

Branch Name:	Mechanical Engineering
Semester/Year:	Semester VIII / Forth Year
Subject Title:	Computer Aided Manufacturing
Subject Code:	1ET1010801
Pre-requisite:	Manufacturing Processes-I, Production Technology

Course Objectives:

1. To educate students by covering different aspects of computer aided manufacturing.
2. Understand different advances in manufacturing system like: GT, CAPP and FMS
3. To understand the different computer integrated production management system.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
04	00	02	05	70	30	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weightage (%)	
1	Introduction: CAM concepts, objectives & scope, nature & type of manufacturing system, evolution, benefits of CAM, role of management in CAM, hardware and software requirement for CIMS, benefits, scope and needs, CIMS wheel, elements of CIMS and their role, database requirement, fundamentals of communication, database models, DBMS architecture.	06	12	
2	Computer Numerical Control (CNC): Basic components of an NC & CNC system, coordinate system and motions control systems. Computer Numerical Control (CNC): features of CNC, machine control unit, CNC hardware and software. Direct Numerical Control and Distributed Numerical Control, applications, advantages and disadvantages of CNC, adaptive control of machining system. Programmable Logic Controllers: Relay Device components, Programmable controller architecture, programming a programmable controller, tools for PLC logic design.	08	16	
3	Part Programming: Fundamentals of manual part programming, types of format, word address format manual part programming for drilling, lathe and milling machine operations, subroutines, do loops, canned cycles, parametric sub routines. Computer assisted part programming: need, list of computer assisted programming languages, Automated programmed tools language: its types of statement, command and programming CAD based CNC programming using CAM software.	10	20	
4	Group Technology and CAPP: Introduction, part families, part classification and coding systems: OPITZ, PFA, FFA, Cell design, rank order clustering, composite part concepts, benefits of group technology, approaches to Process Planning, different CAPP system, application and benefits.	08	16	

5	Flexible Manufacturing System: Introduction & component of FMS, needs of FMS, general FMS consideration, objectives, types of flexibility and FMS, FMS layout and advantages. Automated material handling system: Types and application, automated storage and retrieval System, automated guided vehicles, cellular manufacturing, tool Management, tool supply system, tool Monitoring System, flexible assembly systems.	08	12
6	Robot Technology: Introduction: Robot Anatomy, Laws of Robot, Human System and Robotics, Coordinate system, Specifications of Robot. Power sources, actuators and Transducers, Robotic Sensors, Grippers, Robot Safety, Robot Programming and Robot Applications, Economic Considerations of Robotics system, Robot Kinematics and Dynamics, Robot Arm Dynamics. Concepts of Computer Vision and Machine Intelligence.	06	08
7	Computer aided Production planning and control: Introduction to Computer aided production planning , application of computers, materials requirement planning with case study, capacity planning and data collection systems, shop floor control and monitoring systems, inventory control, JIT approach, lean Manufacturing	06	08
8	Integrated Production Management System: Introduction, PPC fundamentals, Problems with PPC, MRP-I, MRP-II. Concepts of Expert System in Manufacturing and Management Information System.	04	08

Course Outcomes:

The student will be able to

1. Predict the understand computer aided manufacturing technology, through programming, setup, and operations of various computer numerical control (CNC) machine tools.
2. Prepare programmes various CNC machine tools.

List of Reference Books:

1. Groover Mikell P., "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall India, 1991.
2. Groover Mikell P. and Emory Zimmers W., "CAD/CAM: Computer Aided Design and Manufacturing", Prentice Hall India, 1991.
3. Ibrahim Zeid, "CAD/CAM Theory and Practice", Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2010.
4. Kundra T. K., Rao P. N. and Tewari N. K., "Numerical Control & Computer Aided Manufacturing", Tata McGraw Hill, 1990.
5. Sinha S. K., "CNC Programming", Galgotia Publications, 2004
6. Rao P N., "CAD/CAM: Principles and Applications", Tata McGraw Hill, 2006.

List of Practical:

1. NC/CNC technology: Definition, classification, specification, construction details, sensors and actuators, and different controllers.
2. To study different hardware and software used in CNC machine.
3. Demonstration and study of CNC lathe machine with sample programming.
4. Demonstration of CNC milling machine with user interface and understanding of coordinates of given geometry in absolute & incremental mode of cutter path.
5. Write the CNC Milling part programming: Lathe job.
6. Write the CNC Milling part programming: Milling job.
7. To study about flexible manufacturing system.
8. To study about Robotics Technology.
9. A case study on MRP.
10. To Study on expert system in manufacturing and MIS

E-Resources:

1. <https://nptel.ac.in/courses/112102103/>
2. [https://www.seminarsonly.com/mech%20&%20auto/Computer%20Aided%20Process%20Planning%20\(CAPP\).php](https://www.seminarsonly.com/mech%20&%20auto/Computer%20Aided%20Process%20Planning%20(CAPP).php)
3. <http://www.engineersgallery.com/computer-aided-manufacturing-cam/>
4. http://shodhganga.inflibnet.ac.in/bitstream/10603/117938/12/12_chapter%202.pdf
5. <http://www.ceet.niu.edu/faculty/kim/mee430/chapter-8.pdf>
6. <http://www.psnacet.edu.in/courses/Mechanical/CAM/lecture2.pdf>
7. <https://www.autodesk.com/products/fusion-360/blog/computer-aided-manufacturing-beginners/>