

CHEMICAL 3

## Design and Analysis of Liquid Air Membrane Energy Exchanger (LAMEE)

Unit: I  
Introduction - Types of HVAC technologies - Definitions and Concepts about LAMEE and Membrane Energy Exchanger (RAMEE); Types of LAMEE: Flat Plate; Hollow Fiber LAMEE

Unit: II  
Construction of LAMEE and RAMEE, Performance of LAMEE: Effectiveness, Moisture Removal rate, Flow configuration, Liquid Air Channel Design, Steady state Performance and Transient Performance, Flow mal-distribution of LAMEE

Unit: III  
Membrane properties and Selection: Vapor Diffusion Resistance - Liquid Penetration Pressure, Membrane Porosity and Tortuosity Factor, Selection of Desiccant

Unit: IV  
Scaling methodology: Small scale Energy and small scale test facility- Small Scale Single Panel LAMEE- Single Panel Energy Exchanger Test (SPEET); Model Formulation of RAMEE; Modeling the energy exchanger: Numerical modeling, Numerical Effectiveness. Results; Testing full scale LAMEE.

Unit: V  
Economics: Applications of RAMEE in office buildings, Hospital, Hybrid Liquid Desiccant Air Conditioner, Automotive Hybrid Liquid Desiccant Air Conditioners; Indoor Air Quality - Environmental Impacts.

### References:

1. Richard. W. Baker, "Membrane Technology and Applications", 3rd Edition, John Wiley and Sons Limited, 2012.
2. Nóbrega, Carlos E. L., Brum, Nisio Carvalho Lobo (Eds.), "Desiccant-Assisted Cooling, Fundamental and Applications", Springer- Verlag London, 2014.
3. Cater Stanfield and David Skaves, "Fundamentals of HVACR", 2<sup>nd</sup> Edition Prentice Hall, 2012.
4. Warren Rohsenow, James P. Harenett and Young. I Cho, "Hand Book of Heat Transfer", 3<sup>rd</sup> Edition, McGraw-Hill Edition, 1998.