

2.9 40186 HEAT MASS TRANSFER

UNIT-1 MODES OF HEAT TRANSFER

1.1 Conduction, convection & radiation.

UNIT-2 CONDUCTION

2.1 Fourier's law, Thermal conductivity,

2.2 Conductance, flat Wall, Multilayer flat wall,

2.3 Hollow Cylinder, Multilayer cylinder log mean area, geometric mean area & Arithmetic Mean Area,

2.4 Simple numerical problems in S.I. Units.

UNIT-3 CONVECTION

3.1 Natural and forced convection, Physical significance of dimension less number.

3.2 Reynolds No, Paddle No, Nusselt No, Stanton No., Peclet No., Grashoff No,

3.3 Dittus Belter's Equation-simple numerical problems using Dittus Belter equation.

3.4 Fouling factor.

3.5 Individual heat transfer coefficient and over all heat transfer coefficient.

UNIT-4 RADIATION

4.1 Reflection, absorption and transmission of radiation,

4.2 Kirchhoff law, Emissive power,

4.3 Wein's displacement law, the stefen Boltman law,

4.4 Heat transferred by radiation exchange of energy between two parallel planes of difference emissivity,

4.5 Radiant Heat transfer coefficient, solar radiation, gray surfaces or gray body.

UNIT-5 HEAT EXCHANGERS

5.1 Log.-Mean-temp.-Difference (L.M.T.D.) for parallel or concurrent - flow,

5.2 Counter current-flow, cross - flow,

5.3 Construction and description of

5.3.1 Double pipe heat exchangers.

5.3.2 Shell & Tube heat exchanger.

5.3.3 Finned tube heat exchangers. Scale formation and cleaning devices, Wilson's plot (Simple Numerical Problems).

5.3.4 Plate type heat exchanges.

UNIT-6 CONDENSER

6.1 Film-wise and Drop-wise condensation.

6.2 Construction & description of contact condenser and surface condenser.

UNIT-7 EVAPORATORS

7.1 Construction and description of

7.1.1 Horizontal tube types.

7.1.2 Standard vertical type or calendric type.

(a) Natural and forced circulation type.

(b) Entrainment and foam formation.

(c) Method of feeding evaporators-Forward, Backward & cross, mixed multi effect evaporation.

7.2 Boiling Nuclear boiling, film boiling, Transition boiling,

7.3 Maximum flux and critical temperature drop, construction & description of Kettle type boilers.

7.4 Boiling point rise (B.P.R) and effect, steam economy for single effective evaporator (Simple Numerical Problem).

UNIT-8 CRYSTALLIZERS

8.1 Classification of crystallizers; construction and description of

8.2 Swensen walker

8.3 Vacuum crystalizer.

UNIT-9 INSULATION

9.1 Purpose of insulation common insulators,

9.2 critical thickness of insulation for cylinder and spheres, optimum thickness of insulation,

9.3 Heat loss from a pipe.

Reference Books:

1. Heat Transfer by D. Q. Kern
2. Unit Operating in Chemical Engineering by Mc Cabe & Smith
3. Introduction to Chemical Engineering by Badger & Bancaro

