



SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology



Mechanical Engineering Department
B. Tech. Semester V

Course Name: Computer aided Drawing **Course Code:** BTME15503

Type of course: Open Elective Course

Prerequisite: Engineering Graphics and Design

Rationale of course: This course is designed to develop the knowledge and experience of engineering drawing using software. Students will be able to use graphical software to generate necessary engineering drawings with high precision and less time. The engineering drawing practices using software are important for the students to make them aware of drafting practices, symbols, codes, norms and standards generally used in industries.

Teaching and Examination Scheme:

Teaching scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Contents:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Introduction to Computer Aided Drawing: Types of drawings, lettering and lines, geometric construction, freehand sketching, orthographic and isometric projection, sectioning, dimensioning, industrial standards for drawing. Fundamentals of computer aided drawing and its applications, computer aided drawing process and various softwares. Principles of computer aided drawing: Computer configurations and peripherals.	4	10 %



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Sr. No.	Topics	Teaching Hrs.	Module Weightage
2	<p>Basic Commands in Computer Aided Drawing:</p> <p>Co-ordinate systems- cartesian and polar, absolute and relative mode, UCS (user coordinate system), WCS (world coordinate system).</p> <p>File menu commands: new, open, save, save as and close, basic 2D commands- line, circle, ellipse, multi-line, construction line, polyline, point, donut, ellipse, polygon, rectangle, arc, erase, snap, redraw, regenerate, zoom, pan. Edit commands- copy, move, rotate, mirror, offset, array, scale, stretch, lengthen, trim, extend, break, chamfer, fillet, block, insert, explode.</p>	8	20 %
3	<p>Advanced 2D Commands:</p> <p>Layer command with sub commands, line type, color, hatch. Dimension commands: linear, aligned, arc length, radius, diameter, centre, leader, baseline and continuous dimensioning, tolerance, override and dimension updates. Text and dtext commands with text style. 3D commands- units, elevation, thickness, UCS and UCS icon, viewports, extrude. 3D solids- sphere, box, cylinder, cone, wedge, interference. 3D surface- revolved, tabulated and ruled surfaces. Hide, render and shade of 3D drawings.</p>	12	25 %
4	<p>2D Drawing in Computer Aided Drawing:</p> <p>Conventional representation of materials, machine components, drawing of machine elements and simple parts, selection of views, additional views for the machine elements and parts with every drawing proportion. Popular forms of fasteners such as screw threads, bolts, nuts, stud bolts, tap bolts, set screws. Production drawing including surface roughness values, tolerances, limits, geometrical tolerances/symbols.</p>	13	25 %



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Sr. No.	Topics	Teaching Hrs.	Module Weightage
5	<p>3D Drawing in Computer Aided Drawing:</p> <p>Solid Modelling Tools:</p> <p>Solid creation- extrude, revolve, sweep, loft, rib, web, emboss, hole, thread, box, cylinder, sphere, torus, coil, pipe, pattern, mirror, thicken, boundary fill. Solid Modify- press-pull, fillet, chamfer, shell, draft, scale, combine, offset face, replace face, split face, split body, silhouette. Assembly Tools- creating components, reusing components, positioning components, importing components from the browser, move, copy process, assembly constraints, introducing joints using the rigid joint type, working with the different types of joints.</p>	8	20 %

Percentage Distribution of Marks as per Bloom’s Taxonomy (Theory/Practical):

% Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	30	10	05	05

Legends: R: Remembrance, U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create

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



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Reference Books:

Sr. No.	Title of book /article	Author(s)	Publisher	Publication Year	Publication Edition
1	Manual of Engineering Drawing	Colin H Simmons	Elsevier	2012	4 th
2	Engineering Graphics with AutoCAD	D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar	PHI India	2010	1st
3	Computer Aided Engineering Drawing	<u>S. Trymbaka Murthy</u>	I K International Publishing House Pvt. Ltd.	2013	3 rd
4	Production Drawing	K. L. Narayana	New Age International Pvt Ltd	2014	3 rd
5	Technical Drawing 101 with AutoCAD 2017	Douglas Smith, <u>Antonio Ramirez, Jana Schmidt</u>	SDC Publications	2016	1 st

Course Outcomes (COs):

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Recognize the basics of computer aided drawing software and selection of suitable software.	10 %
CO-2	Apply basic commands of computer aided drawing with geometrical data.	18 %
CO-3	Select and practice 2D commands for a specified drawing.	26 %
CO-4	Design a detailed 2D drawing of a component with all the specifications.	28 %
CO-5	Construct a 3D drawing of a component using software tools and illustrate the application of computer aided drawing for the generation of production drawing with geometric tolerances.	18 %



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Mapping of (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	2	1	0	1	1	0	1	2	2	1	1	1			
CO-2	3	2	2	1	2	1	1	0	1	1	1	2			
CO-3	3	3	3	1	3	1	0	1	2	2	1	2			
CO-4	3	3	2	3	3	2	0	2	3	2	2	2			
CO-5	3	3	3	3	3	1	0	1	2	2	2	2			
Rationale*	14	12	10	9	12	5	2	6	10	8	7	9			

***Rationale of CO-PO Mapping:**

This course will help students to solve engineering problems reaching substantiated conclusions; moreover students can create, select and apply appropriate techniques, resources and modern engineering and software tools to complex engineering activities with an understanding of the limitations.

This course highly maps with Program outcomes 1, 2, 3, 4, 5, 9 and 12. It states that the course will develop Engineering knowledge, Problem analysis, Design / development of solutions. Conduct investigations of complex problems, Modern tool usage, Individual and teamwork and life-long learning.

List of Practical:

1. Demonstration and practice of initial setting commands in computer aided drawing.
2. Demonstration of computer aided drawing tools.
3. Demonstration and practice of 2D commands.
4. Demonstration and practice of advanced 2D commands.
5. Demonstration and practice of 3D commands
6. Prepare 2D drawing of a component using computer aided drawing software tools.
7. Prepare 3D drawing of a component using computer aided drawing software tools.
8. Generate assembly and production drawings using computer aided drawing software tools.



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Student activities:

1. 2D and 3D production drawings of mechanical components (Mechanical engineering).
2. Electrical power circuit drawing, electrical schematic drawings with standards symbols (Electrical engineering).
3. PCB circuit and loop drawings, control panel layout drawings (Electronics and Computer engineering).
4. Drawing of structures and layout of the building (Civil engineering).
5. Drawing of distillation columns (Chemical engineering).

Major Equipment:

1. Computational and software facilities

List of Open Source/learning website:

1. <https://nptel.ac.in/courses/112105294>
2. <https://nptel.ac.in/courses/112104172>
3. <https://academy.autodesk.com/curriculum/introduction-cad-and-cae>