

## Computer Aided Design/ Computer Aided Manufacturing

VII Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AME018	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

**COURSE OBJECTIVES:**  
The course should enable the students to:

- I. Understand the concepts of implementation of automation and PLMS in industries practicing CIM.
- II. Recognize the need of computer graphics in seamless manufacturing environment.
- III. Summarize the historical development o CAD/CAM software and CNC Technology.
- IV. Categorize the creation of group technology of part families and end-end utility.

**COURSE OUTCOMES:**

CO 1: Understand the basic foundation in computer aided design /manufacturing.  
CO 2: Understand the fundamentals used to create and manipulate geometric models.  
CO 3: Learn working principles of NC machines CNC control and part programming.  
CO 4: Understand concept of Group Technology, FMS, CAPP.  
CO 5: Understand the concept of Computer integrated manufacturing.

**COURSE LEARNING OUTCOMES (CLOs):**

- 1. Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics.
- 2. Demonstrate the ability to create concepts design solutions through CAD tools that can be manufactured using CNC machinery.
- 3. Understand the Computers in industrial manufacturing, product cycle, CAD / CAM Hardware
- 4. Generate and interpret engineering technical drawings of parts and assemblies according to engineering design standards.
- 5. Understand of the principles of CAD/CAM, including engineering drawing, geometric and surface modeling, and feature-based design.
- 6. Create accurate and precise geometry of complex engineering systems and use the geometric models in different engineering applications.
- 7. Compare the different types of modeling techniques and explain the central role solid models play in the successful completion of CAD/CAM-based product development.
- 8. Explain Synthetic curves and the concept of NURBS.
- 9. Explain the basic concepts of CNC programming and machining.
- 10. Develop CNC programs to manufacture industrial components.
- 11. Generate tool path for part and to create CNC manual part program and APT part program.
- 12. Apply the concepts of machining for the purpose of selection of appropriate machining centers, machining parameters, select appropriate cutting tools for CNC milling and turning.
- 13. Understand grouping of similar parts through group technology and developing automated process plans through computer aided process planning.
- 14. Illustrate group technology, computer aided quality control.
- 15. Understand different elements of robotic systems. Also understand the different components and design of FMS.
- 16. Apply the contact and non-contact types inspection with computer aided testing with integration of computer aided quality with CAD/CAM.
- 17. Understand automated material handling systems and integration of material handling and storage.
- 18. Analyze various automated flow lines and line balancing problem.

19. Design automated material handling and storage systems for a typical production system. 20. Apply the concepts/components of computer integrated manufacturing and integrate them. 21. Understand data management and its important for decision making in computer integrated manufacturing system.		
<b>UNIT I</b>	<b>FUNDAMENTAL CONCEPTS IN CAD</b>	<b>Classes: 09</b>
Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices, raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.		
<b>UNIT II</b>	<b>GEOMETRICAL MODELLING AND DRAFTING SYSTEMS</b>	<b>Classes: 09</b>
Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, solid modeling, modeling facilities desired, Basic geometric commands, layers, display control commands, editing, dimensioning.		
<b>UNIT III</b>	<b>COMPUTER AIDED MANUFACTURING</b>	<b>Classes: 09</b>
Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of machining center, turning center; CNC part programming: fundamentals, manual part programming methods, computer aided part programming.		
<b>UNIT IV</b>	<b>GROUP TECHNOLOGY, CAPP AND CAQC</b>	<b>Classes: 09</b>
Group technology: Part family, coding and classification, production flow analysis, advantages and limitations, computer Aided Processes Planning, Retrieval type and generative type, terminology in quality control, the computer in QC, contact inspection methods, non-contact inspection methods, optical, computer aided testing, integration of CAQC with CAD/CAM.		
<b>UNIT V</b>	<b>COMPUTER INTEGRATED MANUFACTURING SYSTEMS</b>	<b>Classes: 09</b>
Types of manufacturing systems, machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.		
<b>Text Books:</b>		
1. William M Neumann and Robert F.Sproull, “Principles of Computer Graphics”, McGraw-Hill Book Co. Singapore, 1 <sup>st</sup> Edition, 1989. 2. Ibrahim Zeid, “Mastering CAD/CAM”, McGraw-Hill, 1 <sup>st</sup> Edition, 2007. 3. K. Lalit Narayan, K. Mallikarjuna Rao and M.M.M. Sarcar, Computer Aided Design Manufacturing, PHI, 1 <sup>st</sup> Edition, 2008.		
<b>Reference Books:</b>		
1. Yoram Koren, “Computer Control of Manufacturing Systems”, McGraw-Hill, 1 <sup>st</sup> Edition, 1983. 2. Groover, M. P, Zimmers, E. W., “CAD/CAM: Computer Aided Design Manufacturing”, Pearson Education India, 1 <sup>st</sup> Edition, 2006.		