

# AMCH3 TRANSPORT PROCESSES

## UNIT-1 INTRODUCTION TO ENGINEERING PRINCIPLES AND UNITS

- 1.1 Classification of Unit Operations and Transport Processes,
- 1.2 SI System of Basic Units Used in This Text and Other Systems,
- 1.3 Methods of Expressing Temperatures and Compositions,
- 1.4 Gas Laws and Vapor Pressure, Conservation of Mass and Material Balances,
- 1.5 Energy and Heat Units, Conservation of Energy and Heat Balances,
- 1.6 Graphical, Numerical, and Mathematical Methods.

## UNIT-2 PRINCIPLES OF MOMENTUM TRANSFER AND OVERALL BALANCES

- 2.1 Fluid Statics,
- 2.2 General Molecular Transport Equation for Momentum,
- 2.3 Heat and Mass Transfer, Viscosity of Fluids,
- 2.4 Types of Fluid Flow and Reynolds Number,
- 2.5 Overall Mass Balance and Continuity Equation, Overall Energy Balance,
- 2.6 Overall Momentum Balance, Shell Momentum Balance and Velocity Profile in Laminar Flow,
- 2.7 Design Equations for Laminar and Turbulent Flow in Pipes, Compressible Flow of Gases.

## UNIT-3 PRINCIPLES OF MOMENTUM TRANSFER AND APPLICATIONS

- 3.1 Flow Past Immersed Objects and Packed and Fluidized Beds, Measurement of Flow of Fluids,
- 3.2 Pumps and Gas- Moving Equipment, Agitation and Mixing of Fluids and Power Requirements,
- 3.3 Non-Newtonian Fluids, Differential Equations of Continuity,
- 3.4 Differential Equations of Momentum Transfer of Motion,
- 3.5 Use of Differential Equations of Continuity and Motion,
- 3.6 Other Methods for Solution of Differential Equations of Motion,
- 3.7 Boundary- Layer Flow and Turbulence, Dimensional Analysis in momentum Transfer.

## UNIT-4 PRINCIPLES OF STEADY-STATE HEAT TRANSFER

- 4.1 Mechanisms of Heat Transfer,
- 4.2 Conduction Through Solids in Series,
- 4.3 Steady-State Conduction and Shape Factors, Forced Convection Heat Transfer Inside Pipes,
- 4.4 Heat Transfer Outside Various Geometries in Forced Convection,
- 4.5 Natural Convection Heat Transfer, Boiling and Condensation, Heat Exchangers,
- 4.6 Introduction to Radiation Heat Transfer, Advanced Radiation Heat Transfer Principles,
- 4.7 Heat Transfer of Non- Newtonian Fluids, Special Heat-Transfer Coefficients,
- 4.8 Dimensional Analysis in Heat Transfer,
- 4.9 Numerical Methods for Steady-State Conduction in Two Dimensions.

### Reference Books:

1. Environmental Transport Processes by Bruce E Logan
2. Transport Processes in Space Physics and Astrophysics: Problems and Solutions (Lecture Notes in Physics) by Alexander Dosch and Gary P Zank