

# 17FT016 PLANT LAYOUT AND PROCESS ECONOMICS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WARA	SSH/HS	CS	SA	S	BS
45	15	-	15	30	-	5	5	-

## Course Description and Objectives:

- To enable the student to understand the various factors involved in the site selection and design of food plant layout. To enable the students learn the concept of preparing cost estimate and economics. To understand the importance HACCP and food safety laws governing food industries

## Course Outcomes:

- The student will gain knowledge to design and setting up of new food processing plant as Entrepreneur and/or consultant.
- The student can prepare cost estimate and economic analysis of food industry.
- The student can implement the food safety standards in food industries.

## SKILLS:

- ✓ Proficient in layout designing of a food processing plant.
- ✓ Expert in estimation of cost and economic analysis of food industry
- ✓ Implementation of food safety standards in food processing plant

#### UNIT-I

Basic concepts of plant layout and design with special reference to food process industries. Application of HACCP concept, ISO, FPO & MPO requirements in food plant layout and design. Design considerations for location of food plants. Basic understanding of equipment layout and ventilation in food process plants. Preparation of flowsheets for material movement and utility consumption in food plants.

#### UNIT-II

Plant layout and design of bakery and biscuit industries. Plant layout and design of fruits and vegetables processing industries including beverages. Plant layout and design of milk and milk products. Miscellaneous aspects of plant layout and design like provision for waste disposal, safety arrangements etc.

#### UNIT-III

Introduction to economics: Meaning, scope, and contribution to business decisions. Analysis of Demand: Law of demand, Utility function, Rate of commodity substitution, Maximization of utility, Demand functions, Indifference curve analysis, Substitution and income effects. Market demand and demand elasticities: concept of market demand, price and income elasticities of demand, importance of elasticity. Demand forecasting: causes and techniques of demand forecasting.

#### UNIT-IV

Analysis of supply and market equilibrium: Law of supply, price elasticity of supply, equilibrium of demand and supply. Theory of the Firm: Production function, returns to scale, Optimizing behavior, Input demands, Cost functions, Profit maximization, economics & diseconomies of scale, break even analysis. Market structures perfect competition: Profit maximization and equilibrium of firm and industry, Short run and long run supply curves; Price and output determination, practical applications.

#### UNIT-V

Plant maintenance program; Role of maintenance staff and plant operators Preventive maintenance; Guidelines for good maintenance & safety precautions; Lubrication & lubricants; Work place improvement through '5S'. Hygiene and sanitation requirement in food processing and fermentation industries; CIP methods, sanitizing & disinfection, pest control in food processing; storage and service areas.

#### TEXT BOOKS:

1. Peters and Timmehaus, Plant Design and economics for chemical Engineers, 4th Ed., McGraw-Hill, Inc., (1989).
2. D G Rao, Fundamentals of Food Engineering, Prentice-Hall of India, New Delhi (2010)
3. D N Dwivedi : Engineering Economics, Vikas.
4. Plant design and economics for chemical engineers- Peters and Timmerhans, McGraws- Hill.
5. Basic Concepts of Industrial Hygiene, Ronald M Scott, CRC Press

#### REFERENCE BOOKS:

1. P A Samuelson & W D Nordhans : Economics: TMH.
2. James M Moore, "Plant Layout and Design", Mcmillan & Co., (1959)
3. Safety design criteria for industrial plants. Maurizio Cumo & Antonio Naviglia CRC Press.
4. J.M. Apple-Plant Layout and material handling – John Willey & Son (1977)

#### ACTIVITY:

- o Design a plant layout for mango juice processing industry.