COURSE CONTENT

Computer Integrated Manufacturing								
I Year II Semester: CAD/CAM								
Course Code	**Category**	**Hours/ Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
2224003	**Advanced**	3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**TotalClasses:45**		
Prerequisites:								

Course Overview:

This course explains the basics of Computer Integrated Manufacturing (CIM), manufacturing types, communication systems, product development, and concurrent engineering concepts. It covers manufacturing databases, DBMS, SQL operations, and Product Data Management (PDM) used for handling manufacturing information. It includes product design, process planning, MRP/MRP-II, cellular and flexible manufacturing systems, shop-floor control, and automation technologies. It also discusses networking in CIM, enterprise integration models, lean manufacturing principles, and modern agile and web-based manufacturing systems.

Course Objectives:

1. To understand the role of computers in manufacturing
2. To provide an in-depth understanding of manufacturing and database systems
3. To provide an understanding of needs of the market and design the product
4. To design and develop material handling, storage and retrieval systems for specific cases of manufacturing
5. To develop CIM systems for current manufacturing scenario by using computer and networking tools

Course Outcomes: After Completion of the Course, Students should be able to

1. Select the necessary computing tools for development of product
2. Use appropriate database systems for manufacturing a product and store the same for future use
3. Use modern manufacturing techniques and tools including principles of networking
4. Apply the concepts of lean manufacturing and agile manufacturing
5. Apply the latest technology of manufacturing systems and software for the development of a product.

UNIT-I:

Basic Concepts of CIM: The meaning of Manufacturing, Types of Manufacturing; CIM Definition, Elements of CIM, CIM wheel, concept or technology, Evolution of CIM, Benefits of CIM, Needs of CIM: Hardware and software. Fundamentals of Communication: Communications Matrix. Product Development Cycle, Concurrent Engineering: Definition, Sequential Engineering Versus Concurrent Engineering, Benefits of Concurrent Engineering, Characteristics of concurrent Engineering, Framework for integration of Lifecycle phases in CE, Concurrent Engineering Techniques, Integrated Product Development (IPD), Product Life-Cycle Management (PLM), Collaborative Product Development

UNIT-II:

Introduction, Manufacturing Data: Types, sources; Database Terminology, Database requirements, Database models, Database Management System, DBMS Architecture, Query Language, Structural Query Language (SQL): Basic structure, Data definition Language (Create, Alter, Drop, Truncate, View), Data Manipulation Language (store, retrieve, update, delete). Illustration of Creating and Manipulating a Manufacturing Database. SQL as a Knowledge Base Query Language. Features of commercial DBMS: Oracle, MySQL, SQL Access, Sybase, DB2. Product Data Management (PDM), Advantages of PDM.

UNIT-III:

Product Design: Needs of the market, Design and Engineering, The design Process, Design for Manufacturability (DFM): Component Design, Design for Assembly. Computer-Aided Process Planning: Basic Steps in developing a process plan, Variant and Generative Process Planning, Feature Recognition in Computer-Aided Process Planning. Material Requirements Planning (MRP), Manufacturing Resource Planning (MRP –II), Cellular Manufacturing: Design of Cellular Manufacturing Systems, Cell Formation Approaches: Machine– Component Group Analysis, Similarity Coefficients Based Approaches. Evaluation of Cell Design. Shop-floor Control: Data Logging and Acquisition, Automated Data Collection, Programmable Logic Controllers, Sensor Technology. Flexible Manufacturing Systems: Physical Components of an FMS. Types of Flexibility, Layout Considerations: Linear Single Machine Layout, Circular Machine Layout, Cluster Machine Layout, Loop Layout; Operational Problems of FMS. FMS benefits.

UNIT-IV:

Introduction to Networking: Principles of Networking, Network Terminology, Types of Networks: LAN, MAN, WAN; Selection of Network Technology: Communication medium, Network Topology, Medium access control Methods, Signaling methods; Network Architectures and Protocols: OSI Model, MAP & TOP, TCP/IP, Network Interconnection and Devices, Network Performance. Framework for Enterprise wide Integration.

CIM Models: ESPRIT-CIM OSA Model, NIST-AMRF Model, Siemens Model of CIM, Digital Equipment Corporation Model, IBM Concept of CIM.

UNIT-V:

Lean Manufacturing: Definition, Principles of Lean Manufacturing, Characteristics of Lean Manufacturing, Value of Product, Continuous Improvement, Focus on Waste, Relationship of Waste to Profit, Four Functions of Lean Production, Performance Measures, The Supply Chain, Benefits of Lean Manufacturing. Introduction to Agile and Web Based Manufacturing systems.

TEXTBOOKS:

1. S.Kant Vajpayee: “Principles of Computer Integrated Manufacturing”, Prentice Hall India
2. Nanua Singh: “Systems Approach to Computer Integrated Design and Manufacturing”, John Wiley.

REFERENCEBOOKS:

1. P.Radhakrishnan, S.Subramanyam: “CAD/CAM/CIM”, New Age International
2. Alavudeen, Venkateshwaran: “Computer Integrated Manufacturing”, Prentice Hall India

ELECTRONIC RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc26_me48/preview
2. https://archive.nptel.ac.in/content/syllabus_pdf/112104289.pdf

MATERIALS ONLINE:

1. Coursetemplate

2. Assignments
3. Modelquestionpaper–I
4. Modelquestionpaper–II
5. Lecturenotes
6. E-LearningReadinessVideos(ELRV)