



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3141311

Semester – IV

Subject Name: MUNICIPAL & INDUSTRIAL SOLID WASTE MANAGEMENT

Type of course: Professional Core Course

Prerequisite: Basics of Environmental Science

Rationale: To understand key issues and its technical solutions pertaining to municipal and industrial solid waste management is necessary for practicing environmental engineers.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
	[A] Municipal Solid Waste Management:	
1	Introduction to Municipal Solid Waste: Solid waste terminology, Sources, Characteristics, Composition, Generation rate, Need for integrated solid waste management	04
2	Onsite Handling, Storage and Processing of Solid Waste: Handling methods, Factors considered for storage, Need for segregation, Onsite processing	04
3	Collection and Transportation of Municipal Solid Waste: Waste collection, Collection systems and equipments, Layout of collection routes, Means of transport, Need and design requirements of Transfer station	08
4	Processing and Separation of Municipal Solid Waste: Importance, Storage, Conveying, Compacting, Shredding , Roll crushing, Material separation principle, Picking, Screens, Float/Sink separators, Magnetic separators, Other	08



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3141311

	devices for processing and material separation, Drying and dewatering	
5	Recovery of Resources, Conversion Products and Energy : Material recovery & recycling, Recovery of chemical and biological products, Recovery of energy	06
6	Disposal of Solid Waste: Landfill site selection criteria, Landfilling methods, Landfill processes, Landfill design, Landfill operations, Landfill closure and post-closure care	08
	[B] Industrial Solid Waste Management:	
7	Hazardous Solid Waste Management: Definition, Sources, Generation, Characteristics, Storage, Transportation, Treatment techniques, siting criteria for TSDF ,Construction and operation of secured landfill, Types of liner system	08
8	Biomedical Waste Management: Definition, Sources, Generation, Classification, Storage, Transportation, Treatment techniques, Disposal	04
9	E-Waste Management: Definition, Sources, Generation, Recovery & Recycling technologies, Disposal	02
10	Incinerable Solid Waste Management: Definition, Sources, Generation, Characteristics, Storage, Guidelines for common hazardous waste incineration	04

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	15	15	15	10	–

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3141311

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Environmental Engineering by Arcadio Sincero and Gregoria Sincero, Second Edition, Prentice Hall India
2. Integrated Solid Waste Management: Engineering Principles and Management Issues by George Tchobanoglous, McGraw-Hill Publication
3. Hazardous Waste Management by M LaGrega and others, McGraw-Hill Publication

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Justify the need for integrated solid waste management and onsite processing of solid waste	20
CO-2	Evaluate collection and transportation systems of municipal solid waste	20
CO-3	Analyze processing techniques to recover resources, Conversion products and energy from solid waste	20
CO-4	Analyze landfill operations and design for disposal of solid waste	20
CO-5	Evaluate treatment techniques and disposal methods of Hazardous, Biomedical, E-waste and Incinerable Solid Waste Management	20

List of practicals/exercise:

Following activities shall be performed during practical hours: (minimum 08 need to be carried out)

1. Determination of solid waste(MSW/E-waste/Biomedical Waste/Hazardous Waste) generation rate
2. Determination of composition of MSW
3. Determination of moisture content of MSW
4. Determination of calorific value of solid waste
5. Determination of volatile matter in MSW
6. Determination of fixed carbon in MSW
7. The students will have to solve examples based on physical properties of MSW.
8. The students will have to solve examples based on energy content of MSW.
9. The students will have to solve examples based on collection system.



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3141311

10. The students will have to solve examples based on landfill.
11. The students will have to solve examples based on material balance analysis.
12. The student will have prepare detail notes on BMW
13. The student will have prepared detail notes on E-waste management.
14. The student will have prepared detail notes on Incinerable Solid Waste Management.

Major Equipments: Weighing balance, Hot air oven, Sieve sets, Bomb calorimeter, Muffle furnace,

List of Open Source Software/learning website:

1. NPTEL - <https://nptel.ac.in>
2. CPHEEO: Manual on Municipal Solid Waste Management- cpheeo.gov.in