

Hall Ticket No

Question Paper Code: AEE551



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## MODEL QUESTION PAPER

B.Tech VII Semester End Examinations, November - 2019

Regulations: R16

### ENERGY FROM WASTE

(Common to CE/ECE/CSE/IT/MECH/AERO)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

#### UNIT – I

1. a) Give the composition of Municipal solid waste. Write down the methods of collection of solid waste? [7M]  
b) List out the physical and chemical properties of MSW? Write briefly about the composting facilities and various types of composting Techniques. [7M]
2. a) Write short notes on any four of the following  
(i) waste minimisation  
(ii) composting [7M]  
(iii) recycling of MSW  
(iv) transfer stations  
(v) hazardous waste  
b) What are the sources of Biomedical Waste? Write briefly about the techniques used in conversion of biomedical waste to useful energy? [7M]

#### UNIT – II

3. a) What are the major advantages of sanitary landfill? Explain with a neat sketch operation of sanitary land fill? [7M]  
b) What are the various phases of operation of landfill with a neat sketch . Give composition of landfill gas emission and hazards due to land fill gas [7M]
4. a) What is the process of Incineration? With the help of a neat sketch, explain incineration process. [7M]  
b) Describe the various guidelines for selection of a landfill site. Write the adverse effects of a landfill leachate and list appropriate control measures. [7M]

### UNIT – III

5. a) Name the two basic biogas digester designs in common use today and show the structural illustration of each. [7M]
- b) Describe in details, stage- by-stage, the biochemical process of bio gas generation/production through anaerobic digestion organic materials. [7M]
6. a) Describe various bio-chemical conversion process [7M]
- b) Illustrate standard rate single-stage digester [7M]

### UNIT – IV

7. a) Explain about gasification process in-detail? Discuss briefly on environmental benefits of bio-chemical and thermo chemical process [7M]
- b) Discuss in-detail about land fill gas generation? Write about utilization of land fill gas? [7M]
8. a) Discuss the process of Bio-mass briquetting? Explain the utilization and advantages of briquetting? [7M]
- b) Explain the Classification of Gasifiers? Explain with neat sketch different gasifiers used in thermo chemical conversion. [7M]

### UNIT – V

9. a) Write a brief note on Management of E-waste and E-waste legislation? What are the impacts of E-Waste on the environment? [7M]
- b) Discuss in-detail about environmental concerns due to e-waste. Explain about environmental laws of E-waste [7M]
10. a) Explain the salient features on E-waste rules. Discuss the global trade in hazardous waste. [7M]
- b) Write a brief note on Management of e-waste and E-waste legislation. Explain E-waste in global context. [7M]



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## COURSE OBJECTIVES:

The course should enable the students to:

I	Understand the principles associated with effective energy management and to apply these principles in the day to day life.
II	Develop insight into the collection, transfer and transport of municipal solid waste.
III	Explain the design and operation of a municipal solid waste landfill.
IV	Evaluate the main operational challenges in operating thermal and biochemical energy from waste facilities and device key processes involved in recovering energy from wastes.

## COURSE OUTCOMES (COs):

CO 1	Identify different sources of solid waste and characteristics of municipal solid waste
CO 2	Classify the methods in disposal of solid waste and the emission of gases, leachate from landfills
CO 3	Understand Biochemical conversion of bio-mass for energy application, Bio-energy systems and process integration.
CO 4	Illustrate sources of thermo chemical energy generation and understand Biochemical conversion of biomass for energy application
CO 5	Understand the global scenario of environmental concerns and health hazards by the generation of E- waste

## COURSE LEARNING OUTCOMES (CLOs):

AEE551.01	Apply the knowledge about the operations of Waste to Energy Plants.
AEE551.02	Understand physical and chemical analysis of municipal solid wastes and apply them for a management system that will be set up.
AEE551.03	Analyze the various aspects of Waste to Energy Management Systems.
AEE551.04	Design a compost facility, incineration facility and make site selection for a landfill.
AEE551.05	Explain the hierarchical structure in solid waste management and a requirement for an integrated solution.
AEE551.06	Use Geographical Information System for landfill site selection that takes place in Solid Waste Management Plan.
AEE551.07	Collect required data for a Solid Waste Management Plan and edit the collected dataset up Solid Waste Management Plan.
AEE551.08	Understand Biochemical conversion of biomass for energy application, Bioenergy systems and process integration.
AEE551.09	Evaluate the subject from the technical, legal and economical points by learning of all terms related to general solid waste management.
AEE551.10	Use multiple criteria decision making systems for an optimum and sustainable integrated solid waste management system based on entire data.
AEE551.11	Examine the technical points that are required to set up a solid waste management system.
AEE551.12	Discuss Thermo chemical conversion of biomass for energy application.

AEE551.13	Understand the concept of bio mass briquetting and its advantages.
AEE551.14	Apply the knowledge in planning and operations in combustion of Waste to Energy.
AEE551.15	Apply the legal legislation related to solid waste management.
AEE551.16	Encourage students to organize recycling events and waste audit.
AEE551.17	Discuss the growth of electrical and electronics in waste to energy industry in India.
AEE551.18	Understand need for stringent health safeguards and environmental protection laws of India.
AEE551.19	Discuss impact of hazardous e-waste in India
AEE551.20	Understand need for stringent health safeguards and environmental protection laws of India.

#### MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes	Course Outcomes	Blooms Taxonomy Level
1	a	<b>AEE551.02</b> Understand physical and chemical analysis of municipal solid wastes and apply them for a management system that will be set up.	CO 1	Remember
	b	<b>AEE551.02</b> Understand physical and chemical analysis of municipal solid wastes and apply them for a management system that will be set up.	CO 1	Understand
2	a	<b>AEE551.01</b> Apply the knowledge about the operations of Waste to Energy Plants.	CO 1	Remember
	b	<b>AEE551.02</b> Understand physical and chemical analysis of municipal solid wastes and apply them for a management system that will be set up.	CO 1	Understand
3	a	<b>AEE551.06</b> Use Geographical Information System for landfill site selection that takes place in Solid Waste Management Plan	CO 2	Understand
	b	<b>AEE551.06</b> Use Geographical Information System for landfill site selection that takes place in Solid Waste Management Plan	CO 2	Understand
4	a	<b>AEE551.04</b> Design a compost facility, incineration facility and make site selection for a landfill.	CO 2	Understand
	b	<b>AEE551.06</b> Use Geographical Information System for landfill site selection that takes place in Solid Waste Management Plan	CO 2	Understand
5	a	<b>AEE551.08</b> Understand Biochemical conversion of biomass for energy application, Bioenergy systems and process integration.	CO 3	Understand
	b	<b>AEE551.08</b> Understand Biochemical conversion of biomass for energy application, Bioenergy systems and process integration.	CO 3	Understand
6	a	<b>AEE551.08</b> Understand Biochemical conversion of biomass for energy application, Bioenergy systems and process integration.	CO 3	Understand
	b	<b>AEE551.08</b> Understand Biochemical conversion of biomass for energy application, Bioenergy systems and process integration.	CO 3	Understand
7	a	<b>AEE551.08</b> Understand Biochemical conversion of biomass for energy application, Bioenergy systems and process integration.	CO 4	Understand
	b	<b>AEE551.08</b> Understand Biochemical conversion of biomass for energy application, Bioenergy systems and process integration.	CO 4	Understand

8	a	<b>AEE551.10</b>	Understand the concept of bio mass briquetting and its advantages.	CO 4	Understand
	b	<b>AEE551.09</b>	Discuss Thermo chemical conversion of biomass for energy application.	CO 4	Understand
9	a	<b>AEE551.18</b>	Understand need for stringent health safeguards and environmental protection laws of India.	CO 5	Understand
	b	<b>AEE551.15</b>	Apply the legal legislation related to solid waste management.	CO 5	Remember
10	a	<b>AEE551.17</b>	Discuss the growth of electrical and electronics in waste to energy industry in India.	CO 5	Understand
	b	<b>AEE551.18</b>	Understand need for stringent health safeguards and environmental protection laws of India.	CO 5	Understand

**Signature of Course Coordinator**

**HOD, CE**