CHEMICAL PLANT DESIGN AND ECONOMICS

Course Code: 15CH1128

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Course Outcomes :

At the end of the Course, the Student will be able to:

CO 1 Recognize the economic implications involved in developing a plant design project.

CO 2 Analyze variety of designs for a process by securing all pertinent information through different sources.

CO 3 Identify the importance of health, safety, loss prevention and environmental considerations along with other items like plant location, layout, operation and control, utilities etc while design development.

CO 4 Apply the principles of accounting viz. cost estimation, computation of taxes, interest on investment, depreciation etc. to the plant design project successfully.

CO 5 Calculate different investment alternatives, in terms of their profitability to choose the most economical among them.

UNIT-I **(6 Lectures)**

Introduction, Process Design development.

UNIT-II **(8 Lectures)**

General design considerations, Cost and asset accounting.

UNIT-III **(12 Lectures)**

Cash flow for industrial operations, factors effecting investment and production cost, capital investments, estimation of capital investments, cost indices, cost factors in capital investment.

Organizations for presenting capital investment: estimates by compartmentalization, estimation of total product of cost direction, production costs, fixed charges, plant overhead costs, financing.

Interest and investment cost, types of interests, nominal and effective interest rates, continuous interest, present worth and discount, annuities, cost due to interest on investment, source of capital.

UNIT-IV (10 Lectures)

Taxes and insurances, type of taxes: federal income taxes, insurance-types of insurance, self insurance. Depreciation: types of depreciation, service life, salvage value, present value, methods for determining depreciation, single unit and group depreciation

UNIT-V (14 Lectures)

Profitability, alternative investments and replacements: Profitability standards, discounted cash flow, capitalized cost, pay out period, alternative investments, analysis with small investment increments and replacements.

Optimum design and design strategy, incremental cost, general procedure for determining optimum condition, comparison of graphical and analytical methods, optimum production rates, semi continuous cyclic operation, fluid dynamics, mass transfer.

TEXT BOOK:

Peters. M.S. and Timmerhaus, K.D., "Plant Design and Economics for Chemical engineering", 4th Edition, McGraw Hill, Singapore, 1991.

REFERENCES:

1. Schweyer. H.E., "Process Engineering Economics", McGraw Hill, New York, 1955.
2. Edgar T.F. and Himmelblau D.M., "Optimization of Chemical Processes" 2nd Ed, McGraw Hill, International editions, Chemical Engineering series, 2001.