

**(AC203) HEAT AND MASS TRANSFER &
REFRIGERATION AND AIR CONDITIONING**

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UNIT I

Heat transfer mechanism and types. Conduction; Fourier's law, heat transfer through various geometries, steady state uni directional flow, insulation. Convection; natural and forced convection. Radiation; Stefan Boltzmann's law, Krichoff's law and Plank's law. Concepts of black body and grey body. Emissivity; shape factor.

UNIT II

Heat exchangers; parallel, counter and cross flow. Logarithmic mean temperature difference. Condensation heat transfer. Introduction to mass transfer, Fick's law of diffusion, steady state diffusion of gases and liquid through solids, Equimolal diffusion. Convective mass transfer, Analogy between heat, mass and momentum transfer, Application of mass transfer phenomena in food processing.

UNIT III

Principles of refrigeration, second law of thermodynamics applied to refrigeration, carnot cycle, reversed carnot cycle, coefficient of performance, unit of refrigeration. Refrigeration in food industry, types of refrigeration system, mechanical vapour compression, vapour absorption system, components of mechanical refrigeration, refrigerant, desirable properties of ideal refrigerant.

UNIT IV

Centrifugal and steam jet refrigeration systems, thermoelectric refrigeration systems, vortex tube and other refrigeration systems, ultra low temperature refrigeration, cold storages, insulation material, design of cold storages, defrosting. Thermodynamic properties of moist air, perfect gas relationship for approximate calculation, adiabatic saturation process, wet bulb temperature and its measurement, psychometric chart and its use, elementary psychometric process.

UNIT V

Air conditioning – principles- Type and functions of air conditioning, physiological principles in air conditioning, air distribution and duct design methods, fundamentals of design of complete air conditioning systems – humidifiers and dehumidifiers – cooling load calculations, types of air conditioners –applications.

TEXT BOOKS:

1. Ballaney, P.L. (1980). Refrigeration and Air Conditioning. Khanna Publishers, Delhi- 6. P 765.
2. Arora, C.P. (1981). Refrigeration and Air Conditioning. . Tata- McGraw Hill Publishing Co., New Delhi. P.710.
3. Arora, S.C and Domkundwar, S. (1984). A Course in Heat & Mass Transfer (3 ed.). Dhanpat Rai & Sons, Delhi.
4. Ballalny,P.L. (1980). Thermal Engineering (14 ed.). Khanna Publishing, Delhi.
5. Geankoplis, C.J. (1997). Transport Processes and Unit Operations. Prentice Hall of India, New Delhi.

6. Holman, J.P. (1989). Heat Transfer S.I. Metric Edition. McGraw Hill Book Company Ltd., New Delhi.

REFERENCE BOOKS:

1. Jordoan and Prister. (1973). Refrigeration and Air Conditioning. Prentice- Hall of India, New Delhi.
2. Kapoor, H.R. (1983). Thermal Engineering (Vol. 1). Tata McGraw Hill Pub. Co. Ltd., New Delhi.
3. Khurmi R. S. and Guptha J. K. (2004). A text book of Refrigeration & Air conditioning. Eurasia Publishing house (P) Ltd. New Delhi.
4. Patel, R.C. (1970). Refrigeration and Air Conditioning. Acharya Book Depot. Baroda.
5. Treybal, R.E. (1981). Mass transfer Operation. McGraw Hill Book.