

ME318 Computer Aided Manufacturing

L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

Objective: To enable the students to understand the fundamentals of CAD, elements of CAD, and Computer Graphics. To understand Fundamentals of Geometric Modeling, part programming and Group Technology.

Syllabus							Contact Hours
Unit-1	Introduction: Introduction to CAD. Elements and essential requirements of CAD hardware. Concepts of integrated CAD/CAM, Necessity & its importance, Engineering Applications.						5
Unit-2	Computer Graphics: CAD/CAM systems, Graphics Input devices cursor control Devices, Digitizers, Keyboard terminals, Image scanner, Speech control devices and Touch, panels, Graphics display devices-Cathode Ray Tube, Random & Raster scan display, Colour CRT monitors, Direct View Storage Tubes, Flat Panel display.						6
Unit-3	Geometric Modeling: Fundamentals of Geometric Modeling. Its application in analysis and manufacturing. Two Dimensional and Three-dimensional line, surface and volume models; Constructive Solid Geometry (CSG); basics of boundary presentation- spline, Bezier, B-spline, and NURBS; sculpture surfaces, classification, basics of coons, Bezier, B-spline and ruled surfaces; tweaking, constraint based parametric modeling; wire-frame modeling, definition of point, line and circle; polynomial curve fitting. Introduction to rapid prototyping.						8
Unit-4	Numeric control and part programming: Principles of NC machines, CNC, DNC; NC modes of point to point, -line and 2D, 3D contouring; NC part programming; ISO standard for coding, preparatory functions (G)- motion, dwell, unit, preset, cutter compensation, coordinate and plane selection groups; miscellaneous (M) codes; CLDATA and tool path simulation; adaptive control, sequence control and PLC; simple part programming examples.						7
Unit-5	Group Technology: Importance of batch and job shop production; merits of converting zigzag process layout flow to smooth flow in cellular layout, Production Flow Analysis (PFA) and clustering methods; concept of part families and coding; hierarchical, attribute and hybrid coding; OPITZ, MICLASS and DCLASS coding; FMS; material handling; robots, AGV and their programming; agile manufacturing; Introduction to Computer Aided Process Planning (CAPP).						8
Unit-6	Robotics: Introduction to robots. Types and generations of Robots, Classification of Robots. Structure and operation of Robot, Robot applications in manufacturing industries. Robot languages and programming methods. Introduction to Artificial Intelligence for Intelligent manufacturing.						8
Total							42

Reference Book:

1	Principles of Computer Aided Design and Manufacturing; FaridAmirouche; Pearson.
2	CAD/CAM Theory and Practice by Ibrahim Zeid.
3	CAD/CAM Principles and Applications by P.N. Rao, Tata McGraw Hill Publishing Company Ltd.
4	CAD/CAM Computer Aided Design and Manufacturing by Mikell P. Groover and Emory W. Zimmer, Jr.
5	Computer Integrated Design and Manufacturing by David D. Bedworth, Mark R. Henderson, Philip M. Wolfe.

Course Outcomes

CO1	Recognize the importance of CAD, CAM, CIM, Engineering product specification and interpreting geometric specifications.
CO2	Improve knowledge on the integration of CAD and CAM.
CO3	Exhibit competency in manual part program and generation of CNC part program using CAM packages.
CO4	Describe the implementation of CAD and CAM in manufacturing processes.
CO5	Develop programs for CNC to manufacture industrial components.
CO6	To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Material Handling system

CO-PO/PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	1	0	1	0	0	3	3	2	2
CO2	2	3	3	2	1	1	0	1	2	0	2	2	2	2	2
CO3	2	2	2	3	1	1	0	0	0	0	0	3	3	1	1
CO4	3	3	3	3	2	2	1	0	1	0	0	3	3	2	2
CO5	2	3	3	2	1	1	0	1	2	0	2	2	2	2	2
CO6	2	2	2	3	1	1	0	0	0	0	0	3	3	1	1