CBCS SCHEME

USN | | | | | | | | | | |

18CH52

Fifth Semester B.E. Degree Examination, July/August 2021
Mass Transfer Operations – I

Time: 3 hrs. Max. Marks: 100

Note: ***1. Answer any FIVE full questions.***
2. Use of humidity chart permitted.

1 a. Define molecular and eddy diffusion state and explain Fick's law. **(10 Marks)**

b. Explain the classification of mass transfer operations based on phases in contact. **(10 Marks)**

2 a. Write short notes on:
i) Whitman's Film theory
ii) Penetration theory. **(10 Marks)**

b. Derive an expression for equimolar counter current diffusion in a gaseous system. **(10 Marks)**

3 a. Define the following terms:
i) Molal humidity
ii) Percent humidity
iii) Dew point
iv) Humid volume. **(08 Marks)**

b. With the help of neat sketches, explain the working of various cooling towers. **(12 Marks)**

4 a. The WBT and DBT of air are 313K and 333K respectively. Determine following using psychrometry chart
i) Absolute Humidity
ii) Percent Humidity
iii) Humid volume
iv) Enthalpy of wet air. **(10 Marks)**

b. Explain wet bulb and dry bulb temperature. **(10 Marks)**

5 a. Explain drying rate curve. Derive the equation to calculate total drying time. **(12 Marks)**

b. Define:
i) Equilibrium moisture
ii) Bound moisture
iii) Unbound moisture
iv) Critical moisture content. **(08 Marks)**

6 a. Explain the working of any one type of dryer with neat sketch. **(10 Marks)**

b. A batch of solids is to be dried from 25 to 6% moisture. The initial weight of wet solid is 160kg and the drying surface is $1m^2$/40kg dry weight. Determine the drying time. Use data for falling rate period.

X	0.2	0.18	0.16	0.14	0.12	0.1	0.09	0.08	0.07	0.064
10^3N	0.3	0.266	0.239	0.208	0.18	0.15	0.097	0.07	0.043	0.025

(10 Marks)

7	a.	List the various industrial adsorbents and their applications.	**(10 Marks)**
	b.	With a neat sketch, explain any one type of adsorber.	**(10 Marks)**
8	a.	Explain Langmuir and Freundlich adsorption isotherms.	**(12 Marks)**
	b.	Explain physical and chemical adsorption.	**(08 Marks)**
9	a.	Write a note on factors governing nucleation and crystal growth.	**(10 Marks)**
	b.	With a neat sketch, explain the working of any one type of crystallizer.	**(10 Marks)**
10		Write a short note on:	
	a.	Dialysis	
	b.	Reverse osmosis	
	c.	Ultra filtration	
	d.	Micro filtration.	**(20 Marks)**

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