

CH 201 PROCESS CALCULATIONS

CREDITS = 4 (L = 4, T=1)

1. **Review of mathematical principles:** Extrapolation, graphs, graphical integration, differentiation and solutions of equations. Review of units, dimensions & dimensional analysis.
2. **Properties of gases, liquids and solids:** Ideal and real gases; Critical properties; properties of mixtures and solutions, phase Equilibria.
3. **Material balances:** Concept of limiting and excess reactant; tie-elements. Material balances without chemical reactions – including recycle, bypass and purging etc – in stage wise and continuous operations. Material balance with chemical reactions. Material balance and unit operations.
4. **Energy Balances:** Concept of heat, work, energy and enthalpy; Heats of formation, combustion, dilution, etc ; and Effect of temperature and pressure thereon. Energy balances for the systems with and without chemical reactions.
5. Unsteady state material and energy balances,
6. **Application of computers in Process calculations:** Programming languages. Roots of equations, simultaneous linear equations, numerical integration and differentiation. Solutions of ODE.
7. **Fuels and combustion:** Solids, liquids and gaseous fuels, calorific value of fuels, theoretical and excess air requirement; combustion calculations.

REFERENCE BOOKS:

Title: Basic Principles and Calculations in Chemical Engineering
Author: David H Himmelblau
Publisher: Prentice Hall of India, 6th edition.

Title: Chemical Process Principles Part-I
Author: O A Hougen and K M Watson
Publisher: John Wiley and Asia Publishing

Title: Stoichiometry (3rd edition)
Author: B I Bhatt and S M Vora
Publisher: Tata McGraw Hill

Title: Chemical Engineering – Vol IV
Author: Backhurst & Harker
Publisher: (Problems and solutions in SI units)