GUJARAT TECHNOLOGICAL UNIVERSITY

M.E SEMESTER: 1II

CHEMICAL ENGINEERING (CAPD)

Subject Name: **Computer Aided Product and Process Design (Major Elective – IV)**

Sr. No	Course content
1.	**Product and Process Design:** Steps in Product and Process Design, Environment Protection, Safety Considerations, Engineering Ethics, Process Creation, preliminary database creation and process synthesis, development of base-case design, simulation to assist process creation, heuristics for process synthesis, Equipment Sizing and Costing.
2.	**Design and Scheduling of Batch Processes:** Single product batch plants, Multiple product batch plants, Transfer policies, Parallel units and intermediate storage, Sizing of vessels in batch plants, Inventories, Synthesis of flow shop plants
3.	**Optimal design and scheduling of multi-product batch plants:** Constraints for flow shop plants, MINLP design model for flow shop plants, MILP reformulation for discrete sizes, NLP design model-Mixed product campaigns, Cyclic scheduling in flow shop plants
4.	**Geometric Techniques for the Synthesis of Reactor Networks:** Graphical techniques for simple reacting system, Geometric concept for attainable regions, Reaction invariants and reactor network synthesis.
5.	**Optimization Techniques for Reactor Network Synthesis:** Reactor Network Synthesis with targeting formulation, Non-isothermal systems, Improvement to the targeting algorithm, Reactor Network Synthesis in process flow sheets, Energy integrating in reactor networks.
6.	**Synthesis and Optimization of Distillation Sequences:** Goal of system design, Minimum vapour flows, Marginal vapour flows, Liner model for sharp split columns, MILP model for distillation sequences, MILP model for continuous and discrete temperature, Design and synthesis with rigorous models.
7.	**General concept of Simulation for Process Design:** Introduction, Process Simulation Modes, methods for solving Non linear equations, recycle partitioning and tearing, simulation examples.
8.	**Process Flow Sheet Optimization:** Constrained non-linear programming, successive quadratic programming, process optimization with modular simulators, equation oriented process optimization.

Reference Books:

1. Product and Process Design Principles
   Second Edition Warren D Seider, J. D. Seader, Daniel R Lewin
   Published by John Wiley and Sons,Inc.
2. Systematic Methods of Chemical Process Design
   Lorens T. Biegler , E.Ignacio Grossmann, Arthur W Westerberg
   Published by-Prentice Hall International,Inc