K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester: V
Class: TY	Program: B.Tech Chem. Engg.
Branch Code: CHE	Pattern:2023
Name of Course: Mass Transfer I	Course Code:2307301
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	Establish the relation for local overall mass transfer coefficient in terms of local individual film mass transfer coefficients for each phase for gas-liquid interphase mass transfer operation.	(6)	CO 1
Question No. 2			
2a)	Describe the significance of the following; 1. Minimum Liquid to Gas Ratio 2. Absorption Factor and stripping factor	(6)	CO 1, CO 2, CO 4
Question No. 3			
3a)	Moist air at 310K has WBT of 300 K. The latent heat of vaporization of water at 300K is 2440KJ/kg, estimate the humidity of the air and the percentage relative humidity. The total pressure is 105KPa and the vapor pressure of water vapor at 300K is 3.60KPa and 6.33KPa at 310K.	(8)	CO 1, CO 2, CO 3, CO 4
	OR		
3b)	What is the importance of Adiabatic Saturation temperature (AST) and derive an expression relating Adiabatic Saturation temperature (AST) with absolute humidity and psychrometric ratio.	(8)	CO 1, CO 2, CO 3, CO 4
3c)	Describe the operating principle of cooling tower and classify the cooling towers and explain any one of them in details with neat sketch.	(8)	CO 1, CO 2, CO 3, CO 4
	OR		
3d)	Write a short notes on 1.Lewis relation	(8)	CO 1, CO 2, CO 3, CO 4

2. Psychrometric ratio

3. Wet Bulb Temperature

4. Approach and Range of cooling tower

Question No. 4

4a)	Write short notes on 1. Performance Diagram or Operating Characteristics of sieve Plate Column. 2. Types of packings and their characteristics	(8)	CO 1, CO 2

OR

4b)	Differentiate between tray column and packed column for gas-liquid mass Transfer.	(8)	CO 1, CO 2
4c)	Which are the various equipment used for gas-liquid contact in Mass transfer. Explain sparged vessel with neat sketch.	(8)	CO 1, CO 2

OR

4d)	Explain construction and working of any two of the following with neat sketch. 1. Venturi scrubber 2. Mechanically agitated vessel.	(8)	CO 1, CO 2

Question No. 5

5a)	Derive the equations for calculating constant rate of drying period and falling rate of drying period.	(8)	CO 1, CO 4

OR

5b)	A wet solid is to be dried from 20% to 10% moisture (wet basis) under constant drying conditions in 2 hours. If the equilibrium moisture content is zero. How long will it take to dry solids to 4% moisture under the same conditions? Assume that no constant rate period is encountered and falling rate period is linear.	(8)	CO 1, CO 4
5c)	Describe the rate of drying curve in drying operation in details with neat sketch.	(8)	CO 1, CO 4

OR

5d)	Discuss on the purpose of drying and the factors affecting rate of drying	(8)	CO 1, CO 4

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