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Question Paper Code:BCSB30



# **INSTITUTE OF AERONAUTICAL ENGINEERING**

**(Autonomous)**

**Dundigal, Hyderabad - 500 043**

## **MODEL QUESTION PAPER - I**

M.Tech III Semester End Examinations (Regular), December – 2019

**Regulations: R18**

### **WASTE TO ENERGY**

(Computer Science and Engineering)

**Time:3hours**

**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) What are the functional elements in a typical solid waste management system? [7M]  
b) Define waste minimization and recycling of MSW? [7M]
2. a) How do proposals for energy from waste developments fit in with the Scottish Government's Zero Waste Plan? [7M]  
b) Distinguish between Incinerators, gasifiers and digestors? [7M]

#### **UNIT – II**

3. a) How will we efficiently grow, collect, and transport the bulky, dispersed biomass required for biofuels? [7M]  
b) Define pyrolytic oil and explain the process of manufacture of pyrolytic oil. [7M]
4. a) Why aren't more farmers collecting agricultural residue or growing energy crops to make biofuels right now? [7M]  
b) Explain briefly about the methods to produce charcoal. [7M]

#### **UNIT – III**

5. a) What is the Gasifier burner arrangement for thermal heating? [7M]  
b) How is gasification more advantageous than pyrolysis and liquefaction? [7M]
6. a) How to produce electric power from biomass gasification? [7M]  
b) Explain about the construction and operation of Fluidized bed gasifiers. [7M]

**UNIT – IV**

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|----|----|--|------|
| 7. | a) | Explain the working of Fixed bed combustors  | [7M] |
|    | b) | Explain about the construction and operation of Fluidized bed combustors.                      | [7M] |
| 8. | a) | Who invented the National Improved Chullahs program and briefly explain about its advantages ? | [7M] |
|    | b) | Explain about the design and working process of inclined grate combustors.                     | [7M] |

**UNIT – V**

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|-----|----|--|------|
| 9.  | a) | What are sustainable and eco-friendly approaches to converting the biodegradable fraction of municipal solid waste (MSW) into bioenergy? | [7M] |
|     | b) | Explain the biomass conversion process and list out the different types of conversions of biomass.                                       | [7M] |
| 10. | a) | Distinguish between biomass gasification, pyrolysis and liquefaction?  | [7M] |
|     | b) | Explain briefly about the Biomass energy program in India.   | [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 wasteland fill.
IV.	Device key processes involved in recovering energy from wastes, systematically evaluate the main operational challenges in operating thermal and biochemical energy from waste facilities.

## COURSE OUTCOMES (COs):

I	Describe basic concepts of waste to energy resources and their conversion devices.
II	Understand the concept of pyrolysis and the production of different products by using pyrolysis
III	Explore different types of biomass gasification techniques and understand Biochemical conversion of biomass for energy application
IV	Explore different types of biomass combustion techniques and their working operations.
V	Describe the basic concepts of biogas and explore Biogas plant technology and their applications.

## COURSE LEARNING OUTCOMES (CLOs):

BCSB30.01	Explain about different types of waste to energy resources.
BCSB30.02	Understand basic concept of energy conversion and explore different types of conversion devices.
BCSB30.03	Understand basic concept of pyrolysis and their types.
BCSB30.04	Describe the concept of Manufacture of charcoal, and their Methods.
BCSB30.05	Describe the concept of Manufacture of pyrolytic oils and gases and their applications.
BCSB30.06	Describe the concept of biomass gasification technique and their gasification types and techniques.
BCSB30.07	Explain about the Gasifier engine arrangement for the production of electrical power and their considerations.
BCSB30.08	Understand about the concept of biomass combustion through some exotic designs .
BCSB30.09	Explore on various combustion techniques and their operations.
BCSB30.10	Understand about the basic concepts of biogas.
BCSB30.11	Demonstrate about Biogas plant technology and Bio energy system.
BCSB30.12	Explain about the concept of Alcohol production from biomass and Bio diesel production.
BCSB30.13	Discuss about the Biomass energy program in India.

### MAPPING OF SEMESTER END EXAMINATION TO COURSE LEARNING OUTCOMES:

SEE Question Number		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	BCSB30.01	Explain about different types of waste to energy resources.	CO 1	Understand
	b	BCSB30.01	Explain about different types of waste to energy resources.	CO 1	Remember
2	a	BCSB30.02	Understand basic concept of energy conversion and explore different types of conversion devices.	CO 1	Remember
	b	BCSB30.02	Understand basic concept of energy conversion and explore different types of conversion devices.	CO 1	Understand
3	a	BCSB30.03	Understand basic concept of pyrolosis and their types.	CO 2	Remember
	b	BCSB30.04	Describe the concept of Manufacture of charcoal, and their Methods.	CO 2	Remember
4	a	BCSB30.03	Understand basic concept of pyrolosis and their types.	CO 2	Understand
	b	BCSB30.05	Describe the concept of Manufacture of pyrolytic oils and gases and their applications.	CO 2	Remember
5	a	BCSB30.07	Explain about the Gasifier engine arrangement for the production of electrical power and their considerations.	CO 3	Remember
	b	BCSB30.06	Describe the concept of biomass gasification technique and their gasification types and techniques.	CO 3	Understand
6	a	BCSB30.06	Describe the concept of biomass gasification technique and their gasification types and techniques.	CO 3	Remember
	b	BCSB30.06	Describe the concept of biomass gasification technique and their gasification types and techniques.	CO 3	Understand
7	a	BCSB30.08	Understand about the concept of biomass combustion through some exotic designs .	CO 4	Remember
	b	BCSB30.09	Explore on various combustion techniques and their operations.	CO 4	Remember
8	a	BCSB30.08	Understand about the concept of biomass combustion through some exotic designs .	CO 4	Understand
	b	BCSB30.09	Explore on various combustion techniques and their operations.	CO 4	Understand
9	a	BCSB30.10	Understand about the basic concepts of biogas.	CO 5	Understand
	b	BCSB30.11	Demonstrate about Biogas plant technology and Bio energy system.	CO 5	Remember
10	a	BCSB30.12	Explain about the concept of Alcohol production from biomass and Bio diesel production.	CO 5	Understand
	b	BCSB30.13	Discuss about the Biomass energy program in India.	CO 5	Remember

Signature of Course Coordinator

HOD, CSE