COURSE CONTENT

INTELLIGENT MANUFACTURING SYSTEMS								
II Semester: ME								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
2224017	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisites: Manufacturing processes and production systems								

Course Overview:

This course introduces the concepts, structure, and applications of intelligent technologies in modern manufacturing environments. It focuses on the integration of computer-based tools and artificial intelligence techniques to enhance productivity, decision-making, and automation in manufacturing systems.

Course Objectives:

1. To understand the computer integrated manufacturing systems
2. To provide an in-depth understanding of components of knowledge-based systems
3. To provide an understanding of artificial intelligence
4. To design and develop automated process planning
5. To develop group technology for intelligent manufacturing systems

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

1.Select the necessary tools for computer integrated manufacturing systems
2. Use appropriate knowledge of components of knowledge-based systems
3. Use machine learning techniques for intelligent manufacturing systems
4. Apply the concepts of automated process planning
5. Apply the group technology for intelligent manufacturing systems

UNIT-I:

Computer Integrated Manufacturing Systems Structure and functional areas of CIM system, - CAD, CAPP, CAM, CAQC, ASRS. Advantages of CIM. Manufacturing Communication Systems - MAP/TOP, OSI Model, Data Redundancy, Top- down and Bottom-up Approach, Volume of Information. Intelligent Manufacturing System Components, System Architecture and Data Flow, System Operation.

UNIT-II:

Components of Knowledge Based Systems - Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition.

UNIT-III:

Machine Learning - Concept of Artificial Intelligence, Conceptual Learning, Artificial Neural Networks -Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT-IV:

Automated Process Planning - Variant Approach, Generative Approach, Expert Systems for Process Planning, Feature Recognition, Phases of Process planning. Knowledge Based System for Equipment Selection (KBSES) - Manufacturing system design. Equipment Selection Problem, Modelling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KRSES.

UNIT-V:

Group Technology: Models and Algorithms Visual Method, Coding Method, Cluster Analysis Method, Matrix Formation - Similarity Coefficient Method, Sorting-based Algorithms, Bond Energy Algorithm, Cost Based method, Cluster Identification Method, Extended CI Method. Knowledge Based Group Technology - Group Technology in Automated Manufacturing System. Structure of Knowledge based system for group technology (KBSCIT) — Data Base, Knowledge Base, Clustering Algorithm.

TEXT BOOKS:

1. Intelligent Manufacturing Systems/ Andrew Kusiak/Prentice Hall.
2. Artificial Neural Networks/ Yagna Narayana/PHI/2006

REFERENCE BOOKS:

1. Automation, Production Systems and CIM / Groover M.P./PHI/2007
2. Neural networks: A comprehensive foundation/ Simon Haykin/ PHI.
3. Artificial neural networks/ B. Venkataramani/PHI

ELECTRONIC RESOURCES:

1. https://swayam.gov.in/
2. https://arxiv.org/abs/2005.06037
3. https://ocw.mit.edu
4. https://nptel.ac.in

MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. E-Learning Readiness Videos (ELRV)