Course Code	Course Name	Credits
26CH609	SOLID WASTE MANAGEMENT	04

Course Objectives

- To provide an understanding of municipal solid waste, including its types, sources, generation and storage.
- To impart knowledge on the methods of collection, transportation and processing of municipal solid waste.
- To develop awareness of appropriate disposal techniques and management strategies for municipal solid waste.

Learning Outcomes

On completion of this course the students will be able to demonstrate

- Understand the sources, types, characteristics, and generation of municipal solid waste and its environmental impacts.
- Explain methods of solid waste storage, segregation, collection, and transportation systems.
- Apply principles of waste processing techniques including recycling, composting, and resource recovery.
- Evaluate solid waste disposal methods such as sanitary landfills, leachate management, and site rehabilitation.

Unit 1 - Sources And Types of Solid Waste (12 Hrs.)

Overview; problems and issues of solid waste management; need for solid waste management; sources and types of municipal solid wastes; waste generation rates; factors affecting generation; characteristics; methods of sampling and characterization; effects of improper disposal of solid wastes; public health and environmental effects; estimation of solid waste quantity; factors affecting solid waste generation rate.

Unit 2- Storage and Processing (12 Hrs.)

On-site storage methods; effect of storage; materials used for containers; segregation of solid wastes; public health and economic aspects of open storage; waste segregation and storage; case studies under Indian conditions; source reduction of waste; reduction; reuse and recycling.

Unit 3 - Collection and Transfer (12 Hrs.)

Methods of residential and commercial waste collection; collection vehicles; manpower; collection routes; analysis of collection systems; transfer stations; selection of location; operation and maintenance; options under Indian conditions; field problems; problem solving.

Unit 4 – Off-site processing Objectives of waste processing (12 Hrs.)

Physical processing techniques and equipment; resource recovery from solid waste; composting and biomethanation; thermal processing options; case studies under Indian conditions.

Unit 5 - Disposal (12 Hrs.)

Land disposal of solid waste; sanitary landfills; site selection; design and operation of sanitary landfills; landfill liners; management of leachate and landfill gas; landfill bioreactor; dumpsite rehabilitation.

Reference Books:

1. G. Tchobanoglous, H. M. Theisen, and R. Eliassen, Solid. Wastes: Engineering Principles and Management Issues, 1993, McGraw Hill, New York.
2. P.A. Vesilind, and A.E. Rimer, Unit Operations in Resource Recovery Engineering, 1981, Prentice Hall, Inc.
3. Paul T Willams, Waste Treatment and Disposal, 2000, John Wiley and Sons.
4. Government of India, Manual on Municipal Solid Waste Management, CPHEEO, 2000, Ministry of Urban Development, New Delhi.
5. A.D. Bhide and B.B. Sundaresan, Solid Waste Management Collection, 2001, Processing and Disposal.
6. A.G.R. Manser and A.A.Keeling, Practical Handbook of Processing and Recycling of Municipal solid Wastes, 1996, Lewis Publishers, CRC Press.
7. George Tchobanoglous and Frank Kreith, Handbook of Solidwaste Management, 2002, McGraw Hill, New York.

K,Sasikumar, Sanoop Gopi Krishna, Solid Waste Management, 2009, PHI learning, New Delhi.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=pn3pGRogN_w
2. https://www.youtube.com/watch?v=cjIacnNRLHE&list=PLwdnzlV3ogoXAap_BHeApkcF7M8nt13hv
3. https://www.youtube.com/watch?v=le0NJNs9NNA

COs and Bloom's Taxonomy Mapping – 26CH609		
Course Outcomes	**On completing P.G. program the students will be able to**	**BTL**
CO1	Recall and explain core concepts of solid waste management, including issues, strategies, collection, processing, and disposal methods.	K1, K2
CO2	Apply knowledge to analyze waste sources, storage effects, collection systems, resource recovery techniques, and landfill management practices.	K3
CO3	Analyze the impacts of improper waste disposal, purpose and operation of transfer stations, thermal processing options, and concept of landfill bioreactors.	K4
CO4	Evaluate factors affecting waste generation, recycling effectiveness, collection methods, processing techniques, and land disposal methods.	K5
CO5	Design methods for estimating waste quantity, evaluating storage and processing impacts, addressing collection and transfer problems	K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

Relationship Matrix – 26CH609												
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	1	3	2	1	2	1	2	3	1	2	1	1.9
CO2	2	3	2	3	2	1	2	3	1	3	1	2.3
CO3	3	2	2	2	1	2	3	1	2	3	1	2.2
CO4	3	2	1	2	1	2	1	2	2	2	2	2.0
CO5	1	2	3	1	2	1	2	1	2	1	2	1.8
											Total	2.1

Mean Score: 3- High, 2- Medium/Moderate, 1-Low