

19CE4704E – SOLID AND HAZARDOUS WASTE MANAGEMENT

Course Category:	Program Elective	Credits:	3
Course Type:	Theory	Lecture-Tutorial- Practical:	3-0-0
Prerequisites:	19CE3404- Environmental Engineering 19BS1103- Chemistry of Materials	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Outline the sources, composition, handling and storage of Municipal Solid Waste	K2
CO2	Understand the process of collection and transport of Municipal Solid Waste	K2
CO3	Assess the different methods involved in separation of Municipal Solid Waste	K3
CO4	Design the construction and operations of landfill facilities, energy recovery systems and management of leachate systems	K6
CO5	Understand and review the procedure for handling of different hazardous waste such as plastic, and radioactive waste	K2

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1		1		2	2					1	2
CO2	3		2		2		2	2					1	2
CO3	3		1		1		2	2					1	2
CO4	3		1		1		2	2					1	2
CO5	3		1		1		2	2					1	2
Avg.	3		1		1		2	2					1	2

1- Low

2-Medium

3-High

Course Content

UNIT-1	<p>Sources, Types and Composition Of Municipal Solid Waste Sources- Types- Composition of Solid Waste- Effects of improper disposal of solid waste- public health effects-Types of materials recovered from MSW.</p> <p>Waste Handling, Separation and Storage: On- site handling and separation at solid waste-on - site storage of solid waste-options under Indian conditions.</p>	CO1.
UNIT-2	<p>Collection Of Municipal Solid Waste: Methods of collection-equipment- types of vehicles-man power requirement-collection routes.</p> <p>Transfer And Transport of Municipal Solid Waste: Need for Transfer Operations-Transfer Stations-Selection of Location of Transfer Station-Transport means and methods.</p>	CO2.
UNIT-3	<p>Processing Techniques: Objectives of waste processing –material separation and processing technologies –biological &chemical conversion technologies – methods and controls of Composting -thermal conversion technologies, energy recovery –incineration –solidification</p>	CO3
UNIT-4	<p>Disposal of Solid Waste: Disposal of Solid Waste – Sanitary land Fills- Site selection- Planning-Design and operation of Sanitary landfills- Leachate collection & treatment-composition of land fill gases.</p>	CO4
UNIT-5	<p>Hazardous Waste Management- Hazardous waste Management: Sources and classification of hazardous wastes – Storage and collection of hazardous wastes – Treatment and disposal techniques: Physical, chemical and biological - Protection of public health and the environment. Biomedical wastes – Types – Management and handling and control. Radioactive wastes- sources and types - control and management.</p>	\CO5

Learning Resources

Text Books	<ol style="list-style-type: none">1. Integrated Solid waste management by Goerge Tchobanolous, Hilary Theisen & Samuel A. Vigil. McGraw Hill International Editions2. Design of Land Fills and Integrated Solid waste management by Amalendu Bagchi , John Wiley & Sons
Reference Books	<ol style="list-style-type: none">1. CPCB Manual on solid waste Management2. Solid waste management K.sasikumar, sanoop Gopi Krishna PHI Learning (P) Ltd.3. Solid waste management in India by Urvashi Dhamija.
e-Resources& other digital material	<ol style="list-style-type: none">1. www.nptel.ac.in/courses/1201080052. nptel.ac.in/courses/105106053. https://www.coursera.org/learn/solid-waste-management