GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Chemical Engineering / Petrochemical Technology				
Semester	IV		Version	1.0.0.0	
Effective from Academic Year	2026-27		Effective for the batch Admitted in	JULY 2025	
Course code	1CH4105	Course Name	Basics of Computer Aided Design		

I.TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course Code	Learning Scheme						Assessment Scheme										
		Actual Contact Hrs./Week			SLH	NLH	Credits	Theory				Practical				Based on SL		Total Marks
		CL	TL	LL				FA-TH	SA-TH	TOTAL		FA-PR	SA-PR	TOTAL		SLA		
								MAX	MAX	MAX	MIN	MAX	MAX	MAX	MIN	MAX	MIN	
DSC	1CH4105	-	-	4	4	8	4	-	-	-	-	60	40	100	40	20	8	120

Abbreviation:			
	CL- Classroom Learning	**TL** - Tutorial Learning	**LL** - Laboratory Learning
	SLH - Self Learning Hours	**NLH** - Notional Learning Hours	**SLA** - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		**SA** - Summative Assessment

II. PRE-REQUISITES

Basic knowledge of Engineering Drawing and Chemical Engineering Equipment Drawing

III. INDUSTRY /EMPLOYER EXPECTED OUTCOMES

Students attain the following industry identified outcome through various teaching learning experiences: Basic skills about AutoCAD software and skills to produce accurate 2D chemical and petrochemical industry parts drawing that align with industry standards. They also develop the ability to interpret technical drawings, apply dimensioning standards, and can contribute to design projects with efficiency and precision.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

CO1 - Draw different shapes using CAD software by drawing, editing and formatting.

CO2 – Produce accurate 2D technical parts drawing with proper dimensioning.

CO3 - Draw intersectional views, isometric views and 3D models of flanges, pipe support and vessels.

CO4 - Prepare and interpret assembly and detailed drawing; organize complex drawings using layers and to prepare and print scaled technical drawings.

V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

SR. NO	PRACTICAL/LABORATORY LEARNING OUTCOME(LLO)	PRACTICAL TITLES	RELEVANT Cos
1	**LLO 1.1** Navigate AutoCAD's workspace and use basic commands to create and manage drawing files.	**Introduction to AutoCAD Interface:** Familiarize with AutoCAD's workspace, toolbars, and basic commands to create and save a simple drawing file.	CO1
2	**LLO 2.1** Accurately draw basic shapes using AutoCAD's tools, applying precise measurements and snap functions.	**2D Geometric Constructions:** Draw basic shapes (lines, circles, arcs) using AutoCAD's drawing tools, applying precise measurements and snap functions.	CO1
3	**LLO 3.1** To construct orthographic projections of various solid geometries (prisms, pyramids, cylinders, cones, etc.	**Orthographic Projections:** Create multi-view orthographic drawings of a simple component used in chemical/petrochemical industry, including front, top, and side views.	CO2
4	**LLO 4.1** Apply industry-standard dimensioning and annotation techniques to 2D drawings.	**Dimensioning and Annotations:** Apply linear, angular, and radial dimensions to a 2D drawing, adding text annotations per industry standards.	CO2
5	**LLO 5.1** Create sectional views with	**Sectional Views:** Develop a sectional view of a part used in chemical/petrochemical industry,	CO3

	appropriate hatching to represent material properties in technical drawings.	using hatching to represent material cross-sections.	
6	**LLO 6.1** Construct isometric views to visualize 3D objects using AutoCAD's isometric tools.	**Isometric Drawing:** Construct an isometric view of a 3D object using AutoCAD's isometric grid and drawing tools.	CO3
7	**LLO 7.1** Build 3D models using AutoCAD's solid modeling commands like extrude, revolve, and subtract.	**3D Solid Modeling:** Create a 3D model of a part used in chemical/petrochemical industry (slip on flanges, Welded neck flanges, screwed flanges, blind flanges etc) using extrude, revolve, and subtract commands in AutoCAD.	CO3
8	**LLO 8.1**. Prepare the accurate drawings of various pipe supports.	**To draw any one pipe support:** Single rod hanger, double rod hanger, angle iron hanger, structural bracket and hanger, roller support, yard piping support.	CO3
9	**LLO 9.1** Create exploded assembly drawings, including part labels and a bill of materials.	**Assembly Drawing:** Draft an exploded view of a simple mechanical assembly used in chemical/petrochemical industry, including part labels and a bill of materials.	CO4
10	**LLO 10.1** Prepare and print scaled technical drawings with layouts, viewports, and title blocks.	**Plotting and Printing:** Prepare a drawing for output by setting up layouts, viewports, and printing a scaled technical drawing with title block.	CO4

VI. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

Micro projects

- Preparation of schematic views of one of the flanges used in the chemical industry.
- Preparation of drawings of one of the various vessels supports used in the chemical industry.
- Preparation of drawings of one of the heat exchanger assembly.

Note:

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, and activities in a similar way.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.

VII. LIST OF LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

1	AutoCAD Education software
2	CAD Workstations
3	LCD Projector
4	Plotter

VIII. LIST OF REFERENCE BOOKS

Sr. No.	Title	Author	Publication
1	AutoCAD 2021: A Problem-Solving Approach, Basic and Intermediate, 27th Edition	Prof. Sham Tickoo	CADCIM Technologies
2	Engineering Drawing and Computer Graphics	K. Venugopal	New Age International Publishers
3	Richard Turton, Joseph A. Shaeiwitz	Chemical Process Equipment Design	Published Feb 1, 2017 by Prentice Hall.

4	D.G. Austin	Chemical Engineering Drawing Symbols	George Godwin Ltd (April 1979)
5	M. V. Joshi, V. V. Mahajani	Process Equipment Design (3rd Edition)	Macmillan India Limited, 2000
6	M. Gopala Rao Marshal Sittig	Dryden's Outlines Of Chemical Technology	Affilated East-West Press Pvt Ltd. (1997)
7	Bureau of Indian Standards	IS 3232: Recommendations on Graphical Symbols for Process Flow Diagrams, Piping and Instrumentation Diagrams	Chemical Engineering Plants and Related Equipment (MED 17)
8	Dr S. D. Dawande	Process Equipment Design Vol. 25/ed.	Denett & Company

IX. LINK OF LEARNING WEB RESOURCE

1	https://www.youtube.com/watch?v=XE65rzh7KHc&list=PLXaJMtuF51X_7wgR0_3eJBAJovz81F_WU
2	https://www.autodesk.com/in/campaigns/autocad-tutorials
3	https://www.mycadsite.com/tutorials.html
4	https://www.cadtutor.net/tutorials/autocad/
5	https://www.udemy.com/topic/autocad/free/
6	https://www.pveng.com/wp-content/uploads/2016/06/HeatExchanger_Drawing.pdf
7	https://www.essentialchemicalindustry.org/processes/chemical-reactors.html
8	https://www.autodesk.com/education/free-software/autocad.
9	https://www.autodesk.com/education/edu-software/overview
10	https://hardhatengineer.com/types-of-pipe-support-use-in-pipeline/
11	https://www.chemengstudent.com/complete-guide-to-designing-a-heat-exchanger/?v=13b5bfe96f3e
12	https://www.shutterstock.com/search/shell-and-tube-heatexchangers?msockid=11337b5010196a6631ff6ef5110c6ba3
13	https://www.cadcrowd.com/3d-models/batch-reactor
14	https://fact.co.in/images/upload/Technical_documents_8787.pdf
15	https://www.lucidchart.com/pages/tutorial/p-and-id
16	https://www.littlepeng.com/single-post/design-of-storage-tank
17	https://kh.aquaenergyexpo.com/wp-content/uploads/2024/02/Storage-Tanks-Basis-Design-Of-Tanks.pdf

X. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Practical Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	**Introduction to AutoCAD Interface:** Familiarize with AutoCAD's workspace, toolbars, and basic commands to create and save a simple drawing file.	CO1	8	2	3	3	8
2	**2D Geometric Constructions:** Draw basic shapes (lines, circles, arcs) using AutoCAD's drawing tools, applying precise measurements and snap functions.	CO1	4	2	1	1	4
3	**Orthographic Projections:** Create multi-view orthographic drawings of a simple mechanical component, including front, top, and side views.	CO2	4	1	1	2	4
4	**Dimensioning and Annotations:** Apply linear, angular, and radial dimensions to a 2D drawing, adding text annotations per industry standards.	CO2	8	1	3	4	8
5	**Sectional Views:** Develop a sectional view of a part used in chemical/petrochemical industry, using hatching to represent material cross-sections.	CO3	8	2	2	4	8
6	**Isometric Drawing:** Construct an isometric view of a 3D object using AutoCAD's isometric grid and drawing tools.	CO3	4	1	1	2	4

7	**3D Solid Modeling:** Create a 3D model of a part used in chemical/petrochemical industry (slip on flanges, Welded neck flanges, screwed flanges, blind flanges etc) using extrude, revolve, and subtract commands in AutoCAD.	CO3	8	1	3	4	8
8	**To draw any one pipe support:** Single rod hanger, double rod hanger, angle iron hanger, structural bracket and hanger, roller support, yard piping support.	CO3	4	1	1	2	4
9	**Assembly Drawing:** Draft an exploded view of a simple mechanical assembly used in chemical/petrochemical industry, including part labels and a bill of materials.	CO4	8	1	3	4	8
10	**Plotting and Printing:** Prepare a drawing for output by setting up layouts, viewports, and printing a scaled technical drawing with title block.	CO4	4	1	1	2	4
		Grand Total	60	13	19	28	60

XI. COs AND POs AND PSOs MAPPING

Course outcome (Cos)	**Programme Outcomes (POs)**							**Programme Specific Outcomes (PSOs)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	1	3	1	1	1	2	1	1
CO2	2	2	3	3	1	1	1	3	2	1
CO3	2	2	3	3	1	2	1	3	1	2
CO4	2	2	3	2	2	1	1	3	1	2

Legends: - *3- High 2-Moderate/Medium 1-Slight/Low 0-None*