Program : **Diploma In Mechanical Engineering / Tool And Die Engineering / Manufacturing Technology**	
Course Code : **2028**	Course Title: **Basic CAD Lab**
Semester : **2**	Credits: **No Credit**
Course Category: **Engineering Science**	
Periods per week: **3 (L:0 T:0 P:3)**	Periods per semester: **45**

Course Objectives:

- To familiarize the different software used for drawing
- To Introduce the basic commands and tools necessary for two-dimensional drawing, design and drafting using AutoCAD

Course Prerequisites:

Topic	Course code	Course name	Semester
Basic knowledge about engineering drawing and Projections		Engineering Graphics	1

Course Outcomes:

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Illustrate the use of computer aided drafting software.	6	Understanding
CO2	Identify various commands used in CAD.	9	Understanding
CO3	Apply knowledge to draw simple two-dimensional drawings and sections using CAD	21	Applying
CO4	Construct Isometric drawing of simple objects	6	Applying
	Lab Exam	3	

CO – PO Mapping:

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	2			2			
CO2	2			2			
CO3	3			3			
CO4	3			3			

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

On completion of the course student will be able to:

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Illustrate the use of computer aided drafting software**		
M1.01	Familiarize CAD software and its applications	2	Understanding
M1.02	Identify applications, advantages and components of CAD	2	Understanding
M1.03	Illustrate software window and opening of new drawing	2	Understanding
Contents: Introduction to Computer Aided Drafting: Application - Advantages over manual drafting - Hard ware requirements - Soft ware requirements - Identifying Different software - Auto CAD - Pro E - IDEAS and Open - Source drafting software. Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon. CAD basics - main menu, starting a new drawing, open, save, save as, exit, drawing editor, entering commands using mouse, pull down menu, getting help, data entry, entity selection. Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.			
CO2	**Identify various commands used in CAD**		
M2.01	Identify various commands used in CAD	3	Understanding
M2.02	Illustrate various coordinate systems	3	Understanding
M2.03	Identify the plotting parameters in CAD	3	Understanding
	Lab Exam – I	1.5	

Contents:

Draw and modifying commands: setting commands - limits of drawing, units, grid, snap,

osnap, co-ordinates, ortho mode locating a point - absolute coordinate system - relative coordinate system - polar coordinate system - direct distance entry system. - simple exercises

Draw commands - line, circle, arc, ellipse, rectangle, polygon, spline, polyline, etc. Editing commands - erase, copy, array, rotate, mirror, offset, scale move, trim, fillet, chamfer, extend, stretch, p - line edit, explode, block, layers etc. Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated Baseline, Continuous, Diameter, Radius and Angular Dimensions. Dim scale variable. Editing dimensions.

Text: Single line Text, Multiline text. - simple exercises

Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview.

CO3	**Apply knowledge to draw simple two-dimensional drawings and sections using CAD**		
M3.01	Draw various basic 2D entities using CAD.	6	Applying
M3.02	Draw simple orthographic and sectional views of various components in CAD	12	Applying
M3.03	Make use of commands to print/plot drawings prepared in CAD	3	Applying

Contents:

Working with CAD: Properties of lines – color, line weight, line type, layer properties - Hatch and gradients.

Draw basic 2D entities like: Rectangle, Rhombus, and Polygon using AutoCAD. Draw basic 2D entities like: Circles, Arcs, ellipse using AutoCAD. Draw basic 2D entities like: Circular and rectangular array using AutoCAD. Draw blocks of 2D entities comprises of Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using AutoCAD. Developing orthographic and sectional views of simple components with dimensions and text.

Exercises:

Orthographic views: Draw orthographic views of simple engineering objects like C-block, Stepped block, Cylindrical block etc. (Draw minimum 5 figures)

Sectional views: Draw sectional views of simple engineering objects like Lever, Wall bracket etc. (Draw minimum 3 figures)

Print/Plot the prepared drawings in CAD.

(Printout should be a part of progressive assessment).

CO4	**Construct Isometric drawing of simple objects.**		
M4.01	Concept of isometric drawings	2	Understanding
M4.02	Construction of isometric drawing of simple objects.	4	Applying
	Lab Exam – II	1.5	

Contents:

Isometric drawing: Concept, Isometric snap and grid, Isometric views of simple objects such as cube, step block, cylinder etc. with dimensioning.

Note: End semester examination in CAD practical only. Students need to prepare record book with printed/plotted drawings.

Text / Reference:

T/R	Book Title/Author
T1	P I Varghese, K C John., Engineering Graphics, VIP Publishers
R1	N. D Bhatt. Engineering Drawing. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93- 80358-17-8.
R2	Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. Engineering Graphics with AutoCAD. PHI Learning Pri- vate Limited-New Delhi (2010); ISBN: 978-
R3	Jeyapoovan, T. Essentials of Engineering Drawing and Graphics using AutoCAD. Vikas Publishing HousePvt. Ltd, Noida, 2011; ISBN: 978-8125953005.
R4	Autodesk. AutoCAD User Guide. Autodesk Press, USA, 2015.
R5	Sham, Tickoo. AutoCAD 2016 for Engineers and Designers. Dreamtech Press; Galgotia Publication, New Delhi, 2015; ISBN 978-9351199113.

Online Resources:

Sl.No	Website Link
1	www.swayam.gov.in
2	https://nptel.ac.in/course.html
3	https://ndl.iitkgp.ac.in/