COURSE TITLE	**SOLID WASTE MANAGEMENT**
COURSE CODE	**01CH0712**
COURSE CREDITS	**3**

Objective:

1 To equip students with the knowledge and skills necessary to effectively manage solid waste, minimizing its environmental impact and maximizing resource recovery.

Course Outcomes: After completion of this course, student will be able to:

1 Comprehend the various categories of solid waste, their origins, and the necessity for effective management.

2 Evaluate various approaches of solid waste management.

3 Exemplify the methods employed in the management of solid waste in chemical industries.

4 Enhance comprehension of principles and regulations pertaining to solid waste management.

Pre-requisite of course: Basics of Environmental Engineering or Sciences

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Overview of Solid waste** Definition of wastes and their classification, Types of sources of solid waste, , transportation of solid waste, health impacts of solid waste, Important quality parameters of different types of waste, wastes suitable for energy production, routes for solid waste management,, Need of energy production from wastes, Definitions, Identification of hazardous waste, Classification of hazardous waste, onsite storage, collection, transfer and transport, processing.	10
2	**Treatment approaches and chemical characterization** Methods of treatment of solid waste: Land filling, Composting, Vermi technology,, Anaerobic digestion, Incineration, Pyrolysis, Catalytic Hydrogenation; Chemical characterization: proximate analysis, ultimate analysis, Lignocellulosic composition, , Energy content and heating value,	10

DR. ABHISHEK GUPTA
Digitally signed by (Name of HOD)

DR. RAJENDRASINH BAHADURSINH JADEJA
Digitally signed by (Name of Dean/ Principal)

Contents : Unit	Topics	Contact Hours
3	**Industrial waste management practices** Industrial Practices in solid waste management: Chemical Industry, Refineries, Aluminum, Iron and Steel, Lead and Zinc smelting, Nickel ore processing and Refining,, Copper smelting, Evaluation and selection of facilities for solid waste management: Introduction and Economic analysis Recovery,, Recycling and Reuse. Case studies on major industrial solid waste generation units.	10
4	**Planning, Guidelines, and Statutory Rules** Solid Waste Management Planning, Monitoring and Control, Environmental laws and Regulatory Drivers: NEPA, RCRA, Occupational Safety and Healthy act, Toxic substances control act. Hazardous and other wastes (Management and Transboundary Movement) Rules, 2016 with amendments, Hazardous waste management techniques.	10
Total Hours		**40**

Textbook :

1 Environmental Education and Solid Waste Management, Nag A and Vijayakumar K , New Age International Publishers, 2005

2 Handbook of Solid Waste Management, 2nd Edition, , Tchobanoglous G., Kreith F. , McGraw Hill., 2002

References:

1 Handbook of Solid waste management and waste minimization technologies, Handbook of Solid waste management and waste minimization technologies, Cheremisinoff N.P., Butterworth-Heinemann Publisher, 2003

2 Solid Waste Engineering, 2nd Edition, Solid Waste Engineering, 2nd Edition, .Vesilind P.A., Worrell W and Reinhart,, C L Engineering, 2011

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

DR. ABHISHEK GUPTA
Digitally signed by (Name of HOD)

DR. RAJENDRASINH BAHADURSINH JADEJA
Digitally signed by (Name of Dean/ Principal)

Instructional Method:

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1 https://archive.nptel.ac.in/courses/105/103/105103205/

2 https://www.coursera.org/learn/solid-waste-management

DR. ABHISHEK GUPTA
Digitally signed by (Name of HOD)

DR. RAJENDRASINH BAHADURSINH JADEJA
Digitally signed by (Name of Dean/ Principal)