

22PCM403T					Economics, Utilities and legal aspects of petrochemical Process Plants					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		TotalMarks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To introduce concepts of cash flow and sources of investment and estimation of capital investment.
- To elaborate components of total product cost and to explain total product cost estimation.
- To illustrate depreciation calculation and profitability analysis of investments.
- To explain the various process utilities requirements and construction working of utility equipment and optimum usage of utilities.
- To familiarize laws and regulations related to process Industries.

Unit I: Cost Estimation

10 Hr.

Cost estimation: Cash flow and cumulative factors affecting estimation of investment and production cost, breakeven point and its significance, total capital investment, fixed and working capital investment & their estimations, type of estimates, cost indexes, method for estimating capital investment. Simple and compound interest.

Estimation of total product cost: manufacturing cost, general expenses, Manufacturing cost: direct production cost, fixed charges, plant overhead cost.

UNIT II: Depreciation

10 Hr.

Types of depreciation, Method for determining depreciation: straight line method, decline balance method, sum of the year digit method, shrinking fund method etc., single unit and group depreciation, adjustment of depreciation account, evaluation of depreciation methods.

Profitability, alternative investments and replacement: Methods for profitability evaluation, Evaluation of Break Even Point, % rate of return, Practical factors in alternative investment and replacement Studies

UNIT III: Process Utilities

10 Hr.

Process auxiliaries and Process utilities: Piping design, layout, and supports for piping insulations. Pipe fittings, types of valves, selection of valves, process control and instrumentation control system design. Process water, boiler feed water, water treatment, waste treatment and disposal, steam, oil heating system, chilling plant, compressed air and vacuum.

Unit IV: Legal Aspects

9 Hr.

International laws on take – back laws, extended responsibility, and Ecolabeling, Examples from pharmaceuticals, foods, cosmetics, packaging, computers, polymers, automobiles and electronics industry. Industrial Case Studies.

Max. 39 Hr.

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1 : Estimate fixed capital working capital and Total Capital investments required for industrial establishments

CO2 : Calculate total product cost from manufacturing expenses and overhead costs of manufacturing

CO3 : Interpret depreciation charges for various equipment's using allowable methods of depreciation

CO4 : Chose alternative equipment's and process by profitability analysis

CO5 : Utilize effectively process utilities and auxiliary equipment's effectively

CO6 : Adapt industrial regulations and laws effectively for the betterment of society

TEXT/REFERENCE BOOKS:

1. Peters, Max S., and Klaus D. Timmerhaus. *Plant Design and Economics for Chemical engineers*. McGraw-Hill International, 2018.
2. Broughton, Jack, ed. *Process Utility Systems: Introduction to Design, Operation, And Maintenance*. IChemE, 1994.
3. Higgins, Rosalyn. *Problems And Process: International Law and How We use It*. Oxford University Press, 1995.
4. Towler, Gavin, and Ray Sinnott. *Chemical Engineering Design: Principles, Practice and Economics of Plant and Process Design*. Butterworth-Heinemann, 2021.
5. Couper, James R., W. Roy Penney, James R. Fair, and Stanley M. Walas. *Chemical Process Equipment: Selection and Design*. Gulf professional publishing, 2005.
6. Silla, Harry. *Chemical Process Engineering: Design and Economics*. CRC Press, 2003.
7. F.C. Vibrandt and C.E. Dryden, "Chemical Engineering Plant Design", McGraw Hill, Volume 5
8. Roger Hunt and Ed Bausbacher, *Process Plant layout and Piping Design*, Prentice-Hall Inc, 1990
9. S.K. Shukla, "Enviro Hazards and Techno Legal Aspects", Shashi Publications, Jaipur, 1993.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Part A: 10 Questions each carrying 5 marks

Part B: 5 Questions each carrying 10 marks

Exam Duration: 3 Hrs.

50 Marks

50 Marks