

# GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Chemical Engineering

Subject Name: **Computer Aided Design**

**Detailed Process Synthesis - Algorithmic Methods:**

| Sr. No | Course Content  | Total Hrs. |
|--------|---|------------|
| 1.     | <b>The Design Process-</b><br>Design Opportunities, Steps in Product Process Design, Environmental Protection, Safety Considerations, Engineering Ethics, Role of Computers. Reactor Design and Reactor Network Synthesis- Objectives, Reactor Models, Reactor Design for Complex Configurations, Reactor Network Design Using the Attainable Region.                           | 12         |
| 2.     | <b>Synthesis of Separation Trains-</b><br>Objectives, Criteria for Selection of Separation Methods, Selection of Equipment, Sequencing of Ordinary Distillation for the Separation of Nearly Ideal Fluid Mixtures, Sequencing of Operations for the Separation of Non-ideal Fluid Mixtures, Separation Systems for Gas Mixtures, Separation Sequencing for Solid-Fluid Systems. | 15         |
| 3.     | <b>Heat and Power Integration-</b><br>Objectives, Minimum Utility Targets, Networks for Maximum Energy Recovery, Minimum Number of Heat Exchangers, Threshold Approach Temperature, Optimum Approach Temperature, Superstructures for Minimization of Annual Costs, Multiple Utilities, Heat-integrated Distillation Trains, Heat Engines and Heat Pumps.                       | 30         |
| 4.     | <b>Optimal Design and Scheduling of Batch Processes-</b><br>Objectives, Introduction, Design of Batch Process Units, Design of Reactor-separator Processes, Design of Single Product Processing Sequences, Design of Multi-Product Processing Sequencing.   | 15         |

## Text Book:

1. Warren D. Seider, J. D. Seader, Daniel R. Lewin, "Product and Process Design Principles: Synthesis, Analysis, and Evaluation", 2nd Edition, Wiley(2003)
2. Systematic Methods of Chemical Process Design by Lorens T Biegler, E. I. Gnacio Grossmann Arthur W Westerberg, PHI International.

## References Books:

1. T.F. Edgar and D.M. Himmelblau, "Optimization of Chemical Processes", Chemical Engg. Series, McGraw Hill
2. Richard G. Brereton, "Chemometrics: Data Analysis for the Laboratory and Chemical Plant", April 2003 Wiley