

**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**

**Lesson plan**

**Semester: 5<sup>th</sup>. Semester**

**Subject: Mass Transfer I**

Lecture	Module	Topic
1	1	Introduction to Mass Transfer Operation
2	1	Molecular and Turbulent diffusion, Driving forces in mass transfer, Velocity, Mass and molar flux
3	1	Relation between mass and molar concentration, Laws of diffusion, Diffusivity
4	1	Determination of flux for a species A & B in binary mixture, Mutual diffusivity, Steady state molecular diffusion, Problems
5	1	Equimolar & non-equimolar counter diffusion of A & B, Problems
6	1	Measurement of gas phase diffusion co-efficient: Twin-bulb method, use of Stefan tube, analytical methods to determine gas phase diffusivity and related problems
7	1	Molecular diffusion in liquid: experimental methods of determination of liquid phase diffusion coefficient and analytical methods to determine liquid phase diffusivity and related problems
8	1	Knudsen, Surface and surface diffusion. Introduction of convective mass transfer and mass transfer coefficient
9	1	Types of mass transfer coefficients, relation between mass transfer coefficients with film thickness, Dimension less groups in mass transfer

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10	1	Theories of mass transfer
11	1	Mass transfer analogy, Introduction to Interphase mass transfer
12	2	Introduction to Absorption, Mass transfer between two phases, Two film theory, Determination of the Interfacial concentration.
13	2	Overall mass transfer coefficient
14	2	Steady state counter current mass transfer
15	2	Determination of number of stages in counter current contact
16	2	Analytical methods for the determination of number of ideal stages in absorption column
17	2	Number of ideal stages for steady state cross current contact
18	2	Solvent selection criteria, minimum liquid rate for absorption
19	2	Design of packed absorption column
20	2	Analytical method for determination of NTU, HETP
21	2	Tray efficiency, Types of absorption column and packing materials
22	2	Absorption Equipment and other fundamentals of absorption
23	3	Introduction to Distillation, VLE, Constant temperature and constant pressure binary equilibria
24	3	Raoult's law, Deviation from ideality, Relative volatility
25	3	Equilibrium in multicomponent system and related problems
26	3	Enthalpy concentration diagram
27	3	Flash distillation and its material balance
28	3	Steam distillation and differential distillation
29	3	Continuous multi stage binary distillation column material balance

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30	3	Determination of number of stages using Mc-Cabe-Thiele method
31	3	Smoker's equation, minimum reflux ratio, optimum and total reflux ratio
32	3	The Ponchon Savarit Method
33	3	Solving problems in distillation using Mc-Cabe-Thiele method
34	3	Solving problems in distillation using The Ponchon Savarit Method
35	4	Introduction to Humidification and de-humidification, terminologies, adiabatic saturation temperature
36	4	Wet bulb temperature, use of Psychometric chart
37	4	Atmospheric, Natural and Mechanical cooling tower
38	4	Structural components of cooling tower
39	4	Calculation of cooling tower
40	4	Problems related to cooling tower

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