GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL ENGINEERING (13)
MUNICIPAL AND INDUSTRIAL SOLID WASTE MANAGEMENT
SUBJECT CODE: 2151307
B.E. 5th SEMESTER

Type of course: Applied Science

Prerequisite: Knowledge of subjects Environmental Sciences I and II

Rationale: To understand the water supply and sewage collection systems in cities

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	2	0	5	70	20	10	30	0	20	150

Content:

Sr. No.	Course Contents	Total Hrs	% Weightage
	[A] Municipal Solid Waste Management:		
1	Solid Waste Terminology	1	2
2	Municipal Solid Waste Generation: Sources; Characteristics; Composition ; Generation rate	3	7
3	Onsite Handling, Storage and Processing: Handling Methods; Factors Considered for Storage; Onsite Processing	2	5
4	Collection of Solid Waste : Collection Services; Collection Systems and Equipments	2	5
5	Transfer and Transport of Solid Waste : Need; Transfer stations; Means of Transport; Location of Transport Station	3	7
6	Processing of Municipal Solid Waste: Importance; Processing Techniques Equipments :Compaction, Incineration, Shredding ,Component Separation ,Drying and Dewatering	8	19
7	Recovery of Resources, Conversion Products and Energy : Material Recovery; Recovery of chemical and biological products; Recovery of Energy	6	14
8	Disposal of Solid Waste and Residual Matter : Landfilling Methods ; Basic Aspects of Landfill Implementation ; landfill operations; post-closure care and use of old landfills; landfill mining	6	14
	[B] Hazardous Solid Waste Management:		
9	Definition, Identification And Classification Of Hazardous Solid Waste	1	2
10	Hazardous Waste Management: Waste Minimization; Waste Exchange; Recycling	4	10
11	Treatment Technologies: Biological, Chemical; Physico-Chemical Treatment: Incineration, Stabilization, Solidification	4	10

12	Disposal of Hazardous solid Waste: Secured landfills, Incinerators	4	10
13	Biomedical Waste Management: Sources; Generation; Classification; Storage; Transportation; Disposal; Waste Treatment: Disinfection, Irradiation, Incineration	4	10

Suggested Specification table with Marks (Theory):

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)

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 Outcome:

After learning the course the students should be able to do:

1. Realize the dilemma of solid waste and the functional elements of a solid and Hazardous waste management system.
2. Classify the sources, types, composition and quantities of solid waste.\
3. Identify the physical, chemical and biological properties of solid waste.
4. Take measure to collection, transfer, transport, separate and process of solid and Hazardous waste.
5. Appraise aspects and issues related to recycling and composting of solid waste.
6. Use of incineration for disposal of solid waste.
7. Design aspects related to land disposal of solid and Hazardous waste

List of Tutorials:

1. Examples based on Generation Rate of solid waste.
2. Questions based on Sources & Characteristics of Municipal Solid Waste.
3. Questions based on Onsite Handling, storage and processing of Solid waste.
4. Examples on Haul Container System and Stationary Container System.
5. Questions based on Transfer and Transport of Solid Waste.
6. Questions based on processing of Municipal Solid Waste.
7. Questions based on Recovery of Resources, Conversion Products & energy from MSW.
8. Questions based on Disposal of Solid Waste.
9. Questions based on Hazardous Solid Waste.
10. Biomedical Waste management

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The

power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.