

AMFT12 FUNDAMENTALS OF HEAT AND MASS TRANSFER

UNIT-1 HEAT TRANSFER- CONDUCTION

- 1.1 Basic transfer processes- heat, mass and momentum- heat transfer process
- 1.2 Conductors and insulators- conduction- Fourier's fundamental equation
- 1.3 Thermal conductivity and thermal resistance- linear heat flow
- 1.4 Heat transfer through homogeneous wall, composite walls,
- 1.5 Radial heat flow through cylinders and sphere- extended surfaces (fins)
- 1.6 Solving problems in heat transfer by conduction.

UNIT-2 HEAT TRANSFER- CONVECTION

- 2.1 Newton Rikhman's law- film coefficient of heat transfer
- 2.2 Convection- free and forced convection
- 2.3 Dimensional analysis and its application
- 2.4 Factors affecting the heat transfer coefficient in free and forced convection heat transfer
- 2.5 Overall heat transfer coefficient- solving problems in heat transfer by convection.

UNIT-3 HEAT TRANSFER- HEAT EXCHANGER

- 3.1 Heat exchangers- parallel, counter and cross flow- evaporator and condensers
- 3.2 Logarithmic Mean Temperature Difference- overall coefficient of heat transfer
- 3.3 Tube in tube heat exchanger, shell and tube heat exchanger,
- 3.4 Plate heat exchanger- applications of heat exchangers- solving problems in heat exchangers.

UNIT-4 HEAT TRANSFER- RADIATION

- 4.1 Radiation heat transfer- concept of black and grey body
- 4.2 Monochromatic total emissive power
- 4.3 Kirchhoff's law- Planck's law- Stefan Boltzman's law
- 4.4 Heat exchange through non-absorbing media
- 4.5 Solving problems in heat transfer by radiation.

UNIT-5 MASS TRANSFER

- 5.1 Mass transfer- introduction
- 5.2 Fick's law for molecular diffusion - molecular diffusion in gases
- 5.3 Equimolar counter diffusion in gases and diffusion of gas A through non diffusing or stagnant B- diffusion through a varying cross sectional area and diffusion coefficients for gases
- 5.4 Molecular diffusion in liquids, biological solutions and gels.

References Books

- 1 Jacob and Hawkins. "Elements of Heat Transfer". John Willey and Sons Inc. New York, 1983
- 2 Eckert, E.R.G. "Heat and Mass Transfer". McGraw Hill Book Co., New York, 1981.