



CVM
UNIVERSITY

Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Mechanical Engineering)

Semester: VI

Course Code: 202090601

Course Title: Computer Aided Design

Course Group: Professional Core Course-XIII

Course Objectives: Computers have become inevitable in today era and find their application in various stages of product development. This course intends to introduce students to use of computers in the phases of product design viz. conceptualization, geometric modelling, graphical representation, and simulation.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	4	50 / 18	50 / 17	25 / 9	25 / 9	150/53

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction: A typical product cycle, CAD tools for the design process of product cycle, CAD / CAM system evaluation criteria, Applications and benefits of CAD Input / Output devices; Graphics Displays: Refresh display, DVST, Raster display, pixel value and lookup table, estimation of graphical memory, LCD, LED fundamentals.	5
2	Concept of Coordinate Systems: Working Coordinate System, Model Coordinate System, Screen Coordinate System. Line and Curve generation algorithm: DDA, Bresenham's algorithms. Graphics exchange standards and Database management systems.	5
3	Geometric Modelling: Parametric representation of lines: Locating a point on a line, parallel lines, perpendicular lines, distance of a point, Intersection of lines. Parametric representation of circle, Ellipse, parabola and hyperbola. Synthetic Curves: Concept of continuity, Cubic Spline: equation, properties and blending. Bezier Curve: equations, properties; Properties and advantages of B-Splines and NURBS. Various types of surfaces along with their typical applications.	9



4	Mathematical representation of solids: Geometry and Topology, Comparison of wireframe, surface and solid models, Properties of solid model, properties of representation schemes, Concept of Half-spaces, Boolean operations. Schemes: B-rep, CSG, Sweep representation, ASM, Primitive instancing, Cell Decomposition and Octree encoding.	12
5	Geometric Transformations: Homogeneous representation; Translation, Scaling, Reflection, Rotation, Shearing in 2D and 3D; Orthographic and perspective projections. Window to View-port transformation	4
6	Simulation: Computer aided design of Mechanical Elements & Mechanical Assembly with animation. Capabilities of various commercially available software in the area of CAD	10
Total		45

List of Practicals / Tutorials:

1	Introduction to software
2	Sketching features
3	Geometric features
4	Datum commands
5	Creating 3D solids
6	Modifying features
7	Drafting features
8	Generating assembly hierarchy
9	Constructing assembly
10	Generating sequence and animation

Reference Books:

1	Computer Graphics - Hearn & Baker, PHI
2	CAD/CAM: Computer Aided design and Manufacturing by Mikell Groover and Zimmer, Pearson Education
3	Mathematical Elements for Computer Graphics - David F. Rogers & J. Alan Adams, McGraw Hill
4	CAD/CAM Theory & Practice by Ibrahim Zeid, Tata Mc Graw Hill
5	Computer Graphics & design by P. Radhakrishnan, C.P. Kothanadaraman, New Age publication
6	Computer Aided Engineering & Design by Jim Browne, New Age International Publications
7	CAD/CAM: Computer Aided Design and Computer Aided Manufacturing by P K Jain, S Chand

Supplementary learning Material:

1	NPTEL resources
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Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations



- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Course Projects

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
10%	20%	50%	10%	5%	5%	

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.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand and appreciate use of computer in product development.	20
CO-2	Apply algorithms of graphical entity generation.	30
CO-3	Understand mathematical aspects of geometrical modelling.	30
CO-4	Simulation and Animation of models.	20

Curriculum Revision:

Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	June-2025