

INSTITUTE	DIPLOMA STUDIES
PROGRAM	DIPLOMA ENGINEERING (CHEMICAL ENGINEERING)
SEMESTER	6
COURSE TITLE	CHEMICAL ENGINEERING PLANT ECONOMICS
COURSE CODE	09CH2602
COURSE CREDITS	5

Objective:

- 1 To understand various design and development of plant with cost calculation and analysis of profitability in chemical process industries

Course Outcomes: After completion of this course, student will be able to:

- 1 To Know and understand basic economic concept and apply this concepts in the project works undertaken and to chemical engineering situation by solving problem
- 2 To Know, understand and Select appropriate process for a project Differentiate the equipment and able to prepare specification sheet
- 3 Evaluate cost including capital investment, product cost, breakeven point, depreciation cost for equipment and the total project cost and solve problem on profitability and replacement analysis

Pre-requisite of course: Basic concepts of Chemical Engineering and its equipments and different unit operations.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	2	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction Role of chemical engineers, Need for plant design, Process design, basic for good design	4
2	Project Development Objective of plant Project, Process evolution stages and their importance, Pilot plant formation, Technical factors, Economic Factors, Legal phases	6
3	Process Design Selection of Process, Continuous v/s Batch Processing, shift and operating Schedule, Types of flow diagram, block diagram, Material and Energy Balance.	6

Contents : Unit	Topics	Contact Hours
4	Selection Process Equipment and materials Selection of material and process equipments, selection of pumps and dryers.	6
5	Plant location and Layout Factors to be considered in plant and site location, Primary factors, Specific factors, principles of plant layout, factors methods for plant layout, unit area concept, Two-dimensional layout, scale models	4
6	Economic Evaluation of Project Capital and Fixed cost, Working capital investment, Depreciation, Methods for determining depreciation, total product cost, Utilities, maintenance and repairs cost, Net and gross earnings, Profitability analysis, Percent Return on investment, Payout time, Break Even chart, Turn Over Ratio,	8
7	Optimum design Procedure for determining optimum stage, Optimum economic design for insulation thickness, pipe diameter, Optimum Operation Design, Process Auxiliaries .	8
Total Hours		42

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Tutorial 01 Preparation of Block Diagram.	4
2	Tutorial 02 Preparation of flow diagram..	4
3	Tutorial 03 Material balance and energy balance calculation.	4
4	Tutorial 04 Prepare specification sheet for Heat Exchanger.	4
5	Tutorial 05 Prepare specification sheet for Distillation column.	3
6	Tutorial 06 Problem based on cost calculation.	3
7	Tutorial 07 Problem based on finding out break even point..	3
8	tutorial 08 Problems based on finding out optimum value.	3
Total Hours		28

Textbook :

- 1 “Plant design and Economics for Chemical Engineers”, M.S. Peters and Timmerhaus, McGraw Hill 3rd Edition , 2003

References:

- 1 Chemical Engg. Plant Design.” , Chemical Engg. Plant Design.” , Vibrant and Dryden., McGraw-Hill,, 1959

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
40.00	40.00	10.00	10.00		

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <https://www.digimat.in/nptel/courses/video/103107207/L01.html>