



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3160515

Semester – VI

Subject Name: Solid Waste Management

Type of course: Open elective course

Prerequisite: None

Rationale:

To provide an idea on Solid Waste Management is a pressing issue. The course on Solid Waste Management gives the student an overview of municipal solid waste management including collection, transfer, transport and disposal. To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs	% weightage
1	Introducing Municipal Solid Waste Management its Generation and Characteristics of Waste: Sources, Types, composition, quantity, sampling and characteristics of waste, factors affecting generation of solid wastes. Overview: problems and issues of solid waste management-Need for solid waste management-Functional elements such as waste generation, storage, collection, transfer and transport, processing, recovery and disposal in the management of solid waste.	08	15
2	Types of Solid Waste: Waste products during manufacturing and packing, operation of pollution control facilities, generation and minimization at source, recycling, disposal, Bio medical waste-generation and management system, E-waste-generation and management system.	10	20
3	Disposal of Solid Waste: Segregation, volume reduction at source, recovery and recycle; dumping of solid waste-sanitary, landfills-site selection-design and operation of sanitary landfill-leachate, landfill gas management-landfill closure and environmental monitoring-landfill remediation; Municipal solid waste in Indian conditions, legal aspects of solid waste disposal, plastic waste disposal and necessary equipments.	10	20
4	Waste Collection, Storage and Transport: Collection: Collection of solid waste-collection services-collection system, equipments-time and frequency of collection-labour requirement-factors affecting	10	20



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3160515

	collection–analysis of collection system–collection routes–preparation of master schedules. Transfer and Transport: Need for transfer operation–transfer stations–types –transport means and methods–location of transport stations–Manpower requirement–collection routes: Transfer stations–selection of location, types and design requirements, operation and maintenance.		
5	Risk Assessment and Environmental Legislation Characterization and site assessment, Waste minimization and resource recovery, Laws for solid waste management	07	15

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
30	15	15	5	5	0

Legends: R: Remembrance; U: Understanding; A: Application; N: Analyze; 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:

Text Books

1. Integrated solid waste management: Engineering Principles and Management Issues, Tchobanoglous G., Theisen H., Vigil S.A. McGraw-Hill, New York, 1993.
2. Unit Operations in Resource Recovery Engineering, Vesilind P.A. and Rimer A.E., Prentice Hall, 1981.
3. Waste Treatment and Disposal, Willams P. T. John Wiley and Sons, Ltd. 2005.
4. Waste Management, Bilitewski B., Härdtle G., Marek K. Springer-Verlag Berlin Heidelberg, 1997.

Other references

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Housing and Urban Affairs, Government of India, New Delhi, 2000.
2. Solid Waste Management: Collection Processing and Disposal, Bhide A.D. and Sundaresan, B.B. NEERI, Nagpur, 2001.
3. Practical Handbook of Processing and Recycling Municipal Waste, Manser A.G.R. and Keeling A.A. Lewis Publishers, CRC Press, 1996.
4. Waste Management Practices: Municipal, Hazardous, and Industrial, Pichtel J. CRC Press, 2014.
5. Hazardous Waste Management, LaGrega M.D., Buckingham P.L., Evans J.C. McGraw-Hill, New York, 1994.
6. Hazardous Wastes: Sources, Pathways, Receptors, Watts R.J. John Wiley and Sons, New York, 1998.



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3160515

List of Open Source Software/learning website: www.nptel.iitm.ac.in/courses/

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO1	An understanding of the nature and characteristics of municipal solid wastes	15
CO2	Execute an action plan for types of solid waste	20
CO3	Select the appropriate method for solid waste disposal	15
CO4	Ability to plan waste minimization and design storage, collection, transport, processing and disposal of municipal solid waste	20
CO5	To implement risk assessment and laws related to solid waste management	15

List of Tutorials: Students can select any type of solid waste management techniques. Each group of students is expected to create a way to utilize industrial methods of waste minimization techniques in innovative way and prepare report of project assigned to his/her group. In addition, each group is expected to give a power point presentation during the semester. The presenter will be selected randomly just prior to the presentation.

List of Open Source Software/learning website: Students can refer to video lectures available on various websites including NPTEL. Students can refer to the CDs which are available with some reference books for the solutions of problems using softwares. Students can develop their own programs for the solutions using excel, ChemCAD and other simulation softwares.