Computer Aided Design/ Computer Aided Manufacturing

VII Semester: ME

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

COURSE OBJECTIVES:

The students will try to learn:

I	The product designs, manufacturing processes, and production plant as critical base for the interface and integration of CAD/CAM.
II	The assimilation of all product life cycle systems using computer controlled networks, integrated systems software and secondary information technologies.
III	Implementation of computer aided design techniques, digital in seamless way in the manufacturing automation for product life management systems.
IV	Identify the quality parameters by adopting the contact and non-contact type of inspection techniques.

COURSE OUTCOMES:

CO 1	**Simplify** the integration of CAD, CAM and other systems with support of hardware and software for product life cycle management.
CO 2	**Illustrate** downstream applications to a computer aided design system, including computer-aided manufacturing and rapid prototyping to digital manufacturing.
CO 3	**Analyze** the complex mechanical designs with available geometric modeling tools and software packages for product life cycle management
CO 4	**Compare** various computer controlled machine tools with respect to their functional capacity.
CO 5	**Develop** the computer assisted process plan to manufacture the products in automated plants with tailor made plant layouts.
CO 6	**Design** the various operations of the manufacturing plant through computer controlled machine tool systems to produce products.
CO 7	**Organize** the computer controlled monitoring and material handling management system for computer integrated manufacturing systems.
CO 8	**Adapt** the existing automated systems to similar business organizations in present global market
CO 9	**Recall** the different quality control methods and various contact and non-contact inspection methods used in various manufacturing systems.
CO 10	**Select** the appropriate machining centers, machining parameters to digital manufacturing.
CO 11	**Develop** 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.
CO 12	**Demonstrate** the technical documentation for Design/ Selection of suitable drive technologies, precision components using appropriate multi-axis CNC Technology
C0 13	**Explain** the roles of computer-aided design and manufacturing that plays in support of the product design process and product life cycle management.

UNIT I	FUNDAMENTAL CONCEPTS IN CAD	Classes: 09
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.		
UNIT II	**GEOMETRICAL MODELLING AND DRAFTING SYSTEMS**	**Classes: 09**
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.		
UNIT III	**COMPUTER AIDED MANUFACTURING**	**Classes: 09**
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.		
UNIT IV	**GROUP TECHNOLOGY, CAPP AND CAQC**	**Classes: 09**
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.		
UNIT V	**COMPUTER INTEGRATED MANUFACTURING SYSTEMS**	**Classes: 09**
Types of manufacturing systems, machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.		

Text Books:

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

Reference Books:

1. Yoram Koren, "Computer Control of Manufacturing Systems", McGraw-Hill, 1st Edition, 1983.
2. Groover M. P, Zimmers. E. W., "CAD/CAM: Computer Aided Design Manufacturing", Pearson Education India, 1st Edition, 2006.