SOLID WASTE MANAGEMENT

(Professional Elective-1)

I Semester

Course Code: 19CE2152	**L**	**P**	**C**
	3	**0**	**3**

Prerequisite: Environmental Engineering

Course Outcomes:

At the end of the course, the student will be able to:

CO1 Discuss about Regulations of various Solid Wastes.
CO2 Describe about various fundamentals of Solid Waste Management.
CO3 Illustrate various aspects of Environmental Risk Assessment.
CO4 Explain chemical and physicochemical processes of Solid Waste.
CO5 Illustrate Biological Treatment of Wastes and Land Fills.

UNIT-I: **(10 Lectures)**

RELEVANT REGULATIONS

Municipal solid waste (management and handling) rules; hazardous waste (management and handling) rules; biomedical waste handling rules; fly ash rules; recycled plastics usage rules; batteries (management and handling) rules

Learning outcomes:

1.Classifies Rules for Municipal Solid Waste and Hazardous Waste Treatment/Disposal(L2)

2. Explain the rules of recycled plastics usage(L2)

3.Illustrates the rules of management and handling of Municipal Solid Waste(L4)

UNIT-II: (10 Lectures)

MUNICIPAL SOLID WASTE MANAGEMENT – FUNDAMENTALS

Sources; composition; generation rates; collection of waste; Segregation, transfer and transport of waste; treatment and disposal options

Hazardous Waste Management – Fundamentals Characterization of waste; compatibility and flammability of chemicals; fate and transport of chemicals; health effects

Learning outcomes:

1. Explain treatment and disposal options of solid waste(L2)
1.Illustrates the fundamentals of Municipal Solid Waste(L4)
2. Illustrates the fundamentals of Hazardous Waste Management (L4)

UNIT-III: (10 Lectures)

RADIOACTIVE WASTE MANAGEMENT – FUNDAMENTALS

Sources, measures and health effects; nuclear power plants and fuel production; waste generation from nuclear power plants; disposal options

Environmental Risk Assessment Defining risk and environmental risk; methods of risk assessment; case studies

Learning outcomes:

1. Explain the waste generation from nuclear power plants(L2)
2. Illustrates the fundamentals of Radioactive Waste Management (L4)
3. Assesses the Environmental Risk associated with various wastes(L6)

UNIT-IV: (10 Lectures)

PHYSICOCHEMICAL TREATMENT OF SOLID AND HAZARDOUS WASTE

Chemical treatment processes for MSW (combustion, stabilization and solidification of hazardous wastes); physicochemical processes for hazardous wastes treatment (soil vapour extraction, air stripping, chemical oxidation); ground water contamination and remediation

Learning outcomes:

1. Explain about physicochemical processes for Hazardous Wastes(L2)
2. Elaborates groundwater contamination and remediation(L3)
3. Illustrate Chemical Treatment processes for Municipal Solid Waste(L4)

UNIT-V: (10 Lectures)

BIOLOGICAL TREATMENT OF SOLID AND HAZARDOUS WASTE

Composting; bioreactors; anaerobic decomposition of solid waste; principles of biodegradation of toxic waste; inhibition; co-metabolism; oxidative and reductive processes; slurry phase bioreactor; in-situ remediation

Landfill design Landfill design for solid and hazardous wastes; leachate collection and removal; landfill covers; incineration

Learning outcomes:

1. Plans a process for biological treatment of Solid and Hazardous Waste(L1)
2. Explain leachate collection and removal(L2)

3. Designs a Land fill for Solid and Hazardous Waste Disposal(L5)

Text Books:

1. John Pichtel, *Waste Management Practices*, CRC Press, Taylor and Francis Group 2005.

2. LaGrega, M.D. Buckingham, P.L. and Evans, J.C., *Hazardous Waste Management*, McGraw Hill International Editions, New York, 1994.

References:

1. Richard J. Watts, *Hazardous Wastes - Sources*, Pathways,Receptors, John Wiley and Sons, New York, 1997.