

Branch Name:	Mechanical Engineering, Automobile Engineering, Civil Engineering, Electrical Engineering
Program Code	ET402
Course Name:	Engineering Graphics
Course Code:	2ET4000106
Pre-requisite Course:	---

Rational

Engineers can communicate effectively with engineering graphics. It serves as the building block for the engineering and technological structure, strengthening it. Additionally, it serves as the conduit for ideas to become reality. It is an effort to establish a fundamental comprehension and use of engineering graphics. It introduces the learner to the Bureau of Indian Standards as well as knowledge and application of graphical tools. The program seeks to improve students' drawing and reading skills for various projections, curves, and drawings. The subject primarily focuses on using sketching tools, expanding one's imagination, and communicating ideas. In addition to producing successful computer-aided graphics, developing the sense of drawing sequence and effective use of drawing tools also produces successful industrial applications, from marking to operational performance.

Course objective

1. To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs. •
2. To develop drafting and sketching skills, to know the applications of drawing equipment, and get familiarize with Indian Standards related to engineering drawings.
3. To develop skills to visualize actual object or a part of it, on the basis of drawings.
4. To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.
5. To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD.

TEACHINGANDEXAMINATIONSCHEME:

Teaching Scheme (Hours/ week)				Evaluation Scheme(Marks)				Total (Marks)
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory		Practical		150
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	4	4	60	40	20	30	

Subject Contents

SR. NO.	TOPIC	TOTAL HOURS	WEIGHTAGE (%)
1.	Basic elements of Drawing Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications. Representative Fractions – reduced, enlarged and full-size scales; Engineering Scales such as plain and diagonal scale. Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning. Geometrical and Tangency constructions. (Redraw the figure)	6	20%

2.	Orthographic projections Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination). Introduction to orthographic projection, First angle and Third angle method, their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (Use First Angle Projection method only)	6	20%
3.	Isometric Projections Introduction to isometric projections. Isometric scale and Natural scale. Isometric view and isometric projection. Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection	6	20%
4.	Free Hand Sketches of engineering elements Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washer, Locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching) Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)	3	10%
5.	Computer aided drafting interface Computer Aided Drafting: concept. Hardware and various CAD software available. System requirements and understanding the interface. 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. File features: new file, Saving the file, opening an existing drawing file, creating templates, Quit. Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action	3	10%
6.	Computer aided drafting Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Polyline. Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates. Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers. Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, diameter, Radius, Angular Dimensions. Dim scale variable. Editing dimensions. Text: Single line Text, Multiline text. Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview	4	20%

List of Practical/Experiments

Sr. No.	Practical Exercises	Unit No.	Approx Hours
1	Draw horizontal, Vertical, 30-degree, 45 degrees, 60- and 75-degrees lines, different types of lines, dimensioning styles using Tee and Set squares/ drafter. (Do this exercise in sketch book)	1	02
2	Write alphabets and numerical (Vertical only) (do this exercise in sketch book)	1	02
3	Draw regular geometric constructions and redraw the given figure (do this exercise in sketch book) Part I	2	02
4	Draw regular geometric construction and redraw the given figure (do this exercise in sketch book) Part II	2	02
5	Draw a problem on orthographic projections using first angle method of projection having plain surfaces and slanting. Part I	3	02
6	Draw another problem on orthographic projections using first angle method of projection having slanting surfaces with slots. Part II	3	02
7	Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs. Part I	3	04
8	Draw two problems on Isometric view of simple objects having plain and slanting surface by using natural scale. Part I	4	04
9	Draw some problems on Isometric projection of simple objects having cylindrical surface by using isometric scale. Part I	4	04
10	Draw free hand sketches/ conventional representation of machine elements in sketch book such as thread profiles, nuts, bolts, studs, set screws, washers, Locking arrangements. Part I	5	04
11	Problem based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views in sketch book. Part I	2,3,5	04
12	Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD (Print out should be a part of progressive assessment). Part I	5	04
13	Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD (Printout should be a part of progressive assessment). Part II	5	04
14	Draw basic 2D entities like: Circular and rectangular array using AutoCAD (Printout should be a part of progressive assessment). Part III	5	04
15	Draw blocks of 2D entities comprises of Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using AutoCAD (Print out should be a part of progressive assessment). Part IV	5	04
16	Draw basic branch specific components in 2D using AutoCAD (Print out should be a part of term work). Part I	6	04
17	Draw complex branch specific components in 2D using AutoCAD (Print should be a part of progressive assessment). Part I	6	04

Course Outcome:

After completions of this course, students will able to:

1. Understand and draw different geometrical shapes like polygons, circles and lines with different geometric conditions.
2. Draw the orthographic views of object containing lines, circles and arc geometry.
3. Draw the isometric view from orthographic views of objects containing lines, circles and arcs.
4. Use the basic commands and draw, modify and edit the different geometrical shapes and basic shapes (2D) using AUTOCAD.

SUGGESTED LEARNING RESOURCES

1. Bureau of Indian Standards. Engineering Drawing Practice for Schools and Colleges IS: Sp-46. BIS. Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2.
2. Bhatt, N. D. Engineering Drawing. Charotar Publishing House, Anand, Gujarat 2010; ISBN: 978-93-80358-17-8.
3. Jain & Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978-93-86173-478)
4. Jolhe, D. A. Engineering Drawing. Tata McGraw Hill Edu. New Delhi, 2010; ISBN: 978-0-07-064837-1
5. Dhawan, R. K. Engineering Drawing. S. Chand and Company, New Delhi; ISBN: 81-219-1431-0.
6. Shah, P. J. Engineering Drawing. S. Chand & Company, New Delhi, 2008, ISBN: 81-219-2964-4.
7. Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. Engineering Graphics with AutoCAD. PHI Learning Private Limited-New Delhi (2010); ISBN: 978-8120337831.
8. Jeyapovan, T. Essentials of Engineering Drawing and Graphics using AutoCAD. Vikas Publishing House Pvt. Ltd, Noida, 2011; ISBN: 978-8125953005.
9. Autodesk. AutoCAD User Guide. Autodesk Press, USA, 2015.
10. Sham, Tickoo. AutoCAD 2016 for Engineers and Designers. Dreamtech Press; Galgotia Publication, New Delhi, 2015; ISBN 978-9351199113

Software/Learning Websites

1. <https://www.youtube.com/watch?v=TJ4jGyD-WCw>
2. https://www.youtube.com/watch?v=dmt6_n7Sgcg
3. https://www.youtube.com/watch?v=_MQScnLXL0M
4. <https://www.youtube.com/watch?v=3WXPanCq9LI>
5. <https://www.youtube.com/watch?v=fvjk7PlxAuo>
6. <http://www.me.umn.edu/courses/me2011/handouts/engg%20graphics.pdf>
7. <https://www.machinedesignonline.com>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing	1 remembering 2 Understanding
CLO2	Draw views of given object and components 3) Sketch orthographic projections into isometric projections and vice versa	2 Understanding 3 Applying,
CLO3	Apply computer aided drafting tools to create 2D engineering drawings	2 Understanding 3 Applying,

Course Learning Outcomes	Program Outcomes (Pos)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	H											L	H	L	
CLO2	H		M										M		L
CLO3	H												M	M	
CLO4	L	M		M									L		L
CLO5	M											L	M	L	
CLO6	M					L	L					L	M	L	

H: High, M: Medium, L: Low