

PCE5J002 PROCESS SIMULATION AND MODELLING

Module I:

Modeling: Fundamentals of mathematical models and formulation – Continuity equation, Equation of motion, Transport equations, Energy equation, Equations of state, Equilibrium, Chemical kinetics and their applications; Lumped and distributed parameter models – Fluid systems, C.S.T.R. (single, series, isothermal, constant hold up, variable hold up, gas phase pressurized and non-isothermal), Single component vaporizer, Multi-component flash drum, Batch reactor, Reactor with mass transfer, Ideal binary distillation column, Batch distillation, Heat exchanger, etc.

Module II:

Optimization: Single variable optimization (analytical, dichotomous search, fibonacci, golden section, regufalsi), Multivariable optimization (analytical, geometric programming, linear programming), Convergence methods (Newton's methods, direct substitution, Wegstein's method).

Module III:

Simulation: Techniques of digital simulation – Information flow, from process to information flow diagram, From information flow diagram to numerical form, Recycles, Calculation of a recycle set, etc.

Text Books:

1. *Process Modeling, Simulation, and Control for Chemical Engineers*, 2nd ed. by W L Luyben, McGraw-Hill.

Reference Books:

1. *Process Plant Simulation* by B V Babu, Oxford University Press.
2. *Engineering Optimization: Theory and Practice* by S S Rao, New Age.
3. *Process Control: Modeling, Design and Simulation*, 1st ed. by B W Bequette, PHI.
4. *System Modeling and Simulation: An Introduction* by FLSeverance, Wiley.