

Course code	Course Name	L-T-P-Credits	Year of Introduction
CH312	CHEMICAL ENGINEERING DESIGN -I	3-0-0-3	2016
<b>Course Objectives</b>			
<ul style="list-style-type: none"> <li>To impart the basic concepts of chemical engineering drawing, mechanical design and process design of heat exchangers</li> <li>To develop understanding about P&amp;ID, I&amp;C drawing, design and heat exchangers</li> </ul>			
<b>Syllabus</b>			
Introduction to chemical engineering drawing – P&ID of heat exchangers, distillation columns and stirred tank jacketed reactors with at least one control loop. Introduction to pressure vessels: stress variation. Mechanical design of pressure vessels and jacketed vessels. tall columns, column supports- skirt, bracket- saddle as per IS codes. Mechanical design of non standard flange- Design of storage tanks for Volatile and Non-volatile liquids. Process design and detailed drawing of double pipe heat exchanger and shell & tube heat exchangers for single phase streams. Process design of shell & tube condensers: Tubular horizontal & Tubular vertical for condensation of single vapours.			
<b>Expected outcome</b>			
At the end of the course, students will be able to			
<ol style="list-style-type: none"> <li>Demonstrate general P&amp;ID symbols and I&amp;C drawing used in chemical engineering practice</li> <li>Select and design suitable equipment for the given operation.</li> </ol>			
<b>Text Books:</b>			
<ol style="list-style-type: none"> <li>B.C Bhattacharya, Introduction to Chemical Equipment Design, CBS Publishers &amp; Distributors, New Delhi.</li> <li>D.Q.Kern, Process Heat Transfer, Tata Mc-GRAW HILL</li> </ol>			
<b>References:</b>			
<ol style="list-style-type: none"> <li>Badger &amp; Bancharo, Introduction to Chemical Engineering, McGraw Hill</li> <li>Bhatt N.D., Machine Drawing, Charotar Book Stall</li> <li>E. Ludwig, Applied Process Design for Chemical &amp; Petrochemical Plants, Vol I, II, III, Gulf Publication, London.</li> <li>Harriot P., Process Control, Tata McGraw Hill</li> <li>I.S.A. code (P&amp;ID)</li> <li>IS Codes.</li> <li>J.M.Coulson &amp; J.F.Richardson, Chemical Engineering, Vol.6, 3<sup>rd</sup> Edn, Butterworth-Heinemann, (Indian print)</li> <li>M.V Joshi &amp; Mahajan V.V., Process Equipment Design, 3<sup>rd</sup> Edn, Mac-Milan &amp; Co. India.</li> <li>McCabe W.L., Smith J.C., &amp; Harriot P., Unit Operations in Chemical Engineering, McGrawHill.</li> <li>Perry. R.H &amp; Green.D.W., Chemical Engineers Handbook, 7<sup>th</sup> Edn, Mc- Graw Hill.</li> <li>Rase &amp; Barrow, Project Engineering of Process Plants, John Wiley</li> </ol>			
Module	Contents	Hours	Sem. Exam Marks
I	Introduction to chemical engineering drawing – P&ID of heat exchangers, distillation columns and stirred tank	21	50%

	jacketed reactors with at least one control loop. Introduction to pressure vessels: stress variation. Mechanical design of pressure vessels and jacketed vessels. tall columns, column supports- skirt, bracket- saddle as per IS codes. Mechanical design of non standard flange		
<b>FIRST INTERNAL EXAMINATION</b>			
II	Design of storage tanks for Volatile and Non-volatile liquids. Process design and detailed drawing of double pipe heat exchanger and shell & tube heat exchangers for single phase streams. Process design of shell & tube condensers: Tubular horizontal & Tubular vertical for condensation of single vapours.	21	50%
<b>SECOND INTERNAL EXAMINATION</b>			
<b>END SEMESTER EXAMINATION</b>			

### Question paper pattern

Maximum marks : 100

Exam duration : 3 hours

There shall be 3 questions uniformly covering modules I & II each carrying 50 marks of which the student has to answer any 2 questions. At the most 4 subdivisions can be there in one main question with a total of 50 marks for all the subdivisions put together.

(2 x50= 100 Marks)

