Marks : 20 + 30	ESE Marks: 50

Course Description:

Sustainable environment in industry ensures that the resources are used conservatively and efficiently. Sustainable industrialization reduces environmental impact by shifting toward eco-friendly development and upholding ethical responsibility to ensure a cleaner and safer environment. Sustainable environment practices result in lower greenhouse gas emissions and conserve water, energy and natural resources. This course deals with significance of environmental sustainability to industry and organizations.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability
PSO2	To develop abilities in graduates to suit to the requirements of the varied industry

Course Objectives:

- 1 To understand the importance of environmental sustainability
- 2 To know sustainable development goals
- 3 To aware about the individual, social responsibilities and role of government toward sustainable development.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C221.1	Describe the basics of sustainable development and its concepts.
C221.2	Summarize dimensions of environmental sustainability and its applications.
C221.3	Explain sustainable development goals in the context of social, industrial context.



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Prerequisite:	Environmental Studies
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Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and
Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C221.1	2	-	-	1	-	2	3	-	-	-	-	-	1	1	2
C221.2	2	1	-	-	-	2	3	-	-	-	-	-	1	1	2
C221.3	2	1	-	-	-	2	3	-	-	-	-	-	1	1	2

Content	Hours
Unit 1: Introduction Evolution and History of sustainability, Brundtland commission report, Principles of sustainable development, Objectives, Conceptualization of sustainability, Boundaries of sustainable development.	6
Unit 2: Sustainable development framework Pillars of sustainable development, Impediments to achieving sustainability, Concept of environmentally sustainable development, Environmental dimensions of sustainability, Frameworks to measure sustainable development	6
Unit 3: Issues of environmentally sustainable urban environment: Sustainable urban transport, Sustainable transport indicators, Engineering tools for assessment and design for environment and sustainability.	6
Unit 4: Strategies for promoting environmentally sustainable development: Sustainable Development Goals (SDG), Capacity Building, Human Rights and Intergenerational Equity, Environmental and Human Health, Sustainable Cities	6



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Unit 5: Social and environmental responsibilities: Responsibilities towards environmentally sustainable development, Role of local Government, Steps for adopting sustainability approach, behaviour change communication, Corporate Social Responsibility (CSR).	6
Unit 6: Green Technology for Sustainable Development: Clean - green energy technology alternatives to reduce greenhouse gas emissions, advantages, mitigation and adaptation	6

Text Books:

1	Abdul Malik, Elisabeth Grohmann. Environment protection strategies for sustainable development by. ISBN 978-94-007-1591-2.
2	Jennifer A. Elliott. An introduction to sustainable development. ISBN-13: 978-0415590730.
3	Chopra, K., and Kadekodi, G.K. (1999), Operationalizing Sustainable Development, Sage Publication, New Delhi.

Reference Books:

1	LEAD India (Editor) Rio to Johannesburg: India's Experience in Sustainable Development, Orient Longman, Hyderabad, 2002.
2	Sylvie Faucheux, Martin O' Corner Jan van der strateen. Sustainable development: concepts, rationalities, and strategies, ISBN 978-94-017-3188-1.



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Third Year B. Tech. Civil Engineering

SEM-V (Academic Year-2023-24)

Course Plan

Course Title: Sustainable Sanitation	
Course Code: 201CEMIL337	Semester: V
Teaching Scheme: L-T-P : 3-0-0	Credits: 3
Evaluation Scheme: ISE + MSE Marks : 20 + 30	ESE Marks: 50

Course Description:

The course aims to equip the students with fundamental understanding, knowledge and skills to contribute to the practice of sustainable sanitation. The students would develop as competent professionals in the field of sanitation with the ability to plan and implement the sanitation techniques that is inclusive and sustainable.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability.
PSO2	To develop abilities in graduates to suit to requirements of the varied industries.

Course Objectives:

- 1 To understand sustainable sanitation and wastewater management in different contexts.
- 2 To understand the various components of building sanitation.
- 3 To study the government schemes & policies for sustainable sanitation.

COs	At the end of successful completion of course, the students will be able to...
C337.1	Analyze sustainable sanitation and wastewater management in different contexts.
C337.2	Illustrate the various components of building sanitation.
C337.3	Describe the government Schemes & Policies for Sustainable Sanitation.

Prerequisite:	Environmental Studies.
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Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C337.1	2	2	1	1	-	2	3	-	-	-	-	-	1	1	4
C337.2	2	1	-	-	1	2	3	-	-	-	-	-	1	1	3
C337.3	2	1	1	1	-	2	3	-	-	-	-	-	1	1	2

Content	Hours
Unit 1. Water and Sanitation: Introduction to Sustainable Development Goal-6 Current Scenario Targets and Indicators	6
Unit 2. Sanitation Planning: Current status of water pollution in Indian context: Problems, Issues and Challenges Problems of dominant approach in municipal wastewater Management shifts in sanitation planning The Emergent alternative solutions Strategies to alternative sanitation planning	6
Unit 3. Technology options in wastewater management: Technology options in wastewater management Steps for sanitation planning Developing sanitation zones and waste watershed zones	6
Unit 4. Fecal Sludge Management: Current status of Fecal Sludge Management in Indian context: Problems, Issues and Challenges. Approaches and tools to fecal sludge management strategies. Steps to fecal sludge management.	6



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Unit 5. Building Sanitation: Definitions of the terms related to building sanitation- Water pipe, Rain water pipe, Soil pipe, Waste pipe, Vent pipe, anti-siphonage pipe, etc. Traps, Sanitary Fittings- Water closets, flushing cistern, bath tubs, wash basin, water fountains, sinks and urinals. Systems of plumbing- one pipe, two pipes, single-stack and single-stack partially ventilated system.	6
Unit 6. Government Schemes & Policies for Sustainable Sanitation: National Urban Sanitation Policy National Water Policy National Rural & Urban Health Mission Central Rural Sanitation Programme National Policy on Faecal Sludge and Septage Management (FSSM)	6

Text Books:

1	Arno Rosemarin, Nelson Ekane, Ian Caldwell, Elisabeth Kvarnstrom, Jennifer McConville, Cecilia Ruben, Madeleine Fogde, Pathways for Sustainable Sanitation Achieving the Millennium Development Goals.
2	Petra Bongartz, Naomi Vernon, John Fox, Sustainable Sanitation for All: Experiences, challenges and innovations.
3.	G. S. Birdie, J. S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publishing Company.

Reference Books & websites :

1	Abey Suriya, K., Cynthia, M., & Willets, J. (2010). Urban Sanitation Through the Lens of Thomas Kuhn. In J. in John R. McNeill (Ed.), Environmental History: As if Nature Existed (pp. 65-84). New York: Oxford University Press
2	https://www.un.org/sustainabledevelopment/water-and-sanitation/
3	http://www.sulabhenvi.nic.in/Home.aspx



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Third Year B. Tech. Civil Engineering

SEM-V (Academic Year-2023-24)

Course Plan

Course Title : Sustainable Sanitation Lab	
Course Code : 201CEMIP338	Semester : V
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 50	ESE Marks : NA

Course Description:

Sustainable sanitation laboratory deals with the determination and study of parameters of water and waste water which are important for hygienic conditions at residential, industrial and commercial establishments. It also covers the study of systems of sanitation, plumbing fixtures and materials.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability
PSO2	To develop abilities in graduates to suit to requirements of the varied industries.

Course Objectives:

- 1 To study the quality parameters of water and waste water as per the I.S. 10500 & Pollution control Board norms.
- 2 To understand systems of sanitation and plumbing lay out

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C338.1	Assess the quality parameters of water and wastewater as per the I.S. 10500 & Pollution control Board norms.
C338.2	Demonstrate the abilities to select a system of sanitation and prepare plumbing layout.

Prerequisite:	Engineering Chemistry, Environmental Studies
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Third Year B. Tech. Civil Engineering**SEM-V (Academic Year-2023-24)****Course Articulation Matrix:**

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C338.1	2	2	2	-	-	2	2	2	-	-	-	-	1	1	3
C338.2	2	2	2	-	-	2	2	2	-	-	-	-	1	1	3

LIST OF EXPERIMENTS:

Experiment No	Title of the experiment	Type	Hours
A.	Determination of parameters of Water and Wastewater (Minimum 6)		
1	pH	O	2
2	Acidity	O	2
3	Alkalinity	O	2
4	Solids (Total Suspended Solids, Total Dissolved Solids, Total Solids)	O	2
5	Residual Chlorine	O	2
6	Optimum dose of alum by jar test.	O	2
7	Turbidity	O	2
8	Dissolved Oxygen (DO)	O	2
9	Biochemical Oxygen Demand (BOD)	O	2
10	Chemical Oxygen Demand (COD)	O	2
11	Oil & Grease	O	2
B.	Study of systems of sanitation/plumbing	S	6
C.	Demonstration of plumbing fixtures/Site visit to treatment plant	S	6



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Text Books:

1	G.S. Birdie and J.S. Birdie, "Water Supply and Sanitary Engineering"- Dhanpat Rai Publisher.
2	B. C. Punmia, Ashok Kumar, A. K. Jain, "Water Supply Engineering" - Laxmi Publisher.
3	B. C. Punmia, Ashok Kumar, A. K. Jain, "Waste Water Engineering" - Laxmi Publisher.

Reference Books:

1	Metcalf & Eddy, "Waste Water Engineering Treatment & Disposal" –Tata McGraw Hill
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Reference Manuals:

1	"Manual on Water Supply and Treatment"- Government of India Publication, 1993
2	"Manual on Sewerage & Sewage Treatment" Ministry of Urban Development Govt. of India Msy-2000.

Codes:

1	IS:10500
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SEM- VI (Academic Year-2023-24)

Course Plan

Course Title: Environmental Management System	
Course Code: 201CEMIL339	Semester: VI
Teaching Scheme: L-T-P : 3-0-0	Credits: 3
Evaluation Scheme: ISE + MSE Marks : 20 + 30	ESE Marks: 50

Course Description:

Environmental Management Systems course deals with the implementation of effective environmental management system in organizations managing the various environmental aspects. The course emphasizes on the requirements prescribed in ISO 14001:2015. ISO 14001:2015 standard is an International Standard followed worldwide for the environmental management in organizations.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability
PSO2	To develop abilities in graduates to suit to the requirements of the varied industry

Course Objectives:

- 1 To study scope of ISO 14001:2015, Environmental Management System standard
- 2 To know requirements of ISO 14001: 2015 Environmental Management System standard
- 3 To understand the requirements & procedures for EMS audit.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C339.1	Discuss scope and benefits of ISO standards and aims of EMS.
C339.2	Illustrate the process and requirements of EMS audit as per ISO 19011 standard.
C339.3	Explain the auditory and managerial aspects



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Prerequisite:	Engineering Management
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Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and
Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C339.1	2	2	-	-	-	2	2	1	-	-	-	-	1	1	2
C339.2	2	2	-	-	-	2	2	1	-	-	-	-	1	1	2
C339.3	2	2	-	-	-	1	1	1	-	-	2		1	1	2

Content	Hours
Unit 1: Introduction to ISO, ISO History, Need of International Standards, Standard Development Process, Benefits of ISO Standards, Environmental Management System (EMS) and Sustainable Development, Concept of Life Cycle Analysis, Aim of EMS, Deming's PDCA Cycle, Scope of ISO 14001:2015 Standard, Terms and Definitions	6
Unit 2: Leadership and Commitment, Environmental Policy, Organizational Roles, Responsibilities and Authorities, Planning, Actions to address Risks and Opportunities, General Requirements, Environmental Aspects – Impacts Analysis, Compliance Obligations, Environmental Objectives, Planning Actions to achieve Environmental Objectives.	6
Unit 3: Support – Resources, Competence, Awareness, Communication – Internal and External Communication, Documented Information – Creating and Updating, Control of Documented Information, Operation – Operational Planning and Control, Emergency Preparedness and Response.	6



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Unit 4: Performance Evaluation – Monitoring, Measurement, Analysis and Evaluation, Evaluation of Compliance, Checklists, Calibration and Records, Standard Operating Procedures, Work Instructions.	6
Unit 5: Internal Audit, Internal Audit Programme, Terms and Definitions, Principles of Auditing, Managing Audit Programme, Audit Activities, Audit Checklists and Reports, Competence and Evaluation of Auditors.	6
Unit 6: Management Review - Need, Role of Management Representative, Role of Top Management, Improvement, Nonconformity and Corrective Action, Continual Improvement.	6

Text Books & Reference Books:

1	International Standard ISO 14001:2015 – Environmental Management Systems – Requirements with Guidance for Use
2	International Standard ISO 14004:2016 - Environmental Management Systems - General guidelines on implementation
3	International Standard ISO 19011 – Guidelines for Environmental Management System auditing.
4	Environmental Management Systems Auditors Course Manual by Confederation of Indian Industries



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Third Year B. Tech. Civil Engineering

SEM-VI (Academic Year-2023-24)

Course Plan

Course Title: Waste Management	
Course Code: 201CEMIL340	Semester: VI
Teaching Scheme: L-T-P : 3-0-0	Credits: 3
Evaluation Scheme: ISE + MSE Marks : 20 + 30	ESE Marks: 50

Course Description:

For sustainable and hygienic environment, management of waste is very important. Variety of wastes is produced in industry. The composition and characteristics of waste vary from city to city as well as from industry to industry. Broadly the wastes can be categorised in to municipal solid waste, industrial waste, hazardous waste, e waste, biomedical waste as well as plastic waste. The course deals with elements of waste management system, characterization, waste to energy concepts, waste management policies and legislation.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability
PSO2	To develop abilities in graduates to suit to the requirements of the varied industry

Course Objectives:

- 1 To understand importance of waste management for better environment.
- 2 To study characteristics of waste, elements of waste management system,
- 3 To know Waste Management Policies and its legislation

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C340.1	Discuss characteristics of wastes and waste management system
C340.2	Illustrate treatment technology and energy conversion options for wastes
C340.3	Explain technical and legal aspects related to waste management



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SEM-VI (Academic Year-2023-24)

Prerequisite:	Engineering Chemistry, Environmental Studies
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Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C340.1	2	2	1	-	-	2	3	-	-	-	-	-	1	1	2
C340.2	2	2	2	1	1	2	3	-	-	-	-	-	1	1	3
C340.3	2	2	-	-	-	2	3	2	-	-	-	-	1	1	2

Content	Hours
Unit 1: Introduction to wastes Definition of waste and their classification, Important quality parameters of different types of wastes, Wastes suitable for energy production, Solid wastes and its classification, Elements of solid waste management, Waste water and their classification	6
Unit 2: Characterization and analysis of wastes Types of wastes generated in industry and its effects on environment, Characterization of solid wastes- Physical, Chemical, Energy content, Heating value Analysis of wastes: Proximate analysis, Ultimate analysis, Fusing point of ash, Leaching properties, Characterization of waste water- Physical, Chemical.	6
Unit 3: Elements of waste management system Waste generation, storage, collection, separation & processing, transfer and transport, Integrated waste management using waste hierarchy, Principles of the waste hierarchy, waste prevention or reduction, reuse, recycling/composting, energy recovery and disposal	6
Unit 4: Treatment technologies for solid waste a) Composting: Concept of composting, Principles of composting process. Methods – i) Manual Composting methods, ii) Mechanical Composting, iii) Vermicomposting. b) Land filling: Concept, Methods- Area method, Trench method and Ramp method. c) Incineration of waste: Types of incinerators, Products of incineration process, Pyrolysis of waste.	6



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<p>Unit 5: Waste to Energy</p> <p>Need of energy production from wastes, Routes of energy production from waste, Energy production from organic waste- Anaerobic digestion and biogas production, types of anaerobic digestion process, operation of anaerobic digester. Energy production from waste plastic- Classification of plastics, plastic waste generation, options for proper management, code for recyclable Plastics and suitability for energy production, recycling through pyrolysis, converting waste plastic to fuels. Refuse Derived fuels (RDF)- Fundamentals of densification, types of briquetting, Briquetting process and their comparison, Briquette characteristics, application of briquettes.</p>	6
<p>Unit 6: Waste Management Policies and its legislation</p> <p>Need for appropriate and updated legislation, Public concern and education, Rules and regulations for Waste Management by Ministry of Environment & Forest, Highlights of:</p> <ul style="list-style-type: none">•E-Waste Management Rules, 2016•Plastic Waste Management Rules, 2016•Construction and demolition Waste Management Rules, 2016•Hazardous and other wastes Management Rules, 2016•Biomedical Waste Management Rules, 2016•The water (prevention and control of pollution) Act, 1974, <p>Role of Central Pollution Control Board and Maharashtra Pollution Control Board in management of waste from various sources.</p>	6

Text Books:

1	Bhide, A. D. and Sundaresan, B. B. (2001). Solid Waste Management – Collection, Processing and disposal. Mudrashilpa offset printers, Nagpur.
2	T. V. Ramachandra, Municipal Solid Waste Management, Published by Common Wealth of Learning, Canada; Centre for Ecological Sciences, I ISc, Karnataka Environment Research Foundation
3	Tchobanoglous, G., Theisen and Vigil, Integrated Solid Waste Management: Engineering Principles and Management Issues, McGraw Hill, 1993
4	Peavy, H. S., Rowe, D. R. and Tchobanoglous, G. (1985) Environmental Engineering, McGraw-Hill Book Company, Singapore

Reference Books:

1	CPHEEO, Manual on Municipal Solid Waste Management, Govt. of India, 2014
2	George, T. and Frank, K. Handbook of Solid Waste Management: McGrawHills.



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SEM-VI (Academic Year-2023-24)

Course Plan

Course Title: Waste Management Lab	
Course Code: 201CEMIP341	Semester: VI
Teaching Scheme: L-T-P : 0-0-2	Credits: 1
Evaluation Scheme: ISE Marks : 25	TW Marks: NA

Course Description:

Variety of wastes is produced in the use and process of raw material to get end product. The waste varies in its composition and characteristics. Waste management is effective when planned on the 3 R principles. The waste needs to be looked as resource and recovery of materials and energy is possible based on characteristics of the wastes. This laboratory course deals with determination of various characteristics and interpretation of suitable method of disposal and potential of waste in energy recovery.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability
PSO2	To develop abilities in graduates to suit to the requirements of the varied industry

Course Objectives:

- 1 To understand the characteristics of waste important for waste management.
- 2 To study standard laboratory procedure for determination of waste characteristics
- 3 To identify potential of waste for energy recovery.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C341.1	Interpret characteristics amenable for effective waste management.
C341.2	Carry out laboratory experiments for determination of parameters of waste.
C341.3	Estimate potential of waste to convert into energy.

Prerequisite:	Engineering Chemistry, Environmental Studies
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Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and
Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C341.1	2	2	1	-	-	2	2	2	-	-	-	-	1	1	2
C341.2	2	2	2	-	-	2	2	2	-	-	-	-	1	1	3
C341.3	2	2	2	-	-	2	2	2	-	-	-	-	1	1	2

List of Experiments

Experiment No	Title of the experiment	Type	Hours
1	Study of Composition of waste	S	2
2	Determination of bulk density of waste	O	2
3	Determination of moisture content.	O	2
4	Determination of pH	O	2
5	Determination of calorific value	O	2
6	Determination of proximate analysis	O	2
7	Determination of ultimate analysis	O	2
8	Visits to solid waste disposal sites / plants & preparation of report	S	10

Text Books:

1	Bhide, A. D. and Sundaresan, B. B. (2001). Solid Waste Management – Collection, Processing and disposal. Mudrashilpa offset printers, Nagpur.
2	T. V. Ramachandra, Municipal Solid Waste Management, Published by Common Wealth of Learning, Canada; Centre for Ecological Sciences, I ISc, Karnataka Environment Research Foundation
3	Tchobanoglous, G., Theisen and Vigil, Integrated Solid Waste Management: Engineering Principles and Management Issues, McGraw Hill, 1993

Reference Books:

1	CPHEEO, Manual on Municipal Solid Waste Management, Govt. of India, 2014
2	George, T. and Frank, K. Handbook of Solid Waste Management: McGrawHills.



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SEM-VII (Academic Year-2024-25)

Course Plan

Course Title: Occupational Health & Safety	
Course Code: 201CEMIL446	Semester: VII
Teaching Scheme: L-T-P : 3-0-0	Credits: 3
Evaluation Scheme: ISE + MSE Marks : 20 + 30	ESE Marks: 50

Course Description:

The course explains and deals with the concept and need of safety in industries, Importance of risk assessment & management, Safety Management Systems, Accidents in Industries, Occupational health and industrial hygiene, Various preventive methods for occupational Health Problems, Introduction to legal aspects of safety etc.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability.
PSO2	To develop abilities in graduates to suit to requirements of the varied industries.

Course Objectives:

- 1 To study the concept and need of safety in industries.
- 2 To understand accident prevention techniques, industrial hygiene & occupational disease.
- 3 To understand various safety management systems, OSHAS 18001 management system

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C446.1	Interpret need of safety as well as unsafe acts and conditions in industries.
C446.2	Illustrate risk assessment and accident theories, prevention techniques
C446.3	Explain significance of occupation health, safety and industrial hygiene



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(An Autonomous Institute)
Department of Civil Engineering
Minor Degree in Environmental Sustainability
SEM-VII (Academic Year-2024-25)

Prerequisite:	Environmental Engineering, Engineering Management
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Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and
Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C446.1	2	2	-	1	-	3	2	2	-	-	-	-	1	1	2
C446.2	2	2	1	1	1	3	2	-	-	-	-	-	1	1	3
C446.3	2	2	-	-	-	3	2	-	-	-	-	-	1	1	2

Content	Hours
Unit 1: Concept and Need of Safety in Industries, Various Hazards in Industries, Safety department and its role. Evolution of modern safety concept, Purpose, Overview of Audit Systems, Scope and Background, Intended Audience, Period of Applicability, Identification of unsafe acts of workers and unsafe conditions.	6
Unit 2: Introduction to Risk Assessment & Management, Safety Management Systems, Concept of an accident, Definition and Various Causes, Accidents in industries & its Cost, Accident Prevention Techniques, Reportable and Non Reportable Accidents, Principles of Accident Prevention, Theories of Accidents, Accident Investigation and Reporting, Domino sequence, Supervisory role, Role of safety committee.	6
Unit 3: Safety in Industries-, Safe Design and Layout of Plants and Equipment, Machine Guarding, Safe Storage & Handling of Hazardous chemicals, MSDS, Good House Keeping. Job Safety Analysis, Safety Checklists, Safety Inspections, Confined Space Entry, Work Permit System, Lock Out- Tag Out System	6



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Unit 4: Occupational Health and Industrial Hygiene - Objectives, Need, Chronic and Acute Effects, Various Limits of Exposure-, LD50, LC50, TLV(TWA), STEL, OSHA Limits, Effects of Various Physical, Chemical and Biological Hazards in Industries on Human Health. Occupational Diseases in Various Industries and Causative Agent, Various Personal and Work Place Monitoring Systems	6
Unit 5: Preventive Methods for Occupational Health Problems, Protection of Workers against Harmful Agents and Conditions, LEVs, PPEs, Ergonomics, Health Monitoring and Medicine	6
Unit 6: Legal aspects of Safety, Safety in Engineering industries, Chemical industries, Construction industries, On site & Off site Emergency Management Plan, OSHAS 18001 management system and Auditing, Product Safety.	6

Text Books:

1	David L. Goetsch, Occupational Safety and health by, Prentice Hall, Ohio
2	Safety manual - EDEL Engineering consultancy Pvt. Ltd.
3	Gayle Woodside, Hazardous Material and Hazardous Waste management, John Wiley & sons Inc.
4	K. Park, Textbook of Preventive and Social Medicine, Banarsidas Bhanot Publishers.
5	Raja Sekhar Mamillapalli, Visweswara Rao, Occupational Health and Hygiene in Industries, Pharma Med Press / BSP Book
6	K.T. Kulkarni, Introduction to Industrial Safety, Pune Vidyarthi Griha

Text Books & Reference Books:

1	Lee Harrison, Environmental Health and Safety Auditing Handbook, Mac Graw Hill Inc.
2	Health Hazards of the Human Environment - WHO, Geneva



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(An Autonomous Institute) B. Tech. Curriculum

Third Year B. Tech. Civil Engineering

SEM-VII (Academic Year-2024-25)

Course Plan

Course Title : Occupational Health & Safety Lab	
Course Code : 201CEMIP447	Semester : VII
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 25	ESE Marks : NA

Course Description:

The course deals with the practical aspects of occupational health and safety in various Industries, understanding of risk and types of accidents as well as management of safety in Industries. It also deals with the study of various preventive methods for occupational health problems and preventive measures.

Program Specific Outcomes (PSOs):

PSO1	To impart interdisciplinary knowledge and skills for enhancing employability.
PSO2	To develop abilities in graduates to suit to requirements of the varied industries.

Course Objectives:

- 1 To study practical aspects of occupational health and safety
- 2 To understand risk, types of accidents, management of safety in Industries and various preventive methods.

Course Outcomes (COs):

COs	At the end of successful completion of course, the students will be able to...
C447.1	Describe practical aspects of occupational health and safety
C447.2	Interpret causes of risks and accidents in industries
C447.3	Explain occupational health problems and preventive measures.

Prerequisite:	Engineering Chemistry, Environmental Studies
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Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

POs/ COs	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	BTL
C447.1	2	2	1	-	-	2	2	2	-	-	-	-	1	1	2
C447.2	2	2	1	-	-	2	2	2	-	-	-	-	2	2	3
C447.3	2	2	1	-	-	2	2	2	-	-	-	-	2	2	2

LIST OF EXPERIMENTS

Activity No.	Activity/Task to be performed	Type	Hours
1	Study of need of Safety, Safety department and its role, Various Hazards in Industries.	S	2
2	Identification of unsafe acts of workers and unsafe conditions	S	2
3	Risk assessment, management & safety management systems	S	2
4	Study of theories of accidents, Principles of accident prevention & techniques, Accident Investigation and Reporting,	S	2
5	Safety in Industries, Plant layout & Machine Guarding	S	2
6	Safe Storage & Handling of Hazardous chemicals, MSDS, Principles of Good House Keeping.	S	2
7	Job Safety Analysis, Safety Checklists, Safety Inspections	S	2
8	Study of Confined Space Entry, Work Permit System, Lock Out- Tag Out System	S	2
9	Listing and study of Various Physical, Chemical and Biological Hazards in Industries.	S	2
10	Study of various Personal and Work Place Monitoring Systems	S	2
11	Study of preventive methods for Occupational Health Problems, Personal protective Equipment	S	2
12	Study of legal aspects of occupational health and safety.	S	2



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