

<b>Name of Faculty</b>	:	Faculty of Engineering & Technology
<b>Name of Program</b>	:	Diploma Engineering (DE)
<b>Course Code</b>	:	1DME01
<b>Course Title</b>	:	Engineering Graphics
<b>Type of Course</b>	:	Basic Engineering (BE)
<b>Year of Introduction</b>	:	2023-24

<b>Prerequisite</b>	:	Zeal to learn the subject
<b>Course Objective</b>	:	Engineering drawing is a way of communication for engineers. It is a graphical language that essential for communicating design ideas and technical information to engineers in industry and other professionals throughout the design process. The purpose of an engineering drawing is to clearly and accurately capture all geometric features of a product or component so that a manufacturer or engineer can produce the required item. This course aims at development of fundamental understanding and application of engineering drawing so as to develop the ability to prepare, read and interpret drawings correctly and make aware of drafting practices, symbols, codes, norms and standards generally used in industries. It covers knowledge & application of drawing instruments & also familiarizes the learner about codified symbols and principles of technical drawing as per BIS (Bureau of Indian Standards): "SP 46:2003" standards. The course also intended to develop the sense of drawing sequence and imagination in the students and to use computer aided software to create engineering branch specific 2D entities.
<b>Course Outcomes</b>	:	At the end of this course, students will be able to:
	CO1	Use scales, drawing standards and drafting instruments as per BIS codes.
	CO2	Construct polygons, circles and lines with different geometric conditions.
	CO3	Construct engineering curves as per given dimensions.
	CO4	Draw the projection of points, lines and planes under different conditions.
	CO5	Draw orthographic views from isometric views of simple objects and vice versa.
	CO6	Use computer aided drafting software to draw 2D and 3D entities.

**Teaching and Examination Scheme**

Teaching Scheme (Contact Hours)			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
SEE	CIA	SEE	CIA					
1	0	4	3	70	30	30	20	150

Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P- Practical, C - Credit, SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

**Course Content**

Unit No.	Topics	Teaching Hours	Weightage	Mapping with COs
1	<b>Introduction to Engineering Drawing:</b> Drawing instruments and accessories, Instruments-types, specifications, method to use them and applications, Pencils-grades, papers-grades, applications, types of points and applications, Other materials-types and applications.	0	4%	CO1
2	<b>Planning Layout of Drawing:</b> I.S. cods for planning and layout, Scaling technique used in drawing: a) Plain Scale b) Diagonal Scale	0	3%	CO1
3	<b>Dimensioning method in Drawing:</b> Different types of lines, Lettering, Dimensioning methods. a) Aligned method. b) Unilateral with chain, parallel, progressive and combined dimensioning.	0	3%	CO1
4	<b>Geometric Construction:</b> Geometric construction related with line, Geometric construction related with angle, Geometric construction related with circle & arc, Construct polygons of Hexagon: Using drawing tools, Polygon (Triangle, square, pentagon, hexagon and heptagon) by general method, Polygon (Pentagon, hexagon and heptagon) by special method.	2	8%	CO1 CO2
5	<b>Engineering Curves:</b> Conic sections, Concept and understanding of focus, directrix, vertex and eccentricity and drawing of conic sections, using various methods, understand construction and application of: Ellipse, Parabola, Hyperbola, Cycloid Curves (Cycloid, Epicycloids, and Hypocycloid), Involute of a circle and polygons, Spiral (Archimedean spiral only).	2	8%	CO1 CO3
6	<b>Projections of Points and Lines:</b>	2	10%	CO1

	Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Line parallel to one or both the plane, Line perpendicular to one of the planes, Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes.			CO4
7	<b>Projections of Planes:</b> Type of planes, Projections of planar object parallel to one of the reference planes, Projections of planar object inclined to one reference plane and perpendicular to another, Projections of planar object inclined to both reference planes. Planar objects like Triangle, Square, rectangle, pentagon, and hexagon and circle shape should be considered.	2	8%	CO1 CO4
8	<b>Orthographic Projection:</b> Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view	2	10%	CO1 CO4 CO5
9	<b>Isometric Projection:</b> Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing of simple objects.	3	10%	CO1 CO4 CO5
10	<b>Computer Aided Drawing:</b> Basic knowledge of computer hardware, software and System requirement, understanding the interface, Introduction to AutoCAD, Setting up new drawing, Units, Limits. Using Grid, Snap, Ortho, Object Snap, Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Poly Line, Modify and edit commands like trim, delete, copy, offset, array, block, layers, Dimensioning: Linear, Horizontal, Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions, Editing dimensions, Text: Single line Text, Multiline text, Print/plot settings.	2	6%	CO1 CO2 CO3 CO6

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	25	30	30	5	5	5

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

#### Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	<b>Use of Drawing Instruments:</b> Draw following as per I.S, Draw different types of lines, Draw simple 2D entities and demonstrate the use of different types of dimensioning methods, Illustrate dimensioning of circle, arc, angle, square bar, hexagonal bar, cylinder & sphere through figures; Draw 1st and 3rd angle orthographic projection symbols; Draw a typical Title block; Draw simple objects using reduced and enlarge scales.	04
2	<b>Geometric Construction:</b> Draw set of lines with different conditions (Four problems); Draw circle and arcs with different geometric conditions and constraints (Four problems); Draw polygons by general methods (Triangle, square, pentagon, hexagon, heptagon) (Three problems); Draw polygons by special methods (Pentagon, hexagon and heptagon) (Three problems).	06
3	<b>Engineering Curves-1 (Conic Sections):</b> Construct ellipse using concentric circle method, four center method, arc of circle method, rectangle method, oblong method and eccentricity method. (Any three methods); Construct parabola using rectangular method, parallelogram method, tangent method and eccentricity method. (Any two methods); Construct hyperbola using rectangular method, oblique method and eccentricity method. (Any two methods)	08
4	<b>Engineering Curves-2:</b> Construct cycloid, Construct hypocycloid & epicycloids, Construct involute of circle, Construct involute of polygons, Construct Archimedean spiral.	04
5	<b>Projections of Points and Lines:</b> Draw projection of points (For 10 various conditions); Draw projection of lines with different conditions (Five problems).	08
6	<b>Projections of Planes:</b> Draw projections of different planar entities with different conditions; (Triangle, square/rectangular, pentagonal, hexagonal and circular – One for each) (Five problems).	04
7	<b>Orthographic Projections:</b> Draw Orthographic projections of different objects (three views of each object) (Four problems).	08
8	<b>Isometric Projections:</b> Draw isometric drawing from given orthographic views (Four problems).	08
9	<b>AutoCAD:</b> Draw basic 2D entities like: Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using AutoCAD (Print out should be a part of progressive assessment)	06

### Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Drawing instruments for class room teaching (Large Size).
2	Models of various objects (Mechanical, Electrical, Civil etc.).
3	Set of various drawings being used by industries/ developed by experienced teachers.
4	Drawing Board (B2) & Mini Drafter.
5	Other Instruments: T-Square, Set square (45° and 30°-60°), Roller Scale, Protector, Drawing Compass, Dividers, Drawing Pencils (Clutch Pencil with H & 2H Lead), Lead Box (H & 2H - 0.5 or 0.7 mm) Circle Master, French Curves, Stencils (8-6-4 mm, All in One), Eraser, Drawing sheets, Drawing Pins/Clips, Sheet Container and Drawing instrument box.
6	Interactive board with LCD overhead projector
7	CAD Workstation: i7, 2 GB RAM, 320 GB HDD, 17" Screen, 1 GHz. (Minimum requirement)
8	Plotter: Print resolution Up to 1200 x 600 dpi, 16 MB Memory
9	Licensed latest network version of AutoCAD software

### Suggested Learning Websites

Sr. No.	Name of Website
1	<a href="https://nptel.ac.in/courses/112/103/112103019">https://nptel.ac.in/courses/112/103/112103019</a>
2	<a href="https://nptel.ac.in/courses/112/105/112105294">https://nptel.ac.in/courses/112/105/112105294</a>
5	<a href="http://www.cognifront.com/tools.php">http://www.cognifront.com/tools.php</a>
6	<a href="https://www.ncvtonline.com/2022/07/engineering-drawing-instruments.html">https://www.ncvtonline.com/2022/07/engineering-drawing-instruments.html</a>
7	<a href="https://www.iitg.ac.in/rkbc/ME111/Lecture2%20Geometrical%20construction.pdf">https://www.iitg.ac.in/rkbc/ME111/Lecture2%20Geometrical%20construction.pdf</a>

### Reference Books

Sr. No.	Name of Reference Books
1	A Text Book of Engineering Graphics by P.J.Shah S.Chand & Company Ltd., New Delhi.
2	Engineering Drawing by B. Agrawal and C M Agrawal, Tata McGraw Hill, New Delhi.
3	Elementary Engineering Drawing by N.D.Bhatt Charotar Publishing House, Anand.
4	A text book of Engineering Drawing by R.K.Dhawan, S.Chand & Company Ltd., New Delhi.
5	A text book of Engineering Drawing by P.S.Gill, S.K.Kataria & sons, Delhi.
6	Engineering Drawing by M.B. Shah, B.C. Rana, Pearsons.
7	Engineering Drawing Practices for School and Colleges SP 46:2003 Bureau of Indian Standards Bureau of Indian Standards, Government of India, Third Reprint.
8	AutoCAD 2020: A Problem-solving Approach, Basic and Intermediate by Sham Tickoo 26th Edition, CAD/CIM Technologies, 2019