

## CAD/CAM

<b>VII Semester: ME</b>																																						
Course Code	Category	Hours / Week			Credits	Maximum Marks																																
AMEB26	Core	L	T	P	C	CIA	SEE	Total																														
		3	-	-	3	30	70	100																														
<b>Contact Classes: 45</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: Nil</b>			<b>Total Classes: 45</b>																															
<p><b>I. COURSE OVERVIEW:</b></p> <p>Computer aided Design/ Computer aided Manufacturing (CAD/CAM) is a course primary important to mechanical engineering students. The aim is to impart the overview of computer applications or design and manufacturing the discrete engine components, assemblies and final product to meet the global competition. The course covers the life cycle of a product describes the product model generation, analysis structural, thermal, dynamic behaviours. This course also deals with creation of synthetic curves and surfaces. It imposes the knowledge o latest manufacturing techniques using CNC/DNC Machines centres with different CNC programming methods, Manufacturing processes, Group Technologies. It makes the student to understand the modern inspection methods and concepts of CIM.</p> <p><b>II. OBJECTIVES:</b></p> <p><b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>I. Understand the concept of implementation automation and PLMS in industries practicing CIM.</li> <li>II. Recognize the need of computer graphics in seamless manufacturing environment.</li> <li>III. Summarize the historical development of CAD/CAM software and CNC Technology.</li> <li>IV. Categorize the creation of group technology of part families and end-end utility.</li> </ol> <p><b>III. COURSE OUTCOMES:</b></p> <p><b>After successful completion of the course, students should be able to:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">CO 1</td> <td style="width: 70%;">Simplify the integration of CAD, CAM and other systems with support of hardware and software for product life cycle management.</td> <td style="width: 20%;">Remember</td> </tr> <tr> <td>CO 2</td> <td>Illustrate downstream applications to a computer aided design system, including computer-aided manufacturing and rapid prototyping to digital manufacturing.</td> <td>Understand</td> </tr> <tr> <td>CO 3</td> <td>Analyze the complex mechanical designs with available geometric modeling tools and software packages for product life cycle management.</td> <td>Understand</td> </tr> <tr> <td>CO 4</td> <td>Compare various computer-controlled machine tools with respect to their functional capacity.</td> <td>Apply</td> </tr> <tr> <td>CO 5</td> <td>Develop the computer assisted process plan to manufacture the products in automated plants with tailor made plant layouts..</td> <td>Understand</td> </tr> <tr> <td>CO 6</td> <td>Design the various operations of the manufacturing plant through computer-controlled machine tool systems to produce products.</td> <td>Understand</td> </tr> <tr> <td>CO 7</td> <td>Organize the computer-controlled monitoring and material handling management system for computer integrated manufacturing systems.</td> <td>Understand</td> </tr> <tr> <td>CO 8</td> <td>Adapt the existing automated systems to similar business organizations in present global market.</td> <td>Understand</td> </tr> <tr> <td>CO 9</td> <td>Recall the different quality control methods and various contact and non-contact inspection methods used in various manufacturing systems.</td> <td>Understand</td> </tr> <tr> <td>CO 10</td> <td>Select the appropriate machining centers, machining parameters to digital manufacturing.</td> <td>Understand</td> </tr> </table>									CO 1	Simplify the integration of CAD, CAM and other systems with support of hardware and software for product life cycle management.	Remember	CO 2	Illustrate downstream applications to a computer aided design system, including computer-aided manufacturing and rapid prototyping to digital manufacturing.	Understand	CO 3	Analyze the complex mechanical designs with available geometric modeling tools and software packages for product life cycle management.	Understand	CO 4	Compare various computer-controlled machine tools with respect to their functional capacity.	Apply	CO 5	Develop the computer assisted process plan to manufacture the products in automated plants with tailor made plant layouts..	Understand	CO 6	Design the various operations of the manufacturing plant through computer-controlled machine tool systems to produce products.	Understand	CO 7	Organize the computer-controlled monitoring and material handling management system for computer integrated manufacturing systems.	Understand	CO 8	Adapt the existing automated systems to similar business organizations in present global market.	Understand	CO 9	Recall the different quality control methods and various contact and non-contact inspection methods used in various manufacturing systems.	Understand	CO 10	Select the appropriate machining centers, machining parameters to digital manufacturing.	Understand
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CO 11	<b>Develop</b> NC part program data using manual data input (MDI) and automatically using standard commercial CAM package for manufacturing of required component using CNC milling or turning applications.	Apply
CO 12	<b>Demonstrate</b> the technical documentation for Design/Selection of suitable drive technologies and of the product design process and product life cycle management.	Understand
CO 13	<b>Explain</b> the roles of computer-aided design and manufacturing that plays in support o and precision components using appropriate multi-axis CNC Technology.	Understand

#### IV. SYLLABUS:

<b>MODULE-I</b>	<b>FUNDAMENTAL CONCEPTS IN CAD</b>	<b>Classes : 09</b>
Fundamentals of CAD/CAM, Design process, Application of computers for design, Product cycle-CAD/CAM approach, Benefits of CAD, computer peripherals, Graphics terminal CAD software, Definition of system software and application software, Functions of Graphics package, Graphics packages in present industry, CAD database and structure.		
<b>MODULE-II</b>	<b>GEOMETRICAL MODELLING AND DRAFTING SYSTEMS</b>	<b>Classes : 09</b>
Wire frame modeling- wire frame entities and their definitions, interpolation and approximation of curves, concepts of parametric and non-parametric representation, curve fitting techniques, Characteristics of Bezier and B-spline curves, NURBS. Surface modeling: Surface modeling entities, blending functions, Parameterization of surface patch, sub dividing. Applications of Surface Modeling. Solid modeling: Solid modeling entities-Boolean operations, sweep representation, Constructive Solid geometry, Boundary representation, Hybrid Modeling. Applications of Solid Modeling		
<b>MODULE-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>MODULE-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, noncontact inspection methods-optical, noncontact inspection methods-non-optical, computer aided testing, integration of CAQC with CAD/CAM.		
<b>MODULE-V</b>	<b>COMPUTER INTEGRATED MANUFACTURING SYSTEMS</b>	<b>Classes: 09</b>
Flexible Manufacturing System: FMS Equipment, FMS layouts Benefits of FMS, Computer Aided Quality Control: Automated inspection, Contact and non-contact Inspection methods, co-ordinate measuring machines, machine vision, Computer Integrated Manufacturing: CIM systems, Benefits of CIM.		

#### V. Text Books:

1. William M Neumann and Robert F.Sproull “Principles of Computer Graphics”, McGraw Hill Book Co. Singapore, 1989.
2. Ibrahim Zeid, “Mastering CAD/CAM”, McGraw Hill, International Edition, 2007.
3. K. Lalit Narayan, K. Mallikarjuna Rao and M.M.M. Sarcar, “Computer Aided Design Manufacturing”, PHI, 2008

**VI. Reference Books:**

1. YoramKoren, “Computer Control of Manufacturing Systems”, McGraw Hill. 1983.
2. Groover, M. P. and Zimmers, E. W., “CAD/CAM: Computer Aided Design & Manufacturing”, Pearson Education India, 2006.

**VII. Web References:**

- 1.[http:// nptel.ac.in/courses/112102101/](http://nptel.ac.in/courses/112102101/)
- 2.<http://nptel.ac.in/courses/112102103/>
- 3.<https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-i-spring-009/lecturenotes/>

**VIII. E-Text Book:**

1. <https://elsevier.com/books/curves-and-surfaces-for-cagd/farin/978-1-55860-737-8>
2. <http://springer.com/in/book/9789401171229>