Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	CHC306	Chemical Process Equipment Design	3	0	0	9

Course Objective
The objectives of this course are to provide training to the students for understanding the fundamentals of the concepts of various equipment, used in the process industries and to familiarize them with calculations for designing these equipment.
Learning Outcomes
Upon successful completion of this course, students will: ● have ability to design general process equipment use in CPI. ● be able to make use of basic principles of unit operations and codes in process design. ● be able to provide a preliminary dimensioning of the material of construction. ● be able to use various codes of practice in mechanical design.

Unit No.	Topics to be covered	Lecture Hours	Learning Outcome
	A. Process Design		
1	**Fluid Transport and mixing:** Fluid transport, mixing and storage, Design of pumps and compressors and centrifugal and reciprocal; Design of Storage bins, receivers, etc. Design of mixing equipment- Gas, Liquid and Solid pastes.	**08**	Ability to design pipes/ piping, mixers, pumps, etc.
2	**Heat Transfer:** Heat exchanger Analysis - Effectiveness and NTU Concept, Shell and tube heat exchangers - standards and codes, various design methods; Condensers, reboilers and vapourizers, jacketed vessels/ internal coils, agitated vessels.	**09**	Will have basic knowledge in designing heat transfer equipment used in process industries.
3	**Separation:** Separation Equipment Distillation Column for binary systems- Plate and packed columns, plate hydraulics and packings, column internals, height and diameter	**09**	Awareness of basics in designing separation columns for binary mixtures and column internals.

B. Mechanical Design			
4	**Vessels & Storage vessels**: Introduction to vessel design; selection of type of vessels; material of construction; selection and design considerations; introduction of codes for pressure vessel design; classification of pressure vessels as per codes; inspection and testing of pressure vessels.	**05**	Familiarity with mechanical design aspects of vessels, materials of construction and use of codes.
5	**Shell:** Design of cylindrical and spherical shells under internal and external pressure; selection and design of closures and heads; compensation of openings.	**06**	Basic knowledge for shells, columns and heads.
6	**Tall Towers & Supports:** Mechanical design of tall tower, Design of supports, gaskets and standard flanges.	**05**	Basic design of tall towers and associated parts.

Textbooks:

1. McCabe, W.L. Smith J.M. and Harriott, P. (2004). Unit Operations in Chemical Engineering, 7th Ed., McGraw Hill.
2. Sinnott, R. K. (2005). Chemical Engineering Design. 4th Ed. Vol 6, 4th Ed., Elsevier Butterworth - Heinemann.
3. Mahajani, V. V. and Umarji, S. B. (2016). Joshi's. Process Equipment Design. 5th Ed., Trinity press.
4. Couper, J.R, Penney, W.R and James R. F. (2012). Chemical Process Equipment: Selection and Design, 3rd Ed., Butterworth-Heinemann.

Reference Books:

1. Green D. W. and Perry R. H. (2008). Perry's Chemical Engineers' Handbook, 8th Ed., McGraw Hill.
2. Stephen H. (2012). Rules of Thumbs for Chemical Engineer, 5th Ed. Elsevier Butterworth-Heinemann.