

## **Food Processing Equipment and Plant Design**

**Theory**

<b>Paper</b>	<b>:</b>	<b>7.4</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Credits</b>	<b>:</b>	
<b>Teaching Period</b>	<b>:</b>	<b>4 theory + 1 student's presentation</b>

### **Objectives:**

- **To acquaint and equip the students with the design features of different food processing equipments used in the food industries**
- **To introduce the basic concept of process selection and food plant design management.**

**UNIT I:** Design operation in food equipments- definition and scope in industry. Design of machinery for sorting and grading, drying, freezing, size reduction, dry and wet separation, mixing, evaporation, condensation, membrane separation.

**UNIT II:** Plant design concepts and general design considerations: plant location, selection of materials of construction and standard components, design standards and testing standards. Human factors in design- Ergonomics, safety- OSHAS

**UNIT III:** Product and process design, process selection, process flow charts (bakery and dairy industry).

**UNIT IV:** Setting up a plant, estimation of capital investment, analysis of plant cost and profitability, General management techniques in plant operation, preparation of project report.

### **Practical in Food Processing Equipment and Plant Design**

<b>Maximum Marks</b>	<b>:</b>	<b>50</b>
<b>Credits</b>	<b>:</b>	
<b>Teaching Period</b>	<b>:</b>	<b>4/week</b>

### **Contents**

- 1) Design and drawing of mechanical dryers/ milling equipment/evaporators/ mixers/Fermenter/Freezer etc.
- 2) Each individual student will be asked to visit a food processing plant system and develop a plant design report which shall include product identification and selection, site

selection, estimation of plant size, process and equipment selection, process flow-sheet, plant layout.

3) Evaluation and profitability analysis.

### **Suggested readings**

1. P. G. Smith, 2011 Introduction to Food Process Engineering Food Science Text Series. Springer Publisher
2. Michael M. Cramer, 2013. Food Plant Sanitation: Design, Maintenance, and Good Manufacturing Practices. CRC Press Taylor and Francis Group.
3. Ahmed T. 1997. Dairy plant engineering and management. 4<sup>th</sup> Ed. Kitab Mahal.
4. Chakraverty A and De DS. 1988. Post-harvest technology of cereals, pulses and oilseeds. Oxford and IBH.
5. Toledo R.T.(1999), Fundamentals of Food Processing Engineering, 3<sup>rd</sup> edition, CBS publishers
6. McCabe W, Smith J, Harriott P (2004), Unit operation of Chemical engineering,7<sup>th</sup> Edition, Mc Graw Hill