SEMESTER S8

SOLID WASTE MANAGEMENT

Course Code	**PECHT861**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3-0-0-0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	Nil	**Course Type**	Theory

Course Objectives:

1. Understand the fundamentals of solid waste management and its importance in environmental protection
2. Learn about the various methods of solid waste disposal and composting.
3. Understand the principles of waste minimization, reuse, and recycling

SYLLABUS

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Module No.	Syllabus Description	Contact Hours
1	**Solid wastes:**-Sources, nature and characteristics - types of solid waste, Residential, Commercial, Hazardous wastes, and Industrial wastes, Properties of Solid wastes, Waste generation, Sampling and analysis, Characteristics of solid wastes - Energy content, Chemical content, Estimation of chemical composition of a solid waste sample generation rates - Estimation of solid waste quantities - Factors affecting generation rates.	**9**
2	**Collection of solid waste**: On-site storage systems. **Disposal methods** such as sanitary landfill –methods, leachate in landfills – control of leachate movement, Gas movement – control, Design and operation of landfills, Landfarming, deep well injection etc.	**9**
3	**Composting** Factors affecting composting, Aerobic composting and anaerobic digestion, Bio gas plant operations, Incineration, Municipal incinerators, Grates, Furnaces, Pyrolysis of solid waste.	**7**
4	**Recovery, Recycle and Reuse**-Material and Energy recovery operations. **Overview of solid waste management** practices in India. Industrial and Hazardous solid waste management- Biomedical waste, Treatment storage	**11**

	disposal facility (TSDF) Integrated Waste Management (IWM), E-waste, Spent Oil waste, Basics of Data base Management System (DBMS), Geographic Information System (GIS) and Remote Sensing data in planning and management of MSW. **Plastic waste management and extended producers responsibility (EPR):-** Plastic waste definition, plastic waste management rules 2022, EPR Act, Benefits and challenges of EPR implementation, Emerging trends and innovations in EPR and plastic waste management.	

Course Assessment Method
(CIE: 40 marks , ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain municipal solid waste management systems with respect to its physical, chemical and biological properties.	**K2**
CO2	Develop the design and operation of landfills.	**K3**
CO3	Compare disposal methods of MSW by applying specific criteria.	**K2**
CO4	Summarize the recovery and recycling methods of waste management.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3				2					
CO2	3		3				3					3
CO3	3	3	3									3
CO4	3	3					3					3

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Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Environmental Engineering	Howard S.Peavy, Donald R.Rowe, George Tchobanoglous	McGraw Hill	1985
2	Handbook of Solid Waste Management	Frank Kreith, George Tchobanoglous	McGraw Hill	2002
3	Plastics Waste Management: Processing and Disposal	Muralisrinivasan Natamai Subramanian	Wiley-Scrivener	2019

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Solid waste Engineering	P.Aarne Vesilind and William Worrell	Cengage Learning, Asia Pte Limited	2012
2	Environmental Engineering	Gerard Kiely	McGraw Hill	2008
3	Handbook of Solid Waste Management and Waste Minimization Technologies	Nicholas P. Cheremisinoff	Butterworth-Heinemann	2002
4	Solid Waste Management	Luis F. Diaz, George M. Savage, Linda L. Eggerth, Larry , Rosenberg	United Nations Environment Programme, .Paris	2005
5	Solid and liquid waste management: Waste to wealth	Rajaram Vasudevan , Siddiqui Faisal Zia , Agrawal Sanjeev , Khan Mohammad Emran	PHI Learning Pvt Ltd	2016
6	Plastic recycling & Waste Management	Dr. Andras Szeberenyi, Bhgah Y. Adam, Er. Harish Sharma, Dr Dhivya A	JSR PUBLICATIONS	2023

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Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://nptel.ac.in/courses/105103205
2	https://nptel.ac.in/courses/105105160