

Course File

Subject Title/Subject Code: Solid And Hazardous Waste Management

6CE5-12

Semester: VI Year: III

Name of the Faculty: Mr. Gourav Purbia

E-mail id: gourav.purbia@technonjr.org

Class Schedule

Total Number of Lectures: 28

i) Course Objective

The course "Solid and Hazardous Waste Management" provides a comprehensive overview of the concepts, classifications, and methods involved in managing solid and hazardous waste. It covers the fundamentals of waste collection, including the types of waste, collection methods, and waste characterization. The course also explores various waste processing and minimization strategies, such as the 3R principles (Reduce, Reuse, Recycle), and the management of hazardous, radioactive, e-waste, and biomedical waste. Additionally, it examines treatment and disposal techniques like composting, incineration, and sanitary landfilling, along with recent advancements and regulations in waste management. This course equips students with the knowledge to effectively manage waste in various contexts.

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VISSION & MISSION OF INSTITUTE

Vision

Empowering student with recent and emerging technologies to create innovative technical leaders capable of contributing to industrial and societal needs for betterment of mankind across the globe.

Mission

M1: To provide dynamic learning environment to students by providing constant exposure to latest technologies by linking closely with the industries.

M2: To establish effective interface with industry to obtain live problems to enhance critical thinking and problem-solving skills among students and consultancy projects for faculty.

M3: To provide avenues and opportunities to faculty for domain specific trainings and qualification upgradation.

M4: To develop ethical leaders with strong communication skills.

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VISION & MISSION OF DEPARTMENT

Department Vision

To increase students learning of fundamentals for designing and planning of buildings and latest technologies through industry-aligned project-based learning which will help in transforming students to be good civil engineering professionals leading to innovation and incubation of new ideas.

Department Mission

M1: To create experimental learning through solving problems of Government, Society, Smart Cities, Industry and other entities.

M2: To teach the latest technologies to the students as beyond the syllabus activity so that they are updated and industry ready.

M3: To enable engineering students, understand industry-aligned technologies and learn to find solutions from their early engineering days and this is the only way to produce globally relevant engineers solving real-life problems applying current technologies.

M4: To enable students to generate projects through problem faced by and requirement of Smart cities, industry, Government and other entities whereby those outlined problem statements are to be studied deeply by a group of faculty members to convert them into real-time project format.

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs 1: To provide an in-depth understanding of the fundamentals of Civil Engineering and create a foundation for lifelong learning to facilitate a progressive career in the construction Industry, as an entrepreneur and in pursuit of higher studies.

PEOs 2: To equip the students with technical and analytical skills to develop innovative solutions to complex real-life problems using existing and novel technologies. To equip the students with good communication and interpersonal skills, inter-disciplinary teamwork and leadership skills to enable them to fulfill professional responsibilities.

PEOs 3: To expose them to various contemporary issues which will enable them to become ethical and responsible towards themselves, co-workers, Society and the Nation.

PEOs 4: To make the student's industry ready by imparting education related to the latest technologies so that they can grab future industry jobs.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: To be aware of and initiate some-work on future technologies and new developments which may impact the future Industry 4.0.

PSO2: Hands on training on upcoming technologies and project-based learning.

PSO3: Get exposure to BIM (Building Information Modeling).

PROGRAMME OUTCOMES (POs)

A student will develop:

PO01. ENGINEERING KNOWLEDGE: An ability to apply knowledge of Mathematics, Science and Engineering Fundamentals in Electronics and Communication Engineering.

PO02. PROBLEM ANALYSIS: Ability to analyze and interpret data by designing and conducting experiments. Develop the knowledge of developing algorithms, designing, implementation and testing applications in electronics and communication related areas.

PO03. DESIGN/ DEVELOPMENT OF SOLUTION: An ability to Design a system Component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

PO04. CONDUCTION OF INVESTIGATION OF COMPLEX PROBLEMS: Ability to Identify, formulate and solve engineering problems.

PO05. MODERN TOOL USAGE: An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

PO06. THE ENGINEERING AND SOCIETY: Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.

PO07. ENVIRONMENT & SUSTAINABILITY: Understand the impact of professional engineering solution in societal and environmental contexts, and demonstrate the knowledge of, and need of sustainable development.

PO08. ETHICS: An ability to understand the professional, social and ethical responsibility.

PO09. INDIVIDUAL AND TEAM WORK: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. COMMUNICATION: An ability to Communicate effectively in order to succeed in their profession such as, being able to write effective reports and design documentation, make effective presentations.

PO11. PROJECT MANAGEMENT & FINANCE: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environment.

PO12. LIFE-LONG LEARNING: Recognize the need and an ability to engage in life-long learning.

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COURSE OUTCOMES (COs) OF THE SUBJECT

CO No.	Mapping	Statement
CO36512.1	Remembering	To list the solid waste management and disposal techniques.
CO36512.2	Understanding	To define the waste management rules to generators of solid waste and its generation rate.
CO36512.3	Applying	To state what biomedical waste management and hazardous solid waste management are
CO36512.4	Analyzing	To understand the environment and health impacts of solid waste mismanagement.
CO36512.5	Evaluating	Understand the engineering, financial and technical options for waste management.

COS MAPPING WITH POs AND PSOs

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO36512.1	0	0	0	1	0	0	1	1	0	2	0	0	0	0	0
CO36512.2	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0
CO36512.3	0	0	0	0	0	0	2	2	0	2	0	0	0	0	0
CO36512.4	0	0	0	0	0	0	2	2	0	2	0	0	0	0	0
CO36512.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO36512 (AVG)	0	0	0	0.4	0	0	1.4	1	0	1.6	0	0	0	0	0

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UNIVERSITY ACADEMIC CALENDAR

Academic Calendar for Even Semester for Session

Course: Bachelor of Technology (B.TECH.)				
Course: Bachelor of Technology (B.TECH.)				
Semester	II	IV	VI	VIII
Commencement of Classes	26.02.2024	15.02.2024	15.02.2024	02.01.2024
First Mid Term	02.04.2024	20.03.2024	20.03.2024	15.02.2024
Second Mid Term	03.06.2024	06.05.2024	06.05.2024	21.03.2024
Last Working Day	10.06.2024	31.05.2024	31.05.2024	20.04.2024
Commencement of Practical Exams	01.07.2024	03.06.2024	03.06.2024	22.04.2024
Commencement of Theory Exams	19.06.2024	14.06.2024	15.06.2024	02.05.2024
Project (VIII)	06.05.2024 to 15.05.2024			
Practical Training (After II Sem.)	15.07.2024 To 31.07.2024			
Practical Training (After IV Sem.)	01.07.2024 To 17.08.2024			
Practical Training (After VI Sem.)	01.07.2024 To 17.08.2024			
Commencement of Classes for next Odd Semesters (2023-24)	I	III	V	VII
	01.08.2024	01.08.2024	20.08.2024	20.08.2024

Academic Calendar of Institute

Academic Calendar for even semester for session 2023-24

Academic Calendar for even Semester for Session 2023-24 (Even Semester)

Course: Bachelor of Technology (B.TECH.)				
Semester	II	IV	VI	VIII
Commencement of Classes	26-02-2024	15-02-2024	15-02-2024	2-01-2024
Commencement of First Mid Term	20-04-2024	25-03-2024	25-03-2024	15-02-2024
Commencement of Second Mid Term	05-06-2024	24-05-2024	24-05-2024	21-03-2024
Last Working Day	15-06-2024	31-5-2024	31-5-2024	20-04-2024
Commencement of Practical Exams	01-07-2024	04-6-2024	03-6-2024	22-04-2024
Commencement of Theory Exams	19-6-2024	15-6-2024	14-6-2024	02-05-2024
Project (VIII)	06.05.2024 to 15.05.2024			
Practical Training (After II Sem.)	15.07.2024 To 31.07.2024			
Practical Training (After IV Sem.)	01.07.2024 To 17.08.2024			
Practical Training (After VI Sem.)	01.07.2024 To 17.08.2024			

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Evaluation Scheme

FACULTY DETAILS:

Name of the Faculty : Gourav Purbia
Designation : Technical Assistant
Department : Civil Engineering

1. TARGET

- a) Percentage Pass: 100%
b) Percentage I class: 60 %

2. METHOD OF EVALUATION

- Continuous Assessment Examinations (Mid-Term 1, Mid-Term 2)
 Assignments / Seminars
 Mini Projects
 Quiz
 Semester Examination

Others _____

3. List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this Semester.

4. Take the help of creative tools to stimulate creativity. Include slide presentations, demonstration or forms of visual exercises that will excite the young minds and capture their interest.

Signature of Faculty:

Signature of HOD

UNIVERSITY SYLLABUS



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-12: SOLID AND HAZARDOUS WASTE MANAGEMENT

Credit: 2

Max. Marks: 100(IA:30, ETE:70)

2L+0T+0P

End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction to SWM: Definition of waste and solid waste, classification solid waste, sources of solid waste, its composition, factors affecting waste generation, traditional methods of waste collection and disposal	4
3	Waste Collection: Components of waste collection, waste collection containers, their characteristics, types, waste collection vehicles, collection frequency, collection route, transfer stations	4
4	Solid Waste Characterization: Physical characteristics, chemical characteristics and biological characteristics of solid wastes Waste Processing: Size reduction, factors affecting size reduction, size reducing equipment, volume reduction, equipment for volume reduction, waste minimization, waste hierarchy, 3 R principle	5
5	Hazardous Waste: Definition, sources, classification, collection, segregation, treatment and disposal methods Radioactive Waste, E-Waste, Biomedical Waste: Definition, sources, classification, segregation, management and disposal methods	6
6	Treatment and Disposal of Solid Waste: Composting, vermicomposting, biogas production, thermal treatment, incineration, pyrolysis, gasification, biological treatment, Sanitary land filling, land fill leachate and gas management Latest Advances and Rules related to SWM, Hazardous Waste, Plastic Waste and E-Waste Management	5 3
	TOTAL	28

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

PRESCRIBED BOOKS

1. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw- Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002.
3. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering'.

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WEEKLY TIME TABLE OF THE TEACHER

First Time Table: with effect from (Date):

Day	1	2	3	4	5	6	7
Monday							
Tuesday							
Wednesday							
Thursday							
Friday		SWM	SWM				
Saturday			SWM				

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COURSE-PLAN

UNIT	Lect.No.	TOPICS	Teaching Methods/ Teaching Aids
1	1	INTRODUCTION: Objective, scope and outcome of the course	White Board
2	2	INTRODUCTION TO SWM: Definition of waste and solid waste, classification solid waste.	White Board
2	3	Sources of solid waste, its composition.	White Board
2	4	Factors affecting waste generation	White Board
2	5	Traditional methods of waste collection and disposal	White Board
3	6	WASTE COLLECTION: Components of waste collection.	White Board
3	7	Waste collection containers, their characteristics, types.	White Board
3	8	Waste collection vehicles, collection frequency, collection route, transfer stations	White Board
3	9	Waste collection vehicles, collection frequency, collection route, transfer stations	White Board
4	10	SOLID WASTE CHARACTERIZATION: Physical characteristics.	White Board
4	11	Solid Waste Characterization: Chemical characteristics.	White Board
4	12	Solid Waste Characterization: Biological characteristics.	White Board
4	13	Waste Processing: Size reduction, factors affecting size reduction	White Board
4	14	Size reducing equipment, volume reduction, equipment for volume reduction, waste minimization, waste hierarchy, 3 R principle	White Board
5	15	HAZARDOUS WASTE: Definition, sources, classification, collection, segregation, treatment and disposal methods	White Board
5	16	Classification, collection, Segregation, treatment and disposal methods	White Board
5	17	Segregation, treatment and disposal methods	White Board
5	18	Radioactive Waste, E-Waste, Biomedical Waste: Definition, sources	White Board
5	19	Classification, segregation	White Board
5	20	Management and disposal Methods	White Board

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6	21	TREATMENT AND DISPOSAL OF SOLID WASTE: Composting, vermicomposting.	White Board
6	22	Composting, vermicomposting.	White Board
6	23	Biogas production, thermal treatment, incineration, pyrolysis, gasification.	White Board
6	24	Biological treatment, Sanitary land filling	White Board
6	25	Land fill leachate and gas management	White Board
6	26	Latest Advances and Rules related to SWM, Hazardous Waste, Plastic Waste and E- Waste Management	White Board
6	27	(Contd.) Latest Advances and Rules related to SWM	White Board
6	28	(Contd.) Latest Advances and Rules related to SWM	White Board

Signature of Faculty:

Signature of HOD

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Assignment – 1

B. TECH 3rd – YEAR (VI SEM.)

Subject: - *Solid And Hazardous Waste Management*

1. Explain the definition of solid waste and discuss its classification based on sources, composition, and characteristics. Provide examples of each type.
2. Describe the key components of a waste collection system, including types of containers, collection vehicles, and transfer stations. What factors affect the efficiency of waste collection?
3. Discuss the importance of understanding the physical, chemical, and biological characteristics of solid waste. How do these characteristics influence waste management strategies?
4. Explain the different methods used for size and volume reduction in waste processing. How do these methods contribute to effective waste management and minimization?
5. Compare the different management strategies for hazardous waste, radioactive waste, e-waste, and biomedical waste. What are the specific challenges associated with each type?
6. Analyze the latest advances and regulations in the management of solid waste, hazardous waste, plastic waste, and e-waste. How do these changes impact current waste management practices?

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Assignment – 2

B. TECH 3rd – YEAR (V SEM.)

Subject: - *Solid And Hazardous Waste Management*

1. Discuss the various types of waste collection containers and their characteristics. How do these characteristics affect the efficiency and effectiveness of waste collection?
2. Analyze the factors affecting the generation of solid waste. How do demographic, economic, and behavioral factors influence the quantity and composition of waste produced?
3. Examine the different technologies used for volume reduction of solid waste. How do these technologies help in reducing the environmental impact of waste?
4. Explain the processes and challenges involved in the segregation of hazardous waste. What measures can be taken to improve the effectiveness of hazardous waste segregation?
5. Describe the methods used for the management and disposal of radioactive waste. What are the key considerations for ensuring the safe handling and long-term disposal of radioactive materials?
6. Compare and contrast the treatment methods of composting, incineration, and sanitary landfilling. What are the advantages and disadvantages of each method in terms of environmental impact and sustainability?

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SAMPLE QUIZ QUESTIONS

1. Which of the following is a common method used for size reduction of waste?
 - a) Composting
 - b) Incineration
 - c) Shredding (**Answer**)
 - d) Sanitary landfilling

2. Which technology is used to reduce the volume of solid waste by converting it into gases and ash?
 - a) Composting
 - b) Incineration (**Answer**)
 - c) Pyrolysis
 - d) Gasification

3. Which waste management method is used to treat organic waste and produce nutrient-rich compost?
 - a) Incineration
 - b) Vermicomposting (**Answer**)
 - c) Landfilling
 - d) Thermal treatment

4. Which method involves the use of microorganisms to break down organic matter in waste?
 - a) Incineration
 - b) Biogas production (**Answer**)
 - c) Thermal treatment
 - d) Landfilling

5. What is the primary goal of the 3R principle in waste management?
 - a) Reduce, Reuse, Recycle (**Answer**)
 - b) Remove, Reprocess, Reuse
 - c) Reduce, Recycle, Replace
 - d) Reuse, Recycle, Restore

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6. What is a common characteristic of hazardous waste that requires special handling?
- a) High volume
 - b) Biodegradability
 - c) Emission of radiation (**Answer**)
 - d) Recyclability
7. What is the main purpose of using transfer stations in waste management?
- a) Reducing the volume of waste
 - b) Consolidating waste for more efficient transportation (**Answer**)
 - c) Composting organic waste
 - d) Incinerating waste
8. Which type of waste requires specific management techniques due to its potential to emit harmful radiation?
- a) E-waste
 - b) Biomedical waste
 - c) Radioactive waste (**Answer**)
 - d) Municipal solid waste
9. Which of the following methods is used to minimize the environmental impact of plastic waste?
- a) Incineration
 - b) Plastic recycling (**Answer**)
 - c) Sanitary landfilling
 - d) Chemical treatment
10. Which waste management approach involves converting waste into energy through combustion?
- a) Composting
 - b) Incineration (**Answer**)
 - c) Gasification
 - d) Landfilling

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Mid Term 1

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR

B. TECH III YEAR (VI SEM.) – MT-I (APRIL'24) SOLID &

HAZARDOUS WASTE MANAGEMENT (6CE5-12)

Time: 3 Hr

Max. Marks: 70

Note:

1. The paper is divided into 2 parts: Part-A and, Part-B.
2. Part-A contains 10 questions and carries 2 mark each.
3. Part-B contains 5 questions. Each question is having two options and carries 10 marks each.

SECTION A (WORD LIMIT 25 WORDS)		
a	Define solid waste	CO1
b	Define the concept of 3R's	CO1
c	What is the importance of Goals and Objective in SWM	CO1
d	Name 4 factors affecting the generation rate of Solid Waste	CO1
e	What are Solid Waste Management strategies	CO2
f	Who are responsible for handling of waste @ low house dwelling & Commercial sources	CO2
g	Name 3 different types of containers utilized for onsite handling	CO2
h	Write Various method of onsite processing of Solid Waste.	CO2
i	Name different types of collection methods	CO3
j	What is a Dustbin.	CO3
SECTION B (WORD LIMIT 200-300 WORDS)		
1	Write a note on classification of Solid waste	CO1
	or What are factors affecting the rate of Generation of solid waste	
2	Write a note on physical properties of solid waste	CO1
	or How the sample is prepared for various types of test samples	
3	Explain different types of dustbins used for solid waste	CO2
	or What are the different types of methods used in the High Rise apartments for reducing the solid waste	
4	What are Various Ways to decide Collection routes.	CO2
	Or Different type of Vehicle used being in collection system.	

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5	Write a note about the Collection Frequency.	CO3
	Or	
	Write important points you need to focus on for deciding the transfer routes	

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Marks and Gap Analysis of Mid-Term I

S.No.	University Roll No.	Name of Student	Mid-Term 1 MM-70	Remark (Remedial Class need or not – Y/N)
1.	21ETCCE001	Dev vaishnav	52	N
2.	21ETCCE002	Hitesh Sutradhar	47	N
3.	21ETCCE004	Naved khan	54	N
4.	21ETCCE006	Pushpendra gehlot	61	N
5.	21ETCCE007	Shalin Dak	45	N
6.	21ETCCE009	Tamanna kumawat	58	N
7.	21ETCCE300	Muniraj Sharma	61	N
8.	22ETCCE200	Moiz Udaipurwala	43	N
9.	22ETCCE201	Vikas Suthar	56	N

*(Y, if obtained marks are <50%)

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Remedial Action Taken to Remove the Gaps (After Mid-Term 1)

S.no.	University Roll no.	Name of Student	Topics to be discussed in Remedial Class	Schedule Date of Remedial Class	Outcome Achieved
1.	NIL				
2.					

Signature of Faculty:

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Mid Term Paper-II

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR

B. TECH III YEAR (VI SEM.) – MT-II

SOLID & HAZARDOUS WASTE MANAGEMENT (6CE5-12)

Time: 3 Hr

Max. Marks:70

Note:

1. The paper is divided into 2 parts: Part-A and, Part-B.
2. Part-A contains 10 questions and carries 2 mark each.
3. Part-B contains 5 questions. Each question is having two options and carries 10 marks each.

Part- A (20 Marks)

A.	Define solid waste	CO1
B.	Define the concept of 3R's	CO1
C.	What are Solid Waste Management strategies	CO2
D.	Name 3 different types of containers utilized for onsite handling	CO2
E.	What is a Dustbin.	CO3
F.	Define pyrolysis.	CO3
G.	What are different methods of composting?	CO4
H.	How is biomedical waste?	CO4
I.	Define hazardous waste.	CO5
J.	What is leachate? How is it managed?	CO5

Part- B (50 Marks)

1. Write a note on classification of Solid waste	CO1
OR	
1. Write a note on physical properties of solid waste	CO1
2. Explain different types of dustbins used for solid waste	CO2
OR	
2. Different type of Vehicle used being in collection system.	CO2
3. Write a note about the Collection Frequency.	CO3
OR	
3. Write important points you need to focus on for deciding the transfer routes	CO3
4. Write about the Vermicomposting.	CO4

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OR	
4. Write a note on Hazardous waste. (Definition, collection, treatment, disposal etc.)	CO4
5. What do you understand by energy generation from solid waste?	CO5
OR	
5. Discuss disposal of industrial solid waste.	CO5

Marks and Gap Analysis of Mid-Term II

S.No.	University Roll No.	Name of Student	Mid-Term I MM-70	Remark (Remedial Class need or not – Y/N)
1.	21ETCCE001	Dev vaishnav	51	N
2.	21ETCCE002	Hitesh Sutradhar	46	N
3.	21ETCCE004	Naved khan	53	N
4.	21ETCCE006	Pushpendra gehlot	60	N
5.	21ETCCE007	Shalin Dak	44	N
6.	21ETCCE009	Tamanna kumawat	57	N
7.	21ETCCE300	Muniraj Sharma	60	N
8.	22ETCCE200	Moiz Udaipurwala	42	N
9.	22ETCCE201	Vikas Suthar	55	N

*(Y, if obtained marks are <50%)

Signature of Faculty:

Signature of HOD

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Remedial Action Taken to Remove the Gaps (After Mid- Term 1I)

S.no.	University Roll no.	Name of Student	Topics to be discussed in Remedial Class	Schedule Date of Remedial Class	Outcome Achieved
1.	NIL				
2.					

Signature of Faculty:

Signature of HOD

Model Question Paper

5E5068	Roll No. <u>15ECT0019</u>	[Total No. of Pages : <u>2</u>]
	5E5068 B.Tech. V Semester (Main/Back) Examination, Nov./Dec. - 2017 Civil Engineering SCE6.3A Solid Waste Management	

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates :

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) What are the main problems associated with solid waste disposal? (8)
b) Explain the classification of solid waste. (8)

OR

1. a) What are the goals and objectives of solid waste management? (8)
b) Describe the important characteristics of solid waste. Also discuss the factors influencing generation of solid waste. (8)

Unit - II

2. a) What do you mean by onsite handling of solid waste? How is the aspect of public health and aesthetics related to it? (8)
b) What are the different types and materials used for storage containers? Explain with suitable sketches. (8)

OR

2. a) Explain the onsite processing methods used for solid waste. (8)
b) How do we decide the location of containers? Write down the precautions and guidelines for this purpose. (8)

Unit - III

3. a) What are the important steps in collection and transfer system design? (8)
b) Explain the equipment and labour requirement in reference to solid waste management. (8)

OR

3. a) Explain various methods of collection system with flow diagrams. (8)
b) What are the different types of vehicles being used in for collection systems?(8)

Unit - IV

4. What do you understand by sanitary land filling? How is it different from a normal land filling? How is it practiced? Explain the filling process with a neat sketch. (16)

OR

4. Describe in detail the different processing techniques and methods of solid waste disposal with neat sketches. (16)

Unit - V

5. a) Explain the special techniques of treatment for industrial solid waste. (8)
b) Describe the reuse and recycling of solid waste materials. (8)

OR

5. a) How is the nature, treatment and disposal of industrial solid waste different than the municipal solid waste? (8)
b) Explain various methods of energy recovery from solid waste. (8)



STUDENT PERFORMANCE REPORT

Roll No.	Name of Student	I Mid-Term	II Mid-Term	Average
21ETCCE001	Dev vaishnav	52	51	51.5
21ETCCE002	Hitesh Sutradhar	47	46	46.5
21ETCCE004	Naved khan	54	53	53.5
21ETCCE006	Pushpendra gehlot	61	60	60.5
21ETCCE007	Shalin Dak	45	44	44.5
21ETCCE009	Tamanna kumawat	58	57	57.5
21ETCCE300	Muniraj Sharma	61	60	60.5
22ETCCE200	Moiz Udaipurwala	43	42	42.5
22ETCCE201	Vikas Suthar	56	55	55.5

Signature of Faculty:

Signature of HOD

RESULT ANALYSIS

S.NO	RTU ROLL NUMBER	NAME OF STUDENT	END TERM MARKS	SESSIONAL MARKS	TOTAL
		MAX MARKS	70	30	100
1.	21ETCCE001	Dev vaishnav		23	
2.	21ETCCE002	Hitesh Sutradhar		21	
3.	21ETCCE004	Naved khan		24	
4.	21ETCCE006	Pushpendra gehlot		27	
5.	21ETCCE007	Shalin Dak		20	
6.	21ETCCE009	Tamanna kumawat		26	
7.	21ETCCE300	Muniraj Sharma		27	
8.	22ETCCE200	Moiz Udaipurwala		19	
9.	22ETCCE201	Vikas Suthar		25	

TOTAL	PASS	FAIL	ABSENT	PASS %
9	N/A	N/A	N/A	100 %

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Indirect Assessment:

Overall Teacher Self-Assessment (at the completion of course) in terms of course objective and outcomes

Course Objectives:

The course "Solid and Hazardous Waste Management" aims to equip students with a comprehensive understanding of waste concepts, including the definitions, classifications, and sources of solid and hazardous waste, as well as factors affecting waste generation. Students will learn about waste collection systems, including containers, vehicles, and transfer stations, and analyze the efficiency of waste collection methods. The course covers the physical, chemical, and biological characteristics of solid waste and various processing techniques such as size and volume reduction and the 3R principles. It also addresses the management of hazardous, radioactive, e-waste, and biomedical waste, focusing on collection, segregation, and disposal. Students will evaluate treatment and disposal methods like composting, incineration, and landfilling, and stay informed about the latest advancements and regulations in waste management.

Course Outcomes:

At the end of this course students will be able to:

CO1: To list the solid waste management and disposal techniques

CO2: To define the waste management rules to generators of solid waste and its generation rate

CO3: To state what biomedical waste management and hazardous solid waste management are

CO4: To understand the environment and health impacts of solid waste mismanagement.

CO5: Understand the engineering, financial and technical options for waste management

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Methodology to identify bright student

It is done by considering a range of criteria, including academic performance, creativity, critical thinking, problem-solving skills, and enthusiasm for learning. Bright students often excel in multiple areas. Observed how students perform in the classroom. In terms of active participation, engagement in discussions, leadership, and the ability to grasp complex concepts.

Efforts to keep students engaged

1. **Active Learning:** Incorporate active learning strategies, such as group discussions, problem-solving activities, and hands-on projects. Active participation keeps students engaged and encourages critical thinking.
2. **Varied Teaching Methods:** Use a variety of teaching methods, including lectures, group work, multimedia presentations, and interactive activities to cater to different learning preferences.
3. **Technology Integration:** Leverage technology, such as online platforms, educational apps, and interactive software, to make lessons more engaging and interactive.

Methodology to identify weak student

It is done by considering a range of criteria, including classroom observation, formative assessment, summative assessment, assignment review etc. Weak students are struggling students with sensitivity and a desire to support their learning. Some measures, such as additional tutoring, personalized assignments, or alternative assessment methods, to help students succeed.

Targeted interventions for weak student

1. Additional Resources

Offer supplementary learning materials, such as textbooks, online resources, or multimedia content, to provide alternative explanations and reinforce key concepts.

2. Remedial classes

Establish a tutoring program where students can receive extra help from teachers.

3. Flipped classroom

Students are assigned pre-class learning materials, often in the form of videos, readings, or online modules, to cover the foundational concepts before coming to class.