

22PCM404T					Petrochemical Process Synthesis and Intensification					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

### COURSE OBJECTIVES

- Understand the basic concepts of process synthesis.
- Enumerate the importance of product life cycle assessment.
- To familiarise the various concepts and techniques of process scheduling.
- To work out heat exchanger network design using pinch analysis.
- To elaborate process integration in petrochemical processes plants.

#### UNIT I: Basic concepts of process synthesis

10 Hr.

Basic concept in process synthesis. The synthesis step, Structure and synthesis of process flow diagrams. Product life cycles. Understanding process conditions.

#### UNIT II: Process synthesis and analysis

10 Hr.

Design and scheduling of batch processes, Gantt charts, transfer policies, sizing of vessels, inventories. Optimal design and scheduling of multiproduct batch plant

#### UNIT III: Process integration Tools

9 Hr.

Synthesis of heat exchanger networks. Pinch technology, Heat and power integration.

#### UNIT IV: Process intensification using integration tools

10 Hr.

Synthesis of distillation sequences, energy conservation in distillation, heat integration techniques in distillation. MILP model for distillation sequences.

Max. 39 Hr.

### COURSE OUTCOMES

On completion of the course, student will be able to

- CO1:** Comprehend concepts of Process synthesis.
- CO2:** Enumerate synthesis of process flow sheet.
- CO3:** Design and optimization of batch process.
- CO4:** Analyses heat exchanger networks.
- CO5:** Comprehend Pinch Technologies.
- CO6:** Optimize distillation sequences for energy economy.

### TEXT/REFERENCE BOOKS:

1. Smith, Robin. Chemical Process: Design and Integration. John Wiley & Sons, 2005.
2. Biegler, Lorenz T., Ignacio E. Grossmann, and Arthur W. Westerberg. "Systematic Methods for Chemical Process Design." 1997.
3. W.D. Seider, J.D. Seader, D.R. Lewin, 'Product and Process Design Principles', 2nd Ed, Wiley 2004.
4. Majoji, Thokozani. Batch Chemical Process Integration: Analysis, Synthesis and Optimization. Springer Science & Business Media, 2010.
5. Ulrich, Gael D. A Guide to Chemical Engineering Process Design And Economics. New York: Wiley, 1984.

### END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

Part A: 10 Questions each carrying 5 marks

50 Marks

Part B: 5 Questions each carrying 10 marks

50 Marks