Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Sixth Semester

Agriculture Engineering

AI3005 – Food Process Equipment and Design

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

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

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	List the parameters that are to be considered in selection of food process equipment.	L1	1	2
2.	Why the mechanical properties of the materials are important in the construction of process equipment?	L4	1	2
3.	Write about the operating design conditions of a pressure vessel.	L2	2	2
4.	Recall some design codes and its function.	L2	2	2
5.	Distinguish parallel flow and counter flow heat exchangers.	L2	3	2
6.	Water is heated from 16°C to 48°C using hot water entering 96°C and exiting at 51°C through counter flow heat exchanger. Calculate the logarithmic mean temperature difference.	L3	3	2
7.	List the different types of conveyors used in material handling.	L1	4	2
8.	Draw and label the parts of a bucket elevator.	L3	4	2
9.	What do you mean by process efficiency?	L2	5	2
10.	Write any two uses of CAD id designing food process equipment.	L2	5	2

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

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Summarize the importance of equipment design in manufacturing the process equipment.	L2	1	16
		Or			
	b	Brief the application of design engineering for food processing equipment.	L2	1	16
12.	a	Outline the role of material selection and design parameters in designing a pressure vessel for high-pressure applications.	L3	2	16
		Or			
	b	Explain the design considerations for cleaning the paddy grains using air screen cleaner with a capacity of 100 kg/h.	L3	2	16
13.	a	Discuss the design considerations of a plate heat exchanger and shell and tube heat exchanger.	L4	3	16
		Or			

	b	Steam enters a counter flow heat exchanger, dry saturated at 10 bar and leaves at 350°C. The mass flow of steam is 800 kg/min. The gas enters the heat exchanger at 650°C and mass flow rate is 1350 kg/min. If the tubes are 30 mm diameter and 3 m long, determine the number of tubes required. Neglect the resistance offered by metallic tubes. Use the following data: For steam: t_{sat} = 180°C (at 10 bar); cps = 2.71 kJ/kg°C; h_s = 600 W/m^2°C For gas: cp_g = 1 kJ/kg°C; h_g = 250 W/m^2°C	L3	3	16
14.	a	Discuss design considerations of a belt conveyor and screw conveyor.	L4	4	16
		Or			
	b	Discuss in detail about the design of tray dryer for drying 500 kg of tomatoes.	L4	4	16
15.	a	Elaborate the role of optimization in process equipment design in terms of process efficiency, energy consumption, and cost.	L2	5	16
		Or			
	b	Explain the significance of Computer Aided Design in modern process equipment design in terms of accuracy, visualization, and integration with simulation tools.	L2	5	16