GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - VI EXAMINATION - SUMMER 2025

Subject Code: 3165107   **Date: 02-06-2025**

Subject Name: **Transport Phenomena in Food Processing**

Time: 10:30 AM TO 01:00 PM   **Total Marks: 70**

Instructions
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

			Marks
Q.1	**(a)**	Define transport phenomena and classify its types.	03
	(b)	Explain conservation laws in transport phenomena with examples.	04
	(c)	Compare shell and tube, plate, and scraped surface heat exchangers	07
Q.2	**(a)**	State and explain Newton's law of viscosity.	03
	(b)	Explain mode of heat transfer.	04
	(c)	Analyze simultaneous heat and mass transfer in drying of potato slices.	07

OR

			Marks
	(c)	Describe diffusion in porous solids and capillaries with a food industry example.	07
Q.3	**(a)**	What is molecular diffusion? Explain briefly.	03
	(b)	What are the major types of heat exchangers? Compare any two.	04
	(c)	Calculate heat transfer coefficient from given data for laminar flow over a heated plate.	07

OR

			Marks
	(a)	State Stefan–Boltzmann law.	03
	(b)	Explain how radiation is used in food drying or baking.	04
	(c)	Discuss the effect of radiation and conduction on the thawing of frozen food.	07
Q.4	**(a)**	What is a jacketed vessel? Mention its function in food processing	03
	(b)	Discuss the mechanism of unsteady-state mass transfer.	04
	(c)	Explain shell momentum balance and its applications.	07

OR

			Marks
	(a)	List differences between laminar and turbulent flow.	03
	(b)	Enlist all velocity profile for different condition.	04
	(c)	Describe convective heat transfer with a focus on turbulent conditions.	07
Q.5	**(a)**	Define mass transfer coefficient.	03

(b) Describe the heat transfer process between a fluid and a solid food   **04**

(c) Describe the principles and measurement of mass transfer coefficients in food.   **07**

OR

(a) What are the applications of momentum transport in food processing?   **03**

(b) Discuss heat transfer in boiling liquids during food processing   **04**

(c) Explain vector and tensor calculus and their roles in transport modeling.   **07**

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