

Solid Waste Management (SYLLABUS)

Course Code	23CE2702C	Year	IV	Semester	I
Course Category	Open Elective - IV	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites Courses	Environmental Science
Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Objectives:

After completing this course, students will be able to:

1. To introduce the fundamental concepts, sources, characteristics, and legislative aspects of solid waste management systems.
2. To provide knowledge on collection, transportation, processing, recycling, and resource recovery techniques for efficient waste management.
3. To develop understanding of treatment and disposal methods such as composting, incineration, energy recovery, and sanitary landfill design.
4. To familiarize with hazardous waste management practices including identification, handling, treatment technologies, regulations, and e-waste management.

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO1	Explain the sources, types, characteristics, and legislative aspects of municipal solid waste and their impact on environmental sustainability.	L2
CO2	Apply principles of waste collection, transportation, route optimization, and material recovery techniques for efficient solid waste management.	L3
CO3	Analyse processing and treatment methods such as recycling, composting, anaerobic digestion, incineration, and energy recovery for resource utilization.	L4
CO4	Analyse the design, operation, and environmental management of sanitary landfills including leachate and gas control systems.	L4
CO5	Explain the principles of hazardous waste management including identification, handling, treatment methods, regulations, and e-waste management practices.	L2

Course Articulation Matrix: (1 = Low, 2 = Medium, 3 = High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	1	3	-	-	-	-	1	3	2
CO2	3	3	2	1	3	3	-	-	-	-	1	3	3
CO3	3	3	2	2	2	3	-	-	-	-	1	3	3
CO4	3	3	2	2	2	3	-	-	-	-	1	3	3
CO5	2	2	1	1	1	3	2	-	1	-	2	2	3

Syllabus

Unit No	Content	Mapped COs
I	Introduction: Definition of solid waste - waste generation-sources and types of solid waste - sampling and characterization - Determination of composition of Municipal Solid Waste - Onsite storage and handling of solid waste - Future changes in waste composition, major legislation, monitoring responsibilities.	CO1
II	Collection and Transport of Solid Waste: Type and methods of waste collection systems, analysis of collection systems - Optimization of collection routes - alternative routes for collection system. Transfer and Transport: Need for transfer operation, transport means and methods, transfer station types and design requirements. Separation and Processing and Transformation of Solid Waste - Waste as a Resource - Disposable Materials, Recycling, Collection, Processing, and Potential for Reuse.	CO2
III	Processing and disposal: unit operations used for separation and processing, Materials Recovery facilities, Source reduction and waste minimization, Metal Separation & Recovery Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment - Energy recovery - biogas generation and cleaning - Incinerators.	CO3
IV	Landfills: Classification, Site selection, design and operation, methods of filling, drainage and leachate collection systems - designated waste landfill remediation, reclamation, environmental closure.	CO4
V	Hazardous Waste Management: Definition and identification of hazardous wastes-sources and characteristics - hazardous wastes in Municipal Waste - Hazardous wastes regulations - minimization of Hazardous Waste-compatibility, handling and storage of hazardous waste - collection and transport, e-waste - sources, collection, Design and operation of facilities for physical, chemical and thermal treatment of hazardous waste - Solidification, chemical fixation and encapsulation, incineration - reuse after treatment.	CO5

Learning Resource(s)

Text Book(s)
<ol style="list-style-type: none"> 1. Integrated Solid Waste Management: Engineering Principles and Management Issues, Tchobanoglous, G., Theisen, H., and Vigil, S.A., McGraw Hill International Edition, 1993. 2. Hazardous Waste Management, Wentz, C.A., McGraw Hill International Edition, 1995.
Reference Book(s)
<ol style="list-style-type: none"> 1. Solid Waste Engineering, Tchobanoglous, G., McGraw Hill International Edition, 1993. 2. Municipal Solid Waste Management, George Tchobanoglous, Hilary Theisen and Samuel Vigil, McGraw Hill Publishing, 1993.
e- Resources & Other digital material
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/105103205 2. https://nptel.ac.in/courses/105106056