

**Unit I**

**Chapter 1 : Introduction to Solid Waste Management 1-1 to 1-22**

*Definition, objectives of SWM, impacts of improper SWM : soil, water and air, functional outlines of SWM, sources and types of solid waste. MSW: sampling, refuse analysis, composition, characteristics: physical, chemical, biological and generation rate, factors affecting generation rate, estimation of quantity of solid waste. Sustainable solid waste management for smart cities, role of urban local bodies in waste management, objectives and importance of MSW Rules 2016, rules and regulations of SWM in developed countries.*

1.1	Solid Waste .....	1-1
1.1.1	Introduction .....	1-1
1.1.2	Definition of Solid Waste .....	1-1
1.2	Objectives of Solid Waste Management .....	1-2
1.2.1	Introduction .....	1-2
1.2.2	Waste Prevention.....	1-2
1.2.3	Waste Reduction.....	1-3
1.2.4	Hierarchy of Solid Waste Management .....	1-3
1.3	Impact of Improper SWM on Environment .....	1-4
1.3.1	Introduction .....	1-4
1.3.2	Impact on Soil .....	1-4
1.3.3	Impact on Water .....	1-4
1.3.4	Impact on Air.....	1-5
1.4	The Functional Outline of SWM .....	1-5
1.4.1	Introduction .....	1-5
1.4.2	Main Functions of S.W.M.....	1-5
1.5	Sources of Solid Waste.....	1-5
1.5.1	Introduction .....	1-5
1.6	Types of Solid Waste.....	1-6
1.6.1	Domestic Waste .....	1-6
1.6.2	Commercial Waste.....	1-7
1.6.3	Industrial Waste .....	1-7
1.6.4	Agricultural Waste.....	1-7
1.6.5	Biomedical Waste.....	1-7
1.6.6	Institutional Waste .....	1-7
1.6.7	Hazardous Waste .....	1-7

1.6.8	E -Waste .....	1-8
1.7	Factors Affecting Solid Waste Generation .....	1-8
1.7.1	Introduction .....	1-8
1.7.2	Terms Used in Solid Waste Management .....	1-8
1.8	Sampling Techniques and Refuse Analysis of M.S.W.....	1-9
1.8.1	Introduction .....	1-9
1.8.2	Site of Sampling.....	1-9
1.8.3	Sample Size .....	1-10
1.8.4	Number of Samples .....	1-10
1.8.5	Refuse Analysis .....	1-10
1.9	Composition of Solid Waste.....	1-12
1.9.1	Introduction .....	1-12
1.10	Physical and Chemical Characteristics Solid Waste.....	1-13
1.10.1	Physical Characteristics .....	1-13
1.10.2	Physical Properties.....	1-13
1.11	Chemical /Characteristics .....	1-14
1.11.1	Chemical/ Biological Characteristics.....	1-14
1.11.2	Bio-Chemical .....	1-14
1.11.3	Toxic .....	1-14
1.11.4	Lipids .....	1-14
1.11.5	Carbohydrates .....	1-15
1.11.6	Proteins .....	1-15
1.11.7	Natural Fibres .....	1-15
1.11.8	Synthetic Organic Materials (Plastic) .....	1-15
1.11.9	Non-combustibles.....	1-15
1.12	Generation Rate and Factors Affecting the Generation Rate of Solid Waste.....	1-15
1.12.1	Introduction .....	1-15
1.12.2	Topper in the Solid Waste Generation in India.....	1-16
1.12.3	The Factors Affecting the Generation Rate of Solid waste .....	1-17
1.13	Estimation of Quantity of Solid Waste .....	1-17
1.13.1	Introduction .....	1-17
1.13.2	The Estimates of Municipal Solid Waste (MSW) .....	1-17

1.14	Sustainable Solid Waste Management .....	1-18
1.14.1	Introduction .....	1-18
1.14.2	Methods of Sustainable Solid Waste Management.....	1-18
1.14.3	Solid Waste Management in a Smart City of India.....	1-19
1.14.4	Swachh Bharat Mission.....	1-19
1.14.5	Role of Urban Local Bodies in Waste Management.....	1-19
1.14.6	Responsibility of Urban Authorities .....	1-19
1.14.7	Objectives and Importance of MSW Rules 2016 .....	1-19
1.14.8	The Roles and Responsibilities of Waste Generators, (As per MSW Rules, 2016) .....	1-20
1.14.9	E-Waste Management Rules-2016 .....	1-20
1.14.10	The Rules and Regulations of SWM in Developing countries .....	1-20
1.14.11	Solution for better SWM in Developing Countries .....	1-20

**Unit II**

**Chapter 2 : Government Initiatives, Collection and Transportation of Solid Waste**

**2-1 to 2-20**

*Swachh survekshan and its impact on the SWM scenario in India, national urban livelihood missions (NULM) and its role in SWM, social entrepreneurship, swachhta & rural engagement cell (SESREC): government of India initiatives, success stories of SWM in India. Integrated solid waste management, storage, different methods of collection, collection systems, transfer and transportation of solid waste, uses of radio frequency identification (RFI)/global positioning system (GPS) for tracking vehicles location, optimization of route, measurement and methods of measuring solid waste, economics of solid waste collection and transport.*

2.1	Swachh Survekshan and Its Impact on the SWM Scenario in India.....	2-1
2.1.1	Introduction .....	2-1
2.1.2	Objectives of Swachh Survekshan .....	2-1
2.1.3	Impact of swachh Bharat Abhiyan.....	2-2
2.1.4	Role Models of SWM in India .....	2-2
2.2	National Urban Livelihood Mission (NULM) and its Role in SWM.....	2-3
2.2.1	Introduction .....	2-3
2.2.2	Convergence Through Social Mobilization and Institution Building.....	2-3
2.2.3	Responsibilities of NULM .....	2-3
2.2.4	Functions of N.U.L.M.....	2-4
2.3	Social Entrepreneurship Swachhata and Rural Engagement cell [SESREC] .....	2-4
2.3.1	Introduction .....	2-4
2.3.2	Types of Social Entrepreneurship .....	2-4

2.4	Government of India Initiatives Success Stories of SWM in India .....	2-5
2.4.1	Introduction .....	2-5
2.4.2	Mirhajirbad , Dumka District , Jharkhand, India.....	2-5
2.4.3	Municipal Solid Waste Management.....	2-6
2.5	Integrated Solid Waste Management .....	2-7
2.5.1	Introduction .....	2-7
2.5.2	Method of Collection of Solid Wastes.....	2-7
2.5.3	House to House Collection .....	2-7
2.5.4	Storage Bin System.....	2-9
2.5.5	Collection of Solid Waste an Environmental Need.....	2-9
2.5.6	Points to be noted for Safe Collection of M.S.W .....	2-10
2.5.7	Collection of Municipal Solid Wastes [M.S.W] .....	2-10
2.5.8	Factors affecting the Collection of Dry Refuse.....	2-11
2.6	Storage of Solid Waste .....	2-11
2.6.1	Introduction .....	2-11
2.6.2	Criteria to Establish Good Storage for M.S.W .....	2-11
2.7	Transportation of Solid Waste .....	2-11
2.7.1	Transportation of Municipal Waste.....	2-12
2.7.2	Hauled Container System .....	2-12
2.7.3	Transportation Vehicles with their Capacities and Working .....	2-12
2.7.4	Precautions to be taken during Transportation of Municipal Solid Wastes .....	2-14
2.7.5	Municipal Solid Waste Management System .....	2-14
2.8	Use of Radio Frequency Identification [R.F.I] in Solid Waste Management.....	2-15
2.8.1	Introduction .....	2-15
2.8.2	Use of Radio frequency Identification [RFID] and Global Positioning System [G.P.S] in S.W.M.....	2-15
2.8.3	Working of RFID System .....	2-16
2.8.4	Application of Geographic Information System (GIS) in SWM.....	2-16
2.9	The Economics of Solid Waste Collection and Transportation .....	2-17
2.9.1	Introduction .....	2-17
2.9.2	Need to Calculate the Cost Economics of Solid Waste Management.....	2-17
2.9.3	Cost-Economics of Slid Waste.....	2-18
2.9.4	Factors Affecting the Cost of Solid Waste Management.....	2-18
2.9.5	Cost Economics of Transportation of Solid Waste.....	2-18

**Unit III**

**Chapter 3 : Processing & Transformation of Solid Waste**

**3-1 to 3-14**

*Decentralised system Vs centralised system, three tier system, source reduction, segregation and salvage, material recovery facility centres, resource recovery of bye-products, recycling and reuse of solid waste, use of solid waste as raw materials in industry, value added products, recycling and carbon credits, economics of solid waste processing, circular economy in waste management. Theory of composting, processing before composting, types of composting (home composting, vermicomposting, organic waste converter, rotary drum, continuous flow reactor), explain methods: Indore method, Bangalore method, mechanical composting plant, factors governing composting and design of composting system.*

3.1	Centralized Vs Decentralized Systems.....	3-1
3.1.1	Introduction .....	3-1
3.1.2	Steps Involved in Waste Management.....	3-1
3.1.3	Centralized Vs Decentralized System of S.W.M.....	3-2
3.1.4	Comparison between the Centralized and Decentralized System of S.W.M.....	3-2
3.1.5	Three Tier Systems in Waste Management .....	3-2
3.1.6	The Segregation Types.....	3-3
3.1.7	The Advantages and Disadvantages of waste Segregation.....	3-3
3.1.8	Salvaging of waste.....	3-3
3.1.9	Material Recovery Facility Centres [MRFC].....	3-3
3.1.10	Resource Recovery of Bye-products.....	3-3
3.1.11	Benefits of Recycling.....	3-4
3.2	Value Added Products.....	3-4
3.2.1	Introduction .....	3-4
3.2.2	Need to Produce Value Added Products .....	3-4
3.3	Carbon Credit Concept.....	3-4
3.3.1	Introduction .....	3-4
3.3.2	The Importance of Carbon Credits .....	3-5
3.4	Economics of Solid waste Processing.....	3-5
3.4.1	Introduction .....	3-5
3.4.2	Purpose of Solid Waste .....	3-5
3.4.3	The Steps in Processing the Solid Waste .....	3-5
3.4.5	Circular Economy in Solid Waste Management.....	3-6
3.4.6	Relationship between Circular Economy and Sustainability.....	3-6
3.5	Theory of Composting.....	3-6

3.5.1	Introduction .....	3-6
3.5.2	Need of Composting.....	3-6
3.5.3	Advantages and Limitations of Composting.....	3-7
3.5.4	Process of Composting.....	3-7
3.5.5	Factors Affecting Composting Process .....	3-8
3.5.6	Methods of Composting.....	3-9
3.5.7	Beneficial effects of vermi compostings.....	3-11
3.5.8	Rotary Drum Composter.....	3-12
3.5.9	Continuous Flow Reactor .....	3-13

**Unit IV**

**Chapter 4 : Waste to Energy**

**4-1 to 4-26**

*Bio-methnation : theory of anaerobic digestion, stages, factors affecting anaerobic digestion, recovery of bio-gas, applications/use of biogas, design of anaerobic digester. Energy content of MSW, estimation of low and high heating value (LHV, HHV), theory and types of incinerators, design of incineration plant. Pyrolysis, refused derived fuel (RDF), plasma gasification: working principle, energy recovery, advantages, limitations and applications, environmental impacts of waste to energy: dioxins, furans, heavy metals etc.*

4.1	Bio-methanation.....	4-1
4.1.1	Introductions .....	4-1
4.1.2	Theory of Anaerobic Digestion .....	4-1
4.1.3	Factors Affecting the Anaerobic Digestion.....	4-2
4.1.4	Design of an Anaerobic Digester .....	4-3
4.1.5	Capacity of the Digester.....	4-4
4.2	Recovery and Application of Biogas .....	4-7
4.2.1	Introduction .....	4-7
4.2.2	Stages of Biogas Production .....	4-7
4.2.3	Applications of Methane Gas.....	4-7
4.2.4	Advantages of Biogas.....	4-8
4.2.5	Limitations of Biogas .....	4-8
4.3	Energy Constant .....	4-8
4.3.1	Introduction .....	4-8
4.3.2	Estimation of Low Heating Values (LHV) .....	4-9
4.3.3	Estimation of High Heating Values (HHV).....	4-9
4.3.4	Calculation of Energy Constant of MSW .....	4-9
4.3.5	Method to Calculate the Heating Values of a Waste.....	4-9
4.4	Theory of Incineration.....	4-9

4.4.1	Introduction .....	4-9
4.4.2	Stages of Incineration Process.....	4-10
4.4.3	Type of Incinerators.....	4-10
4.5	Advantages and Limitation of Incineration .....	4-14
4.6	Disposal of Solid Waste by Paralysis .....	4-15
4.6.1	Introductions .....	4-15
4.6.2	Products of Incineration Process with their Uses.....	4-15
4.6.3	Types of Incineration System .....	4-16
4.7	Plasma Gasification .....	4-17
4.7.1	Introduction .....	4-17
4.7.2	The Purpose of Gasification in S.W.M.....	4-17
4.7.3	Working Process of PAG.....	4-17
4.7.4	Advantages of Disadvantages of Plasma Gasification .....	4-18
4.7.5	Application of Gasification in M.S.W.....	4-18
4.8	Design of Incineration.....	4-18
4.9	Environmental Impact of Waste to Energy.....	4-24
4.9.1	Introduction .....	4-24
4.9.2	Dioxins .....	4-24
4.9.3	Furans .....	4-24
4.9.4	Heavy Metals.....	4-25

**Unit V**

**Chapter 5 : Disposal of Solid Waste** **5-1 to 5-22**

*Landfill: Introduction, components of Landfilling, types of Landfilling, site selection, acceptable waste, construction techniques, maintenance and precautions, leachate and landfill gas: estimation, management, treatment and disposal/reuse, control of contamination of ground water, operation monitoring, closure and end-use, advantages and disadvantages of secured landfill facility (SLF), design of sanitary landfill, slope stability analysis, concept of bioreactor landfill: principle, types, applications. Legacy waste management or biomining: concept, methods, applications, economics and time duration*

5.1	Landfill Techniques.....	5-1
5.1.1	Introduction .....	5-1
5.1.2	Components of Landfill.....	5-1
5.1.3	Advantages of Landfill.....	5-2
5.1.4	Disadvantages of Landfill.....	5-3
5.1.5	Types of Landfilling Method.....	5-3
5.2	Leachate and its Control .....	5-4

5.3	Landfill Gases .....	5-4
5.4	Biogas from Landfill .....	5-5
5.5	Site Selection for Landfill .....	5-5
5.6	Acceptable Waste Materials for Landfill and for Recycling .....	5-5
5.6.1	Introduction .....	5-5
5.6.2	Municipal Solid Waste (M.S.W.) .....	5-5
5.6.3	Appliances .....	5-5
5.6.4	Tires .....	5-5
5.6.5	Constriction and Demolition Material .....	5-5
5.6.6	Clean Dirt .....	5-5
5.6.7	Wood Waste and Green Waste .....	5-6
5.7	Construction Techniques Maintenance and Precautions for Landfilling.....	5-6
5.7.1	Method of Construction.....	5-6
5.7.2	Difference between Dump and Landfill.....	5-6
5.7.3	The Maintenance of Landfill.....	5-6
5.7.4	Precautions for a Safe Landfill.....	5-6
5.8	M.S.W. Handling and Processing .....	5-6
5.8.1	Introduction .....	5-6
5.8.2	Health Aspect during Handling of M.S.W.....	5-7
5.8.3	Remedial Measures .....	5-8
5.8.4	Health Aspect during Processing .....	5-8
5.9	Estimation, Management Treatment Disposal/Reuse of Leachate and Landfill Gases .....	5-9
5.9.1	Estimation of Leachate and Landfill Gases .....	5-9
5.9.2	Management of Leachate in Landfills.....	5-9
5.9.3	The Management of Landfill Gases.....	5-10
5.9.4	Reuse of the Leachates.....	5-10
5.9.5	Re-use of Landfill Gases.....	5-10
5.10	Control of Contamination of Ground Water .....	5-10
5.10.1	Introduction .....	5-10
5.10.2	Need Control the Ground Water Contamination.....	5-11
5.10.3	The Methods to Control the Contamination of Ground Water Through Landfills.....	5-11
5.11	Secure Landfill Facility (SLF) .....	5-11



5.11.1	Introduction .....	5-11
5.11.2	Advantages of Secured Landfill.....	5-11
5.11.3	Disadvantages of Landfill (Unsecured) .....	5-12
5.12	Design of Landfill.....	5-12
5.13	Slope Stability Analysis of Landfill .....	5-15
5.13.1	Introduction .....	5-15
5.13.2	Need of Slope for Landfill .....	5-16
5.13.3	Analysis of the Slope Stability.....	5-16
5.13.4	Landfill Storage and Slope Stability .....	5-16
5.14	Concept of Bioreactor Landfill.....	5-16
5.14.1	Introduction .....	5-16
5.14.2	Working Principals of Bioreactor Land Fill.....	5-17
5.14.3	Types of Bioreactors.....	5-17
5.14.4	Classification of Bioreactors on the basis of the Functions and Capacity .....	5-18
5.14.5	Applications of Bioreactors in M.S.W. ....	5-19
5.15	Legacy Waste Management or Biomining.....	5-19
5.15.1	Introduction .....	5-19
5.15.2	Need of Legacy Waste Management in India .....	5-19
5.15.3	Methods/Approaches to Deal with the Legacy Waste.....	5-20
5.15.4	Method used to Manage the Waste in Pune City .....	5-20

**Unit VI**

**Chapter 6 : Special Waste Management and Regulations**

**6-1 to 6-37**

*Sources, collection, transportation, treatment and disposal: biomedical waste, hazardous waste, construction and demolition waste, e-waste, sanitary napkin (flow chart and one case study of each). Slaughter waste management: concept of rendering plants. Objectives and key points of hazardous and other waste management rules, 2016, construction and demolition (C&D) waste management rules - 2016, E-waste management rules - 2016, plastic waste management rules – 2016, reuse and recycling of plastic waste in road construction, case studies of processing and reuse of construction & demolition waste, material recovered from e-waste, introduction to life cycle assessment (LCA) in solid waste management.*

6.1	Special Types of Solid Waste Management.....	6-1
6.1.1	Introduction .....	6-1
6.1.2	Types of Special Waste .....	6-1
6.1.3	Segregation of Waste in Colour Coded Bags.....	6-3
6.2	E-Waste .....	6-4
6.2.1	Definition .....	6-4

6.2.2	Varieties of E-Waste.....	6-5
6.2.3	Dangers of E-Waste or Ill Effect of E-Waste .....	6-6
6.2.4	Disposal of E-Waste .....	6-8
6.2.5	Recycling of E-Waste .....	6-10
6.2.6	Advantages of Recycling the E-Waste .....	6-13
6.3	Biomedical Waste Management and Handling as Per Rule 1998.....	6-14
6.3.1	Introduction .....	6-14
6.3.2	Rule for Duty of Occupier .....	6-14
6.3.3	Rule for Treatment and Disposal .....	6-14
6.3.4	Rule for Segregation, Packaging, Transportation and Storage.....	6-16
6.3.5	Rule for Prescribed Authority .....	6-17
6.3.6	Rule for Authorization .....	6-17
6.3.7	Role of Advisory Committee.....	6-17
6.3.8	Rule for Annual Report.....	6-17
6.3.9	Rule for Maintenance of Records .....	6-17
6.3.10	Rule for Accident Reporting.....	6-18
6.3.11	Rule for Appeal.....	6-18
6.3.12	Rules as per 1998 in Brief .....	6-18
6.4	Health Problems during Time of Segregation, Reuse, Recovery, Recycling of Solid Waste .....	6-18
6.4.1	Introduction .....	6-18
6.4.2	Health Problems during the Time of Segregation.....	6-18
6.4.3	Advantages of Segregation for Health Aspect.....	6-20
6.4.4	Health Problems during the Time of Reuse.....	6-20
6.4.5	Health Problems during the Recovery and Recycling.....	6-21
6.5	Public Involvement and Participation in Solid Waste Management.....	6-21
6.5.1	Introduction .....	6-21
6.5.2	Necessity of Public Involvement and Participation .....	6-22
6.5.3	Advantages of Public Participation and their Involvement in Solid Waste Management.....	6-24
6.5.4	Planning for Public Involvement Initiatives.....	6-24
6.5.5	E-Waste, Plastic Waste.....	6-25
6.5.6	Sanitary Napkin Waste Management.....	6-25
6.5.7	Slaughter Waste Management.....	6-27
6.6	Introduction of Hazardous Waste.....	6-27
6.6.1	Introduction .....	6-27
6.6.2	Meaning of Hazardous Waste .....	6-27

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6.6.3	Types of Hazardous Waste.....	6-27
6.6.4	Characteristics of Hazardous Wastes.....	6-28
6.7	Hazardous Management Rules 2016.....	6-28
6.7.1	Introduction .....	6-28
6.7.2	Solid Waste Management Rules 2016.....	6-29
6.7.3	Objectives of Hazardous Waste Management Rules 2016.....	6-29
6.7.4	Construction and Demolition Waste Management Rule 2016.....	6-29
6.7.5	E-waste Management Rules 2016.....	6-29
6.8	Recycling of Solid Waste and Reuse.....	6-30
6.8.1	Introduction .....	6-30
6.8.2	Purpose of Recycling .....	6-31
6.8.3	Benefits or Advantages of Recycling of Solid Waste.....	6-32
6.8.4	Disadvantages of Recycling .....	6-32
6.9	Recycling a Product.....	6-32
6.9.1	Introduction .....	6-32
6.9.2	Methods of Collecting Recyclables .....	6-33
6.9.3	Sorting .....	6-33
6.9.4	Manufacturing.....	6-34
6.9.5	Purchasing Recycled Products.....	6-34
6.9.6	Reuse and Recycle of Plastic for Road Construction .....	6-34
6.10	Introduction to Life Cycle Assessment (L.C.A) in Solid Waste Management.....	6-35
6.10.1	Introduction .....	6-35
6.10.2	FIVE Steps of Product Life Cycle.....	6-35
6.10.3	Need to have Life Cycle Assessment in SWM.....	6-36
6.10.4	Types of Life Cycle Assessment .....	6-36
6.10.5	Features of Life Cycle Assessment (LCA).....	6-36
6.10.6	Advantages of Application of Life Cycle Management.....	6-36

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