

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B.E. SEMESTER : VIII

### CHEMICAL ENGINEERING

Subject Name: **CHEMICAL SYSTEM MODELING**

| Sr. No. | Course Contents   | Total Hrs |
|---------|---|-----------|
| 1.      | <b>Introduction of Modeling:</b><br>Introduction to chemical Engg system models, Model development procedure: system analysis, modeling, simplification of model, solution and validation. Modeling Aspects: Deterministic Versus Stochastic Process, Deterministic Process, Stochastic Process, Physical Modeling, Mathematical Modeling   | 3         |
| 2.      | <b>Classification of Mathematical Modeling:</b><br>Independent and Dependent Variables, and Parameters, Classification based on Variation of Independent Variables, Distributed parameter Models, Lumped Parameter Models, Classification based on the State of the Process, Static Model, Dynamic Model, The complete Mathematical Model, Classification Based on the Type of the Process, Rigid or Deterministic Models, Stochastic or Probabilistic Models, Comparison between Rigid and Stochastic Model. | 6         |
| 3.      | <b>Models in Mass-Transfer Operations:</b><br>Steady-state Single-stage Solvent Extraction, Steady-state Two-stage Solvent Extraction, Steady-state N-stage Counter-current Solvent Extraction  | 3         |
| 4.      | <b>Models in Heat –transfer Operations:</b><br>Counter current Cooling of Tanks, Temperature Distribution in a Transverse Cooling fin of Triangular Cross-Section, Unsteady-state heat Transfer in a Tubular Gas Pre heater, Heat loss through pipe flanges.  | 30        |
| 5.      | <b>Models in Fluid-flow Operations:</b><br>Laminar flow in a Narrow slit, The Continuity Equation, Concentration Profile and Temperature of fixed bed catalytic Reactor.  | 12        |

**Text book:**

Process Plant Simulation --- B.V.Babu,Oxford University Press(publisher)

**Reference Books:**

1. Applied Mathematics in Chemical engg---- Mickley, Sherwood & Reed.
2. Mathematical methods in Chemical engg---- Jenson & Jeffereys
3. Systematic Methods of Chemical Process Design, Lorens T. Biegler , E.Ignacio grossmann, Arthur W Westerberg, Prentice Hall International,Inc
4. Process Modeling and Simulation by Lyuben