

**UNIT I****Chapter 1 : Fundamentals of Solid Waste Management****1-1 to 1-14****Syllabus :**

Definition of solid waste.

Meaning of different solid waste-Domestic waste, commercial waste. Industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.

Sources of solid waste.

Classification of solid waste-hazardous and non-hazardous waste.

Physical and Chemical characteristics of municipal solid waste.

Impact of solid waste on environment.

Solid waste management techniques-solid waste management Hierarchy, waste prevention and waste reduction techniques.

Factors affecting the solid waste generation.

1.1	Introduction.....	1-1
1.2	Definition of Solid Waste	1-1
1.3	Meaning of Different Solid Waste.....	1-2
1.3.1	Domestic Waste	1-2
1.3.2	Commercial Waste.....	1-2
1.3.3	Industrial Waste	1-3
1.3.4	Agricultural Waste.....	1-3
1.3.5	Biomedical Waste.....	1-3
1.3.6	Institutional Waste	1-3
1.3.7	Hazardous Waste	1-3
1.3.8	E - Waste.....	1-3
1.4	Sources of Solid Waste	1-3
1.5	Terms Used in Solid Waste Management.....	1-4
1.6	Constituents of Solid Waste.....	1-5



1.6.1	Issues Regarding Transportation of Solid Waste	1-5
1.7	Classification of Solid Waste	1-6
1.7.1	Types of Hazardous Waste	1-6
1.7.2	Characteristics of Hazardous Wastes	1-7
1.8	Physical and Chemical Characteristics	1-8
1.9	Impact of Solid Waste on Environment	1-10
1.10	Solid Waste Management Techniques	1-11
1.10.1	Hierarchy of Solid Waste Management	1-12
1.11	Factors Affecting Solid Waste Generation	1-14

UNIT II

Chapter 2 : Storage, Collection and Transportation of Municipal Solid Waste 2-1 to 2-14

Syllabus :

Storage of solid waste.

Collection methods of solid waste

Tools and Equipments - Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community Bin like movable and stationary Bin.

Transportation of municipal waste.

Transportation vehicles with their capacity working - Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumper, Compactor vehicles. Transfer station- meaning, necessity, location.

Role of rag pickers and their utility for society.

Organization pattern of solid waste management system, Practices according to population of the town or city.

2.1	Storage of Municipal Solid Wastes	2-1
2.2	Collection Method of Municipal Solid Waste	2-2
2.2.1	Method of Collection of Solid Wastes	2-2
2.2.2	Present Scenario of Collection of MSW	2-5
2.3	Collection of Solid Waste	2-5
2.3.1	Storage Methods of Garden Waste and Construction Demolition Waste	2-7



2.4	Tools and Equipment.....	2-8
2.5	Transfer Stations.....	2-10
2.6	Transportation of Municipal Waste.....	2-11
2.6.1	Transportation Vehicles with their Capacities and Working.....	2-11
2.7	Precautions to be Taken during Transportation of Municipal Solid Wastes.....	2-13
2.8	Role of rag pickers in solid waste management.....	2-13
2.9	Municipal Solid Waste Management System.....	2-14

UNIT III**Chapter 3 : Disposal of Municipal Solid Waste****3-1 to 3-18****Syllabus :**

Concept of Composting of waste

Principles of composting process

Factors affecting on composting process

Methods of composting

(A) Manual Composting : Bangalore method, Indore Method

(B) Mechanical Composting : Dano Process

(C) Vermicomposting : Concept

Land filling technique ,Factors to be considered for site Selection

Land filling methods-Area method, Trench method and Ramp method

Leachate and its control Biogas from landfill

Advantages and Disadvantages of landfill method

Recycling of municipal solid waste

Incineration of waste

Introduction of incineration process.

Types of incinerators – Flash, Multiple chamber incinerators

Products of incineration process with their use.

Pyrolysis of waste - Definition, methods

Products of incineration process

Advantages and Disadvantages of incineration process.



3.1	Composting.....	3-1
3.1.1	Process of Composting	3-2
3.1.2	Factors Affecting Composting Process.....	3-3
3.2	Methods of Composting.....	3-4
3.2.1	Indore Method	3-4
3.2.2	Bangalore Method of Composting.....	3-4
3.2.3	Difference between Indore and Bangalore Method	3-5
3.2.4	Mechanical Composting	3-5
3.2.5	Vermi Composting.....	3-5
3.3	Land Filling Techniques	3-7
3.3.1	Land Fill.....	3-7
3.4	Land Filling Method	3-8
3.4.1	Area Method	3-8
3.4.2	Trench Method.....	3-8
3.4.3	Ramp Method	3-9
3.5	Leachate and Its Control	3-9
3.6	Land Fill Gases	3-9
3.6.1	Biogas from Land Fill.....	3-10
3.7	Site Selection for Land Fill.....	3-10
3.8	Recycling of Municipal Solid Waste	3-10
3.8.1	Purpose of Recycling.....	3-11
3.8.2	Benefits or Advantages of Recycling of Solid Waste.....	3-12
3.8.3	Disadvantages of Recycling.....	3-12
3.9	Recycling a Product.....	3-12



3.10	Solid Waste Recycling in India.....	3-15
3.11	Incineration of Waste.....	3-15
3.11.1	Disposal of Solid Waste by Pyrolysis.....	3-16
3.11.2	Products of Incineration Process with Their Uses	3-16
3.11.3	Types of Incineration System	3-17
3.12	Resource Recovery Through Solid Waste Processing	3-18

UNIT IV**Chapter 4 : Disposal of Municipal Solid Waste****4-1 to 4-24****Syllabus :**

Biomedical Waste Management

Definition of Biomedical Waste

Sources and generation of Biomedical Waste

Classification of Biomedical Waste

Management technologies

Health Aspects and Public Involvement in Solid Waste Management

Health aspect during handling and processing.

Health problem during time of segregation, recovery, recycling and reuse of solid waste.

Public Involvement and participation in Solid waste management Practices.

4.1	Introduction.....	4-1
4.2	Biomedical Waste	4-1
4.2.1	Sources and Generation of Biomedical Waste	4-2
4.2.2	Classification of Biomedical Waste	4-3
4.2.3	Management Technologies	4-4
4.3	Disposal of Biomedical Waste	4-7
4.4	Biomedical Waste Management and Handling as Per Rule 1998	4-9



4.5	Health Aspect during Handling and Processing.....	4-14
4.5.1	Health Aspect during Handling.....	4-14
4.5.1.1	Remedial Measures.....	4-15
4.5.2	Health Aspect During Processing.....	4-16
4.5.2.1	Remedial Measures.....	4-16
4.6	Health Problems during Time of Segregation, Reuse, Recovery, Recycling of Solid Waste.....	4-17
4.6.1	Health Problems During the Time of Segregation.....	4-17
4.6.2	Health Problems During the Time of Reuse.....	4-19
4.6.3	Health Problems during the Time of Recovery and Recycling.....	4-20
4.7	Public Involvement and Participation in Solid Waste Management.....	4-20
4.7.1	Planning for Public Involvement Initiatives.....	4-21
4.7.2	Do's and Don'ts to Avoid Health Problems during Solid Waste Management.....	4-24

UNIT V**Chapter 5 : Disposal of Municipal Solid Waste****5-1 to 5-23****Syllabus :**

Industrial waste management
Variety of industrial waste
Collection and disposal of industrial waste
Control measures for industrial waste
Recycling of industrial waste
E-waste management
Definition of E-waste
Varieties of E-waste
Dangers of E-waste
Recycling of E-waste
Disposal of E-waste



5.1	Industrial Waste	5-1
5.1.1	Industrial solid wastes and problems	5-2
5.1.2	Classification of Industrial Waste	5-2
5.1.3	Hazardous Industrial Waste	5-2
5.1.4	Non - Hazardous Industrial Waste	5-2
5.1.5	Sources of Various Hazardous Wastes	5-3
5.1.6	Important Industrial Solid Waste	5-3
5.1.7	Varieties of Industrial Solid Wastes.....	5-5
5.2	Collection and Disposal of Industrial Waste.....	5-5
5.2.1	Criteria for Effective Collection of Solid Wastes	5-6
5.3	Control Measures of Industrial Waste	5-8
5.4	Recycling and Reuse of Industrial Waste	5-13
5.5	E-Waste.....	5-16
5.5.1	Varieties of E-Waste.....	5-16
5.5.2	Dangers of E-Waste or Ill Effect of E-Waste.....	5-17
5.6	Disposal of E-Waste	5-19
5.7	Recycling of E-Waste	5-20
5.7.1	Step-by Step Process of E-waste Recycling.....	5-20
5.7.2	Advantages of Recycling the E-Waste.....	5-23

**UNIT VI****Chapter 6 : Disposal of Municipal Solid Waste****6-1 to 6-16****Syllabus :****Legal Aspects :**

Legal aspects- present scenario

Municipal Solid Waste Management Rules, 2016

Biomedical Waste Management Rules, 2016

E- Waste Management Rules, 2016

Construction and demolition Waste Management Rules, 2016

Hazardous and other wastes Management Rules, 2016

Plastic Waste Management Rules, 2016

Role of Central Pollution Control Board and Maharashtra Pollution Control Board in management of solid waste from various sources.

6.1	Introduction to Recycling	6-1
6.2	BMW Management Rules, 2016.....	6-3
6.3	Additions made in Biomedical Waste Rules.....	6-4
6.4	E-Waste (Management) Rules, 2016	6-4
6.5	Construction and Demolition Waste Management Rules 2016	6-6
6.6	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.....	6-9
6.7	Plastic Waste Management Rules, 2016	6-13
6.8	Role of Pollution Control Boards and Maharashtra Pollution Control Board in Management of Solid Waste from Various Sources.....	6-15
	• Time Management Sheet for Writing Answers	T-1
	• Model Question Papers.....	Q-1 to Q-4

