



JAIPUR ENGINEERING COLLEGE
AND RESEARCH CENTRE

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE

JECRC Campus ,Shri Ram ki Nangal, Via-Vatika ,Tonk Road, Jaipur

Department of Mechanical Engineering

**Name of Subject: Computer Integrated Manufacturing systems
[CIMS]**

Subject Code: 6ME4-02

Year: 3rd Year, VIth-Semester



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Department of Mechanical Engineering

Vision and Mission of Institute:

Vision: To become a renowned center of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities.

Mission:

M1: Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.

M2: Identify, based on informed perception of Indian, regional and global needs, areas of focus and provide platform to gain knowledge and solutions.

M3: Offer opportunities for interaction between academia and industry.

M4: Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

Vision and Mission of Department:

Vision: The Mechanical Engineering Department strives to be recognized globally for outcome based technical knowledge and to produce quality human resource, who can manage the advance technologies and contribute to society.

Mission:

M1: To impart quality technical knowledge to the learners to make them globally competitive mechanical engineers.

M2: To provide the learners ethical guidelines along with excellent academic environment for a long productive career.

M3: To promote industry-institute relationship.



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Department of Mechanical Engineering

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: To equip graduates with a strong foundation in engineering sciences, with an emphasis on mechanical engineering principles, enabling them to analyze, design, and solve real-world engineering challenges.

PEO2: To prepare graduates with sound scientific and engineering fundamentals to innovate and deliver effective solutions addressing practical challenges in mechanical engineering

PEO3: To inculcate in graduates a professional and ethical attitude, effective communication and teamwork skills, a multidisciplinary approach, entrepreneurial mindset, and the ability to connect engineering solutions with societal and environmental concerns.

PEO4: To provide students with an academic environment that fosters excellence, leadership, adherence to ethical standards, and encourages self-motivated lifelong learning essential for a successful professional career in mechanical

PEO5: To prepare students to excel in industry and higher education by providing quality education grounded in strong technical knowledge and high moral values

Program Specific Outcomes (PSOs)

PSO1: Graduates will be able to design, analyze, and fabricate electric and hybrid vehicles using modern engineering tools and sustainable practices.

PSO2: Graduates will be able to apply design principles and computational techniques, including programming and data structures, to analyze and solve mechanical engineering problems.



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Program Outcomes (POs)

- PO1: Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3: Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
- PO10: Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- PO11: Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)



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Department of Mechanical Engineering

SYLLABUS



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

3rd Year - VI Semester: B.Tech. : Mechanical Engineering

6ME4-02: COMPUTER INTEGRATED MANUFACTURING SYSTEMS (CIMS)

Credit: 3

Max. Marks: 100(IA:30, ETE:70)

3L+0T+0P

End Term Exam: 3 Hours

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction to CIM: Overview of Production Systems, the product cycle, Automation in Production Systems, computer's role in manufacturing, sources and types of data used in manufacturing. The Beginning of CAM: Historical Background,	2
	Numerical Control (NC): Basic components of an NC system, coordinate system and motions control systems. Computer Numerical Control (CNC): features of CNC, machine control unit, CNC software. Direct Numerical Control and Distributed Numerical Control. Applications, advantages and disadvantages of NC. Adaptive control of machining system.	3
3	NC Part programming: Manual and computer assisted part programming, Part programming with APT. NC part programming using CAD/CAM software. NC cutter path verification.	8
4	Computer Aided Process Planning: Traditional Process Planning, Retrieval process planning system, Generative Process Planning, Machinability data systems, computer generated time standards.	4
	Group Technology: Introduction, part families, part classification and coding, coding system and machining cells.	4
5	Computer Aided Production Management Systems: Introduction to computer aided PPC, Introduction to computer aided inventory management, manufacturing resource planning (MRPII), computer process monitoring and shop floor control, computer process control.	6
	Computer Aided Quality Control; Computer in quality control, contact inspection methods, Non contact inspection methods, optical and non optical computer aided testing.	3
6	Computer Aided Material Handling; Computer control on material handling, conveying, picking. Ware house control, computerized material handling for automated inspection and assembly.	3
	Computer Integrated Manufacturing Systems: Introduction, types special manufacturing systems, flexible manufacturing systems (FMS).	5
	Collaborative Engineering; Introduction, Faster Design throughput, Web based design, Changing design approaches, extended enterprises, concurrent engineering, Agile and lean manufacturing.	3
	TOTAL	41



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REFERENCE BOOKS (MSE)

Text Book		
1	Automation, Production Systems, and Computer-Integrated Manufacturing, Mikell P. Groover, 5th Edition, Pearson Education	2020
Reference Books		
1	CAD/CAM: Computer-Aided Design and Manufacturing, Mikell P. Groover & Emory W. Zimmers Jr., 1st Edition, Pearson Education	1984
2	Computer Integrated Manufacturing, James A. Rehg & Henry W. Kraebber, 3rd Edition, Pearson Education	2004
3	CAD/CAM/CIM, P. Radhakrishnan, S. Subramanyan & V. Raju, 4th Edition, New Age International	2018
4	CAD/CAM, M. Adithan & B. S. Pabla, 3rd Edition, New Age International	2010
5	CAD/CAM: Principles and Applications, P. N. Rao, 4th Edition, McGraw-Hill Education	2023



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COURSE OUTCOME

6ME4-02: Computer Integrated Manufacturing Systems Credit: 3

Max.Marks:150 (IA:30, ETE:120) 3L+0T+0P

End Term Exam: 3 Hours

Subject: Computer Integrated Manufacturing Systems

Code: 6ME4-02

CO1: Understand the fundamentals of computer integrated manufacturing and its role in modern industry.

CO2: Analyze CNC machines, robotics, and automated systems used in manufacturing.

CO3: Apply CAD/CAM tools to design and manufacture components efficiently.

CO4: Evaluate system integration, process planning, and automation in manufacturing environments.

CO5: Examine quality control, flexible manufacturing systems (FMS), and production management using CIMS.

CO6: Develop solutions to improve productivity, efficiency, and flexibility in manufacturing systems.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	2	1	1	1	1	1	2	3	2
CO2	3	3	3	3	3	1	1	2	1	1	2	3	3
CO3	3	3	3	3	3	1	1	1	2	1	2	3	3
CO4	3	3	3	3	3	1	1	2	2	1	3	3	3
CO5	3	3	3	3	3	1	1	2	2	1	3	3	3
CO6	3	3	3	3	3	1	1	3	3	2	3	3	3



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Course Plan

Name of the Course : **Computer Integrated Manufacturing Systems**

Code of the course : **6ME4-02**

Name of Faculty : **Mr. Yogesh Dubey**

Course Outcome

CO1: Understand the fundamentals of computer integrated manufacturing and its role in modern industry.

CO2: Analyze CNC machines, robotics, and automated systems used in manufacturing.

CO3: Apply CAD/CAM tools to design and manufacture components efficiently.

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CO5: Examine quality control, flexible manufacturing systems (FMS), and production management using CIMS.

CO6: Develop solutions to improve productivity, efficiency, and flexibility in manufacturing systems.

Unit No.	Topic	LecNo.	CO	Specific Objectives	Expected Outcomes	Primary Reference (Automation, Production Systems, and Computer-Integrated Manufacturing, Mikell P. Groover, 5th Edition, Pearson Education)	
Intro	Introduction to CIM: Overview of Production Systems, the product cycle,	1	CO1	Understand the basic concepts and scope of Computer Integrated Manufacturing.	Understand overview of production	Ch.01	Page 1-5
1	Automation in Production Systems, computer's role in manufacturing,	2	CO1	Learn the role of automation and computers in manufacturing.	Gives computer role in manufacturing	Ch.01	Page 6-18
	Sources and types of data used in manufacturing. The Beginning of CAM: Historical Background,	3	CO1	Understand manufacturing data and the evolution of CAM.	Understand Historical Background	Ch.02	Page 22-24
	Numerical Control (NC): Basic components of an NC system, coordinate system and motions	4	CO1	Learn the basic components and working of NC systems.	Explain NC system	Ch.07	Page 167-171



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	control systems.						
	Computer Numerical Control (CNC): features of CNC, machine control unit, CNC software.	5	CO1	Understand the construction and operation of CNC machines.	Explain CNC system	Ch.02	Page 21-37
	Direct Numerical Control and Distributed Numerical Control	6	CO1	Differentiate between DNC and distributed CNC systems.	Understand NC and DNC system	Ch.07	Page 169-171
	Applications, advantages and disadvantages of NC.	7	CO1	Analyze the applications, benefits and limitations of NC systems.	Gives advantages and disadvantages	Ch.07	Page 176-178
	Adaptive control of machining system.	8	CO2	Understand the principles and applications of adaptive control.	uses of adaptive control machining system	Ch.05	Page 106-108
2	NC Part programming	9	CO2	Learn the fundamentals of NC part programming.	Understand part programming	Ch.07	Page 186-195
	Manual and computer assisted part programming,	10	CO2	Compare manual and computer-assisted programming methods.	explain manual PP	Ch.07	Page 203-213
	Part programming with APT	11	CO2	Learn the use of APT language in NC programming.	Gives APT	Ch.07	Page 189-192
	NC part programming using CAD/CAM software	12	CO2	Understand CAD/CAM-based NC programming techniques.	Understand Programming using CAD/CAM	Ch.07	Page 169
	NC part programming using CAD/CAM software	13	CO2	Practice creating NC programs using CAD/CAM software.	Understand Programming using CAD/CAM	Ch.22	Page 662-663
	NC cutter path verification	14	CO2	Learn the methods of cutter path verification.	Path varification of NC cutter	Ch.07	Page 193-194
	NC cutter path verification	15	CO3	Verify machining paths for error-free manufacturing.	Path varification of NC cutter	Ch.07	Page 213
	How Should you Organize Manufacturing(Beyond Curricula)	16	CO3	Understand different manufacturing organization strategies.	Suggest points of manufacturing and Team organization	Ch.01	Page 05-12
3	Computer Aided Process Planning	17	CO3	Learn the concepts and objectives of CAPP.	Explains computer aided process planning	Ch.24	Page 709-710



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	Traditional Process Planning, Retrieval process planning system,	18	CO3	Compare traditional and retrieval process planning methods.	Understand Explain process planning	Ch.24	Page 710-711
	Generative Process Planning, Machinability data systems	19	CO3	Understand generative CAPP and machinability databases.	Gives machinability data systems	Ch.24	Page 711-712
	computer generated time standards.	20	CO3	Learn the generation of machining time standards using computers.	Understand computer generated time standards	Ch.24	Page 704-705
	Group Technology	21	CO3	Understand the principles of Group Technology.	Discussion of group technology	Ch.18	Page 504-506
	Introduction, part families	22	CO4	Learn the concept of part families in manufacturing.	Understand Discussion on part families	Ch.18	Page 506-513
	Part classification and coding,	23	CO4	Understand part classification and coding systems.	Miner discussion on part coding	Ch.18	Page 506-508
	Coding system and machining cells.	24	CO4	Learn coding systems and cellular manufacturing concepts.	Understand coding system	Ch.18	Page 508-513
4	Computer Aided Production Management Systems:	25	CO4	Understand computer-based production management systems.	Gives CAPM systems	Ch.24	Page 716-720
	Introduction to computer aided PPC,	26	CO4	Learn the applications of computer-aided PPC.	Explains CAPP	Ch.24	Page 709-712
	Introduction to computer aided inventory management	27	CO4	Understand computerized inventory management techniques.	Understand CAIM	Ch.25	Page 739-740
	Manufacturing resource planning (MRPII),	28	CO4	Learn the principles and applications of MRP-II.	Gives MRP-II explanation	Ch.25	Page 744-745
	Computer process monitoring and shop floor control, computer process control.	29	CO5	Understand computer-based monitoring and control of manufacturing processes.	Explains shop floor control	Ch.25	Page 733-739
	Computer Aided Quality Control; Computer in quality control, contact	30	CO5	Learn the concepts of computer-aided	Understanding on CAQC	Ch.20	Page 578-582



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	inspection methods,			quality control and inspection.			
	Non contact inspection methods, optical and non optical computer aided testing.	31	CO5	Understand modern inspection and testing techniques.	Discussion on non contact inspection methods	Ch.22	Page 650-686
	Six Reasons to use Robust CAD Software (Beyond Curricula)	32	CO5	Learn the advantages of robust CAD software in product development.	Discussion on Robust manufacturing	Ch.08	Page 216-252
5	Computer Aided Material Handling; Computer control on material handling, conveying, picking.	33	CO5	Understand computer-controlled material handling systems.	Understand material handling through Computer	Ch.10	Page 279-317
	Ware house control, computerized material handling for automated inspection and assembly.	34	CO5	Learn automated warehouse and material handling systems.	Explains computerized material handling	Ch.11	Page 318-342
	Computer Integrated Manufacturing Systems	35	CO6	Understand the architecture and benefits of CIM systems.	Discussion on CIMS	Ch.23	Page 700-701
	Introduction, types special manufacturing systems, flexible manufacturing systems (FMS).	36	CO6	Learn the concepts and applications of Flexible Manufacturing Systems.	Discussion on Flexible manufacturing system	Ch.19	Page 541-576
	Collaborative Engineering; Introduction	37	CO6	Understand the concept of collaborative engineering.	Introduction on collaborative engineering	Ch.08	Page 233-234
	Faster Design throughput, Web based design,	38	CO6	Learn web-based design and methods to improve design efficiency.	Understanding web based design	Ch.08	Page 216-222
	Changing design approaches, extended enterprises	39	CO6	Understand modern design approaches and extended enterprise concepts.	Discussion on changing design approaches	Ch.19	Page 566-568
	Concurrent engineering, Agile and lean manufacturing	40	CO6	Learn the principles of concurrent, agile and lean manufacturing.	Discussion on concurrent engineering	Ch.24	Page 712-715



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