Format K1

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP) Academic Year: **2025-26 (EVEN)**

Institute Code and Name: 0078- K. K. Wagh Polytechnic, Nashik **Semester**: Fifth
Programme and Code: Chemical Engineering (CH) **Course Index:** 603
Course and Code: Chemical Engineering Drawing & Design (CEDD – 316302)
Name of Faculty: M. N. Shete **CLASS:** TYCH

INDUSTRY EXPECTED OUTCOME

The aim of this course is to help the students to attain the following industry identified outcome through various teaching learning experiences: Apply theoretical knowledge and practical skills to create accurate, detailed, and standardized engineering drawings of chemical equipment and processes, including process flow diagrams, P&ID, equipment layout and equipment designs.

COURSE LEVEL LEARNING OUTCOMES (COS)

- CO1 - Draw different shapes using CAD software by drawing, editing and formatting.
- CO2 - Draw different flanges, support for pipe and vessel in chemical industries.
- CO3 - Draw heat exchanger, reactors and their assembly used in chemical industries.
- CO4 - Draw various flow diagrams for different processes by using symbols and specification sheet in chemical industries.
- CO5 - Describe the design procedure of chemical equipment and design of storage tank.

TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
				Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		
											FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
				CL	TL	LL					Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316302	Chemical Engineering Drawing & Design (CEDD – 316302)	CEDD	DSC	4	-	4	-	8	4	04	30	70	100	40	25	10	--	--	--	--	125

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

THEORY LEARNING OUTCOME (TLO)

TLO No.	Title of TLO
TLO 1.1	Explain the use of Computer Aided Drafting (CAD) software in the given chemical engineering application.
TLO 1.2	Explain the use CAD software for the specified workspace and interface
TLO 1.3	Use relevant drawing command for the given assignment and Identify Grips editing commands.
TLO 1.4	Select relevant modify commands and procedure to use those in the given situation.
TLO 1.5	State the relevant formatting commands in the given situation.

TLO 2.1	Sketch the flange for the given application.
TLO 2.2	Draw proportionate sketch of supports for pipe in chemical process industry.
TLO 2.3	Draw neat and proportionate sketch of supports for the given vessels.
TLO 3.1	Draw different type of heat exchanger.
TLO 3.2	Draw different type of heat exchanger assembly.
TLO 3.3	Draw different type of process reactor.
TLO 3.4	Draw different type of process reactor assembly.
TLO 4.1	Draw the given unit operation equipment and instrumentation symbols.
TLO 4.2	Prepare specification sheet for the given process equipment.
TLO 4.3	Draw the block diagram of the given process.
TLO 4.4	Draw utility and engineering line diagram for the given process.
TLO 4.5	Draw process and instrumentation diagram for the given process.
TLO 4.6	Draw equipment layout and tank farm of the given process.
TLO 5.1	Describe general design procedure for chemical process equipment.
TLO 5.2	State classification of storage tank for design.
TLO 5.3	Design of storage tank shell subjected to internal pressure.

SUGGESTED CO_S - PO_S MATRIX FORM

Course Outcomes (COs)	**Programme Outcomes (POs)**							**Programme Specific Outcomes (PSOs)**	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO- 1	PSO- 2
CO1	1	2	2	2	-	2	3	1	2
CO2	3	1	2	1	-	2	3	1	2
CO3	3	2	2	1	-	2	3	1	2
CO4	3	3	2	1	-	3	3	1	2
CO5	3	2	3	2	2	2	3	1	2
Legends :- High:03, Medium:02,Low:01, No Mapping: -									

Maharashtra State Board of Technical Education K-1

Teaching Plan (TP)

Academic Year: 2025-26 **Institute Code:** 0078
Program: Chemical Engineering **Course Code:** 316302
Course: Chemical Engineering Drawing & Design (CEDD – 316302) **Semester:** Sixth (CH-6K)
Name of faculty: M. N. Shete

Chap No. (Allotted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
Unit - I Computer Aided Drafting Software								
1 (06)	**CO-1**	**TLO 1.1**	1.1 Fundamentals of Computer Aided Drafting (CAD) and its applications in chemical industries.	01	15/12/2025 to 15/12/2025		Blackboard, Books, media, PPT	
		TLO 1.2	1.2 CAD initial setting commands- Snap, grid, ortho, osnap, limits, units, ltscale, object tracking.	01	16/12/2025 to 16/12/2025			
		TLO 1.3	1.3 Drawing command and procedure: Line, arc, circle, rectangle.	01	18/12/2025 to 18/12/2025			
		TLO 1.4	1.4 Modify command and procedure - Break, trim, copy, move, stretch.	01	20/12/2025 to 20/12/2025			
		TLO 1.5	1.5 Formatting commands - Layers, block, line type, line weight, colour.	02	22/12/2025 to 23/12/2025			

Unit - II Flanges, Support for Pipe and Vessel								
2 (10)	**CO-2**	**TLO 2.1**	2.1 Types of Flanges (drawing only): Flange cast with pipe (Integral Flange), slip on flange, welded neck flange, screwed flange, blind flange, and cast iron flange joint.	02	27/12/2025 to 29/12/2025		Blackboard, Books, media, PPT	
		TLO 2.2	2.2 Pipe Support (drawing only): Single rod hanger, double rod hanger, angle iron hanger, structural bracket and hanger, roller support, yard piping support.	02	30/12/2025 to 01/01/2026			
		TLO 2.3	2.3 Vessels Support (drawing only): a. Vertical vessel supports: Bracket or lug support, leg support, skirt (angular and straight) support. b. Horizontal vessel supports: Saddle (plate and ring type) support wear plate support.	06	03/01/2026 to 12/01/2026			
Unit - III Process Equipment Drawing								
3 (10)	**CO-3**	**TLO 3.1**	3.1 Heat exchanger (drawing only): a. Shell and tube heat exchanger b. U-tube heat exchanger c. Kettle type reboiler.	03	13/01/2026 to 17/01/2026		Blackboard, Books, media, PPT	

		TLO 3.2	3.2 Heat exchanger assembly (drawing only): Tube sheet-Triangular and square pitch, method of fixing tube sheet, segmental baffle and tie rod, shell and tube side passes.	02	19/01/2026 to 20/01/2026			
		TLO 3.3	3.3 Process reactor (drawing only): Batch reactor, jacketed batch reactor.	02	22/01/2026 to 23/01/2026			
		TLO 3.4	3.4 Assembly of process reactor (drawing only): Different types of nozzles, jackets, coils, agitators and heads/covers.	03	24/01/2026 to 29/01/2026			
Unit - IV Specification Sheet and Process Flow Diagrams								
4(24)	**CO-4**	**TLO 4.1**	4.1 Symbols for unit operation equipment's, instrumentation as per IS 3232	02	02/02/2026 to 03/02/2026		Blackboard, Books, media, PPT	
		TLO 4.2	4.2 Specification sheet for equipment's – Heat exchanger, batch reactor	04	05/02/2026 to 07/02/2026			
		TLO 4.3	4.3 Draw the block diagram, process flow diagram, process and instrumentation diagram, utility line diagram, equipment layout, tank farm layout for the following processes	18	09/02/2026 to 10/03/2026			

			Absolute alcohol, Ortho nitroaniline (ONA) and Oxalic acid.					
Unit - V Basics of Chemical Engineering Design								
5(10)	**CO-5**	**TLO5.1**	5.1 Basic considerations in process equipment design: Introduction, general design procedure, choice of material, corrosion allowance.	02	12/03/2026 to 14/03/2026		Blackboard, Books, media, PPT	
		TLO 5.2	5.2 Storage tank: Introduction, storage of non-volatile liquids, storage of volatile liquids, standard fixed roof of storage tank.	03	16/03/2026 to 23/03/2026			**1 extra**
		TLO 5.3	5.3 Design of storage tanks: Types of tanks for design purpose, bottom design. Shell design: Internal loading, external loading, shell thickness. (Numerical based on maximum stress of bottom design, shell thickness).	05	24/03/2026 to 04/04/2026			

ASSESSMENT METHODOLOGIES/TOOLS

- **Formative assessment (Assessment for Learning) -** Two class test of 30 marks each
- **Summative Assessment (Assessment of Learning) -** End semester examination of 70 marks

SUGGESTED LEARNING MATERIALS / BOOKS

Sr. No.	Author	Title of Book	Publication
1	A .P. Gautam, Pradeep Jain	Engineering Autocad	Khanna Publishers ISBN-13: 978-9381068946
2	Richard Turton, Richard C. Bailic, Wallace B. Whiting, Joseph A. Shaeiwitz, Debangsu Bhattacharyya	Analysis, Synthesis and Design of Chemical Processes	Published Jun 22, 2012 by Prentice Hall. Part of the Prentice Hall International Series in the Physical and Chemical Engineering Sciences series. ISBN-13:978-0-13-261812-0
3	Richard Turton, Joseph A. Shaeiwitz	Chemical Process Equipment Design	Published Feb 1, 2017 by Prentice Hall.ISBN-13: 978-0-13-380447-8
4	D.G. Austin	Chemical Engineering Drawing Symbols	George Godwin Ltd (April 1979) ISBN-13: 978-0711433182
5	M. V. Joshi, V. V. Mahajani	Process Equipment Design (3Edition)	Macmillan India Limited, 2000 ISBN:0333924185, 9780333924181
6	M. Gopala Rao Marshal Sittig	Dryden's Outlines Of Chemical Technology	Affiliated East-West Press Pvt Ltd. (1997)ISBN-13: 978-8185938790
7	Bureau of Indian Standards	IS 3232: Recommendations onGraphical Symbols for ProcessFlow Diagrams, Piping andInstrumentation Diagrams	Chemical Engineering Plants and RelatedEquipment (MED 17)
8	Dr S. D. Dawande	Process Equipment Design Vol. 25/ed.	Denett & Company, ISBN-8190322893,9788190322898

LEARNING WEBSITES & PORTALS

Sr. No	Link / Portal	Description
1	https://www.pveng.com/wp-content/uploads/2016/06/HeatExchanger_Drawing.pdf https://www.essentialchemicalindustry.org/processes/chemical-reactors.html https://www.autodesk.com/education/free-software/autocad. https://www.autodesk.com/education/edu-software/overview https://hardhatengineer.com/types-of-pipe-support-use-in-pipeline/ https://www.chemengstudent.com/complete-guide-to-designing-a-heat-exchanger/?v=13b5bfe96f3e https://www.shutterstock.com/search/shell-and-tube-heat-exchangers?msockid=11337b5010196a6631ff6ef5110c6ba3 https://www.cadcrowd.com/3d-models/batch-reactor https://fact.co.in/images/upload/Technical_documents_8787.pdf https://www.lucidchart.com/pages/tutorial/p-and-id https://www.littlepeng.com/single-post/design-of-storage-tank https://kh.aquaenergyexpo.com/wp-content/uploads/2024/02/Storage-Tanks-Basis-Design-Of-Tanks.pdf	Learning Material

M. N. Shete
(Name & signature of staff)

Dr. P. S. Bhandari
(Name & signature of HOD)