



FACULTY OF ENGINEERING & TECHNOLOGY

First Year Master of Technology

Semester I

Course Code: 102380104

Course Title: Advanced Food Equipment Design and Layout

Type of Course: Program Elective I

Course Objectives: To enable the student to design and develop equipments used in food Processing operations and obtain knowledge of design of food plant lay out.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Internal		External		Total
				Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	30 / 15	20 / 10	70 / 35	30 / 15	150 / 75

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Heat Exchanger Thermal Design, Design Procedure, Pressure-Drop Analysis, Temperature-Dependent Fluid Properties, Performance Failures, Flow Maldistribution, Fouling, and Corrosion, Uncertainties in thermal design of heat exchangers	8
2	Design of evaporator: types of evaporators, methods of feeding of evaporators, general design consideration of evaporator, Material and energy balance calculations, thermal design calculations, mechanical design considerations, performance of evaporators (capacity and economy), Application of evaporation in food industry	9
3	Design of storage vessels for liquid food and grains. Design of extruders: Cold and hot extruder design, design of screw and barrel	9
4	Design of material handling equipment like belt conveyor, screw conveyor, bucket elevator and pneumatic conveyors	7
5	Cleaning and sanitation of process plants, Design of CIP system, Food Plant Location, Food Plant Layout, Process Selection	4

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						R: Remembering; U: Understanding; A: Application, N: Analyze; E: Evaluate; C: Create
R	U	A	N	E	C	
10	20	30	20	10	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:



1	Joshi, M. V. and Mahajan, V. V. Process Equipment Design, (Macmillan India Ltd., 2000)
2	Walas, S. M. Chemical Process Equipment, selection and Design, (Butterworth-Heinemann, 2009)
3	Brownell, L. E. and Young, E. H. Process Equipment Design - Vessel Design, (Wiley EasternEdn., 1968).
4	Ahmad, T. Dairy Plant Engineering and Management, (Kitab Mahal, 2009)
5	R. Paul Singh and Dennis R. Heldman. 2014. Introduction to Food Engineering, 5th Ed. Elsevier, Amsterdam, The Netherlands
6	Albert Ibarz and Gustavo V. Barbosa-Cánovas. 2003. Unit Operations in Food Engineering. CRC Press, Boca Raton, FL, USA.
7	George D. Saravacos and Athanasios E. Kostaropoulos. 2002. Handbook of Food Processing Equipment. Springer Science and Business Media, New York, USA
8	R. K. Sinnott. 1999. Chemical Engineering, Vol. 6, Chemical Engineering Design, 3rd Ed. Butterworth-Heinemann, Oxford, UK

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	To identify the factors that will affect the design of equipments	25
CO-2	To classify the variables based on various properties	25
CO-3	To select the critical variables for the design of equipments	30
CO-4	To design food process equipment and its detailed layout on the floor	20

List of Practicals / Tutorials: [Click or tap here to enter text.](#)

1	Thermal Design of Shell and Tube heat exchanger
2	Thermal design of Plate Heat exchanger
3	Pressure drop analysis in regeneration system of heat exchanger
4	Design of single and multiple effect evaporators
5	Design of storage structures of food grains
6	Design of storage structures of liquid products
7	Design of cold and hot extruders
8	Design of belt conveyor and screw conveyor
9	Design of bucket elevator and pneumatic conveyors
10	Development of food plant location, food plant layout and process selection - A Case Study

Supplementary learning Material:

Curriculum Revision:

Version:	1
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22