

2022

**Food Process Equipment design***Full Marks: 100*

Time: Three hours

*The figures in the margin indicate full marks for the questions.**Answer any five questions.*

1.	a)	Discuss about the properties of following materials: (i). Aluminum (ii). Plastics	5+5= 10
	b)	Discuss about the different stresses that has to be considered during the fabrication of food process equipments and mention the prevention measures also.	10
2.	a)	Write about the operational characteristics (any five) that must be considered in the selection of food processing equipment	10
	b)	Give a schematic diagram of fixed tube sheet shell and tube heat exchanger.	6
	c)	Write about the different fluid flow arrangements in heat exchangers	4
3.	a)	Give short notes on the designing of tube sheet in a shell and tube heat exchangers. How the effective thickness of tube sheet is determined?	10
	b)	Briefly explain about the design aspects of following components of a shell and tube heat exchangers. (i). Shell side and tube side passes (ii). Baffles and tie rods	10
4.	a)	Explain the working mechanism of plate type heat exchangers (PHE) with proper diagram. Mention the advantages, and disadvantages of PHE also.	10
	b)	Write about the working principle of uniform belt conveyors with proper diagrams.	10
5.	a)	Give the schematic diagrams of the following conveyors: (i). Segmented belt conveyors (ii). Roll conveyors (iii). Skate wheel conveyors	4*2=8

		(iv). Screw conveyors	
	b)	Explain the working mechanism of pneumatic conveyors with suitable diagram.	12
6	a)	Write about the different types of feeding arrangement in multiple effect evaporators with suitable diagrams	10
	b)	Detail the working mechanism of short tube vertical evaporators and horizontal tube evaporators with proper diagrams	10
7.	a)	Give the schematic diagram of forced circulation liquid evaporator crystallizer (or) draft tube baffle crystallizer	5
	b)	Write the applications of crystallization in food processing.	5
	c)	How hoop stress and longitudinal stress has been calculated in a thin wall pressure vessel?	10

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