



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3173517

Semester – VII

Subject Name: Solid Waste Management – II

Type of course: Professional Core Course

Prerequisite: Understanding of solid waste management along with some basics of industrial and hazardous waste management.

Rationale: to make students aware about various kind of solid wastes and their general characteristics along with different technologies for treatment of these wastes. Existing legislation for municipal waste, e-waste & hazardous waste.

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)		
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1.	Introduction and characterization of industrial and hazardous waste: Hazardous waste & Other Waste (Management and Transboundary) rules,2016, Waste Hierarchy, Byproducts, Waste utilization and Rule-9, Recovery operations like solvent recovery, wealth-from-waste concept, Manifest system, Handling, storage and transportation of Hazardous Waste, TCLP test, Environmental monitoring for industrial hazardous waste treatment	6
2.	Hazardous waste Landfills- Siting and design requirements, Captive & Common facilities, Liner system, Capping requirements, Acceptance criteria for direct landfill, Leachate management, Monitoring requirements, Post closure maintenance, Case Study of BEIL	8



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3.	Thermal Treatments: Co-processing- Guidelines, waste characteristics, Present scenario, Advantages Incineration- Definition, types, Characteristics of waste, Storage, Captive Incinerators, Guidelines for common hazardous waste incineration and emission norms, Destruction and Removal efficiency (DRE) calculations, Waste heat recovery, Air pollution control, Dioxin formation & control methods	12
4.	Biomedical Waste Management: Definition, Sources, Generation, Classification, Storage, Transportation, Treatment techniques, Disposal E-Waste Management: Definition, Sources, Generation, Recovery & Recycling technologies, Disposal	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	15	08	07	00

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

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:

- Environmental Engineering, Kiely G. McGraw Hill Book Company, 1998.
- Environmental Pollution Control and Engineering, Rao C.S., New Age International (P) Limited, 1991.
- Environmental Engineering by Arcadio Sincero and Gregoria Sincero, Second Edition, Prentice Hall India
- Integrated Solid Waste Management: Engineering Principles and Management Issues by George Tchobanoglous, McGraw-Hill Publication
- Hazardous Waste Management by M LaGrega and others, McGraw-Hill Publication
- Treatment of Industrial Wastes, Besseliere, E and Schwartz. McGraw Hill. 1975.

List of Experiments:

1. To determine the pH of a given sample of hazardous waste by universal indicator method and pH meter method.
2. To carry out Paint Filter Liquid Test (PFLT) for a given sample of hazardous waste to check the availability free moisture.
3. To determine the Calorific value of a given solid waste using Bomb Calorimeter.
4. To determine the concentration of Potassium in given sample by Flame photometer.



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5. To determine the concentration of Sodium in given sample by Flame photometer.
6. To determine the moisture content in given solid waste sample.

Course Outcomes: After learning this course students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Identify the characteristic and waste management practices as described in various waste management rules	15
CO-2	Explain design requirements of hazardous waste landfill	15
CO-3	Interpret the importance of thermal treatment of hazardous waste.	15
CO-4	Appraise the incineration practices as waste treatment methods	20
CO-5	Summarize the biomedical waste management practices	20
CO-6	Explain the E-Waste management practices	15



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