Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Sixth Semester

Chemical Engineering

CH3006 - Bioenergy

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	What is the composition and properties of biomass?	L1	1	2
2.	How biomass is classified?	L1	1	2
3.	Outline the factors affecting biogas generation.	L2	2	2
4.	What are the constituents of biogas?	L1	2	2
5.	Define thermochemical conversion through pyrolysis.	L1	3	2
6.	What are the advantages and disadvantages of incineration?	L1	3	2
7.	Outline the difference between the fixed and fluidized bed gasifier.	L2	4	2
8.	List the major problem in biomass gasification.	L1	4	2
9.	What are the advantages of biomass combustion?	L1	5	2
10.	Define cogeneration system.	L1	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Outline in detail about the Chemical composition, physical and chemical properties of biomass.	L2	1	8
		ii	Explain with a neat sketch for the screening and size reduction of biomass.	L2	1	8
			Or			
	b	i	Explain the merits and demerits of biomass briquettes over loose biomass.	L2	1	8
		ii	Explain in detail about the Health and Safety Aspects of Solid Biomass Storage, Handling and Transportation.	L2	1	8
12.	a	i	What is biogas? Explain with a block diagram and the main stages of Anaerobic digestion.	L2	2	8
		ii	Examine dry fermentation biogas technology and how it is used for sanitation, waste stabilization and nutrient recovery?	L3	2	8
			Or			
	b	i	Outline about small-Size Biogas Technology Applications for Rural Areas in the Context of Developing Countries.	L2	2	8
		ii	Explain with a neat sketch of Anaerobic Digester Wastewater Management During Biogas Production.	L2	2	8

13.	a	i	Explain the following terms in detail: (i) Thermo Chemical Conversion (ii) Direct combustion of Biomass	L2	3	8
		ii	Describe the equipment's involved in fast pyrolysis process and construct a sample block diagram.	L3	3	8
			Or			
	b	i	Compare the ease and technology used for bioethanol and bio butanol production.	L2	3	8
		ii	Outline about the feedstock availability and energy products from biomass pyrolysis.	L2	3	8
14.	a		Explain in detail about the impact of biomass gasification temperature and pressure with a neat sketch.	L2	4	16
			Or			
	b	i	Explain in detail about the Design and operation of Fluidized Bed Gasifier with a neat sketch.	L2	4	8
		ii	Explain in detail about the Common Limitations associated with biomass gasifiers.	L2	4	8
15.	a	i	In a co-generative power plant the boiler consumes 18952KW of heat to produce steam which is then used by a turbine to produce 7846KW of power output. The process heater absorbs 6453KW of heat. Examine the effectiveness of the process in percentage.	L3	5	8
		ii	Explain in detail about the important process steps for cogeneration of bagasse.	L2	5	8
			Or			
	b		Explain the construction and operation of a biomass cogeneration plant with a neat sketch.	L2	5	16