

Branch Name:	Mechanical Engineering (CAD/CAM) Mechanical Engineering (Production Technology)
Program Code:	ET201, ET209
Course Name:	Computer Integrated Manufacturing
Course Code:	2ET2010301T
Pre-requisite Course:	UG level subjects on CAD, CAM and Industrial Engineering

Course Objectives:

1. To use computers in the area of manufacturing to reduce manual processing and linking computers to all the manufacturing machines and increase the productivity, reduce the unnecessary costs.
2. Familiarize with Computer aided quality control and Flexible manufacturing systems.
3. Integrate all production and support process using computer network, cross-functional business software and other information technologies.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
03	03	-	-	03	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: The Scope of CAD/CAM and CIM, Computerized elements of a CIM System, Components of CIM, Database for CIM, Planning, Scheduling and Analysis of CIM Systems.	2	5
2	Manufacturing Automation: Automated Manufacturing Systems, Computerized Manufacturing Support Systems, Reasons for Automation, Ten Strategies for Automation and Process Improvement, Automation Migration Strategy.	4	5
3	Automated Flow lines: System Configurations, Work part Transfer Mechanisms, Storage Buffers, Control of Production Line, Analysis of Transfer Lines-Transfer Lines with No Internal Parts Storage, and Transfer Lines with Internal Storage Buffers.	4	5
4	Automated Assembly Systems: System Configurations, Parts Delivery at Workstations, Applications, Quantitative Analysis of Assembly Systems- Parts Delivery System at Workstations, Multi-station Assembly machines, Single Station Assembly Machines, Partial Automation.	5	15

5	Automatic Material Handling and Storage systems: Design Considerations in Material Handling, Material Transport Equipment-Industrial Trucks, Automated Guided Vehicles, Monorails and Other Rail-Guided Vehicles, Conveyors, Cranes and Hoists, Analysis of Vehicle Based Systems, Conveyor Analysis. Automated Storage/Retrieval Systems, Carousel Storage Systems, Engineering Analysis of AS/RS and Carousel Systems.	5	15
6	Automated Inspection systems: Overview of Automated Identification Methods, Bar Code Technology, Radio Frequency Identification, Other AIDC Technologies-Magnetic Stripes, Optical Character Recognition, and Machine Vision.	6	15
7	Cellular Manufacturing Systems: Part Families, Parts Classification and Coding, Features of Parts Classification and Coding Systems, Opitz of Parts Classification and Coding Systems, Production Flow Analysis, Composite Part Concept, Machine Cell Design, Applications Of Group Technology, Quantitative analysis of Cellular Manufacturing, Grouping of parts and Machines by Rank Order Clustering, Arranging Machines in a GT Cell.	6	20
8	Computer Aided Process Planning: Retrieval CAPP Systems, Generative CAPP Systems, Feature Identification- Algorithms, Graph Based Approach, Attribute Adjacency Graph, Benefits of CAPP.	4	10
9	Flexible Manufacturing Systems: Flexibility, Types Of FMS-A Dedicated FMS, A Random Order FMS, FMS Components-Workstations, Material Handling and Storage Systems, Computer Control System, Human Recourses, FMS Applications and Benefits.	4	10

Review Presentation:

The student is expected to refer at least two peer reviewed journal papers related to this domain/subject so as to identify issues/challenges and emerging trends. Student is supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (4) ieeexplore.ieee.org (5) scholar.google.co.in or others of similar repute.

List of Reference Books:

1. Mikell P Groover, "Automation, production Systems and Computer Integrated Manufacturing", 3rd Edition, Prentice Hall Inc., New Delhi, 2007.
2. Nanua Singh, "System Approach to Computer Integrated Manufacturing", Wiley & Sons Inc., 1996.
3. Andrew Kusiak, "Intelligent Manufacturing System", Prentice Hall Inc., New Jersey, 1992.
4. David Bedworth, "Computer Integrated Design and Manufacturing", 1st Edition 1999, TMH, New Delhi,
5. Yorem Koren, "Computer control Manufacturing Systems", McGraw Hill, 1999.
6. Ranky, Paul G., "Computer Integrated Manufacturing", Prentice Hall International 1999

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the manufacturing automation strategies and derive production metrics.	2 Understanding
CLO2	Explain the knowledge about role of computer and automation in manufacturing.	2 Understanding
CLO3	Analyze automated flow lines and assembly systems, and balance the line.	4 Analyze 3 Applying
CLO4	Learn Computer Aided Process Planning (CAPP) Systems, Cellular Manufacturing Systems and Automated Inspection systems.	2 Understanding
CLO5	develop understanding about Automated Material Handling Systems, Automated Inspection Systems	3 Applying
CLO6	Learn application of Flexible Manufacturing Systems (FMS)	5 Evaluating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	M		M										M	
CLO2				M			M					L	M	
CLO3		M	M						M					M
CLO4	M					M					L		L	
CLO5			M					M				L		L
CLO6					M					M	M			M

H:High, M:Medium, L:Low