

AMCT05 UNIT OPERATIONS

UNIT-1 FLUID STATICS AND FLUID FLOW PHENOMENA

- 1.1 Fluid statics- hydrostatic equilibrium,
- 1.2 Applications of fluid statics
- 1.3 Manometer, gravity & centrifugal decanter, Fluid flow phenomena- laminar flow,
- 1.4 Rheological properties of fluids, turbulence, boundary layers.

UNIT-2 FLUID FLOW EQUATIONS AND FLOW PAST IMMERSED SOLIDS

- 2.1 Fluid flow equation
- 2.2 Mass balance in a flowing fluid,
- 2.3 Mechanical energy equation for flowing fluid,.
- 2.4 Flow past immersed solids, Drag and drag coefficient,
- 2.5 Flow through a bed of solids, motion of particles through fluids.

UNIT-3 CONDUCTIVE AND CONVECTIVE HEAT TRANSFER

- 3.1 Conductive heat transfer- basic laws of conduction,
- 3.2 Steady state conduction, unsteady state conduction.
- 3.3 Convective heat transfer- typical heat transfer equipment's, energy balance,
- 3.4 Heat flux and heat transfer coefficient, heat transfer by forced convection in laminar flow,
- 3.5 Turbulent flow and transition region between laminar and turbulent flow, natural convection.

UNIT-4 RADIATIVE HEAT TRANSFER

- 4.1 Emission of radiation, absorption of radiation by opaque bodies, radiation between surface,
- 4.2 Radiations to semitransparent materials,
- 4.3 Combined heat transfer by conduction, convection and radiation.

UNIT-5 BASICS OF MASS TRANSFER OPERATIONS

- 5.1 Diffusion- theory of diffusion, prediction of diffusivities, transient diffusion,
- 5.2 Humidification operation- definition, humidity chart, wet bulb temperature.
- 5.3 Drying of solids- classification of dryers,
- 5.4 Solids handling in dryer, principles of drying,
- 5.5 Cross circulation drying, through circulation drying, freeze drying,
- 5.6 Drying equipment's for solids, pastes, solutions and slurries.
- 5.7 Crystallization- crystal geometry,
- 5.8 Super saturation, mechanism of crystallization.
- 5.9 Basic problems on material balance.

References Books:

1. Perry R.H and Green D (eds), Perry's Chemical Engineers' Handbook, 6th Edn., McGraw-Hill, New York, 1984.
2. Walas S.M, Chemical Process Equipment, Butterworths, Stoneham, MA, 1988.
3. Treybal R.E, Mass Transfer Operations, 3rd Edn., McGraw-Hill, New York, 1980.