UCH801 PROCESS ENGINEERING AND PLANT DESIGN

	L	T	P	Cr
	3	1	0	3.5

Course Objectives:
To provide comprehensive knowledge of various process parameters and economics involved in the development of process and plant design.

Basic Concepts: General design considerations, Process design development, Layout of plant items, Flow sheets and PI diagrams, Economic aspects and Optimum design, Practical considerations in design and engineering ethics, Degrees of freedom analysis in interconnected systems, Network analysis, PERT/CPM, Direct and Indirect costs, Optimum scheduling and crashing of activities.

Flow-sheetSynthesis: Propositional logic and semantic equations, Deduction theorem, Algorithmic flow sheet generation using P-graph theory, Sequencing of operating units, Feasibility and optimization of flow sheet using various algorithms viz, Solution Structure Generation (SSG), Maximal Structure Generation (MSG), Simplex, Branch-and-bound.

Analysis of Cost estimation: Factors affecting Investment and production costs, Estimation of capital investment and total product costs, Interest, Time value of money, Taxes and Fixed charges, Salvage value, Methods of calculating depreciation, Profitability, Alternative investments and replacements.

Optimum Design and Design Strategy: Break-even analysis, Optimum production rates in plant operation, Optimum batch cycle time applied to evaporator and filter press, Economic pipe diameter, Optimum insulation thickness, Optimum cooling water flow rate and optimum distillation reflux ratio.

Course Learning Outcomes (CLO):

Upon completion of this course, the students will be able to:

1. apply various algorithms to synthesize a process flow sheet.
2. calculate different costs involved in a process plant.
3. calculate interest and time value of investments.
4. measure profitability on investments.
5. perform breakeven analysis and optimum design of a process.

Text Books:
1. *Peters, M.A. and Timmerhaus, K.D., Plant Design and Economics for Chemical Engineers, McGraw Hill (2003).*

Reference Books:
1. *Anil Kumar, Chemical Process Synthesis and Engineering Design, Tata McGraw Hill (1982).*
2. *Ulrich, G.D., A Guide to Chemical Engineering Process Design and Economics, John Wiley & Sons (1984).*

Evaluation Scheme:

S. No.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	45
3	Sessional (May includes tutorials/ assignments/ quiz's etc)	25