INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

REVISION OF AN ELECTIVE COURSE

Course Title	**Mass transfer in industrial applications**	Course Code	ME5XXX			
Dept. / Specialization	Mechanical Engineering	Structure (LTPC)	3	1	0	4
To be offered for	UG / PG	Status	Core ☐		Elective ■	
Faculty Proposing the course	Dr. Raja B	Type	New ☐		Modification ■	
Recommendation from the DAC		Date of DAC	01-06-2021			
External Expert(s)	Prof S. P Venkateshan, IIT Madras and Prof Shaligram Tiwari, IIT Madras					
Pre-requisite	Heat transfer and fluid mechanics	Submitted for approval	45th Senate			
Learning Objectives	1. To enable the students to get familiarized with the concepts of mass transfer, its governing laws and analogies. 2. To apply the concepts of diffusion mass transfer, mass transfer coefficients, convective mass transfer, interphase mass transfer and solve relevant design problems in various fields.					
Learning Outcomes	1. The students will gain knowledge in mass transfer processes and its various performance 2. To leverage the concepts and design various mass transfer operations					
Contents of the course *(With approximate break up of hours)*	Mass Transfer Concepts, Composition Relationships, Fick's Law, Diffusion in Stationary medium, Mass Diffusion Equation, Mass transfer resistance, Boundary conditions, Binary Mixtures - Air-Water Vapor Mixture, Diffusion in moving medium - Stefans tube, Equimolar Counter diffusion - applications. (L8 + T2) Mass convection - Laminar and turbulent flow, Analogy between friction, heat and mass transfer coefficient - limitation - Transient Diffusion, Multiphase mass transfer and Multicomponent mass transfer - Application in surface treatment processes , moisture migration in building walls. (L10 + T4) Simultaneous heat and mass transfer – humidification and dehumidification, effectiveness, NTU relations - Application dry and wet coil, dryers, cooling towers, distillation tower - resistance networks - Sprays and Atomization - Spray Drying - Performance parameters - Solar drying and Desalination – Mass transfer measurement techniques (L10 + T4) Discontinuous Concentrations at Interfaces – Evaporation, Mass transfer in atmospheric drying, Sublimation - Vacuum freeze drying , vacuum cooling (L7+T2) Solubility of gases in Liquids and Solids - Catalytic Surface Reactions - Mass transfer in redox reactions - applications - Crystallization - Membrane separation (L7+T2)					
Text Books	1. Koichi Asano, Mass Transfer, Wiley, 1st Edition, 2006 2. T.L. Bergman, A.S. Lavine, F.P. Incropera and D. P. Dewitt, Fundamentals Of Heat And Mass Transfer, Seventh Edition, John Wiley ,2011					
Reference Books	1. R.E. Treybal , Mass-Transfer Operations, 3rd Edition, McGraw-Hill Book Company,1980 2. D.Basmadjian Mass Transfer - Principles And Applications, CRC, 2005 3. A.S.Mujumdar, Handbook of Industrial Drying, Fourth Edition, CRC, 2014					