COURSE CONTENT

INTELLIGENT MANUFACTURING SYSTEMS								
II Semester: CAD / CAM								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BCCD21	**Elective**	L	T	P	C	CIA	SEE	Total
		3	-	-	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Pre requisites: Automation in manufacturing								

I. COURSE OVERVIEW:

This course will provide students with artificial intelligence (AI) techniques and its application in manufacturing systems. Intelligent Manufacturing System provides a modern manufacturing system with integration of machines, processes, artificial intelligence which integrates the abilities of humans. Manufacturing system refers to the entire process of gathering inputs, arranging, and transforming them into the desired output. It seeks to achieve optimal utilization of manufacturing resources, minimize wastage, and add value to the business.

II. COURSE OBJECTIVES:

The students will try to learn:

I. The statistics and optimization methodologies in intelligent manufacturing systems.
II. The importance of Knowledge based system and Knowledge Acquisition
III. The importance of intelligence in manufacturing systems, so as to apply the artificial intelligence in the application of manufacturing
IV. The modern techniques such as APP and GT used in manufacturing systems

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO1 Outline the systematic approach for design and implementation of manufacturing systems
CO2 Explain the Components of Knowledge Based Systems and Knowledge representation for Equipment Selection.
CO3 Apply Artificial intelligence (AI) and Machine Learning techniques to solve the real problems in shop-floor level or capacity planning problems.
CO4 Make use of various Automated Process Planning approach for problem solving
CO5 Develop various algorithms to cluster products based on group technology concepts

IV. COURSE CONTENT:

MODULE-I: Computer Integrated Manufacturing Systems (09)

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.

MODULE-II: Knowledge Based Systems in Manufacturing (10)

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

MODULE-III: Machine Learning and AI (10)
Machine Learning - Concept of Artificial Intelligence, Conceptual Learning. Artificial Neural Networks - Biological Neuron.

Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

MODULE-IV: Automated Process Planning (09)
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, Modeling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KRSES.

MODULE-V: Group Technology (10)
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.

V. TEXT BOOK:

1. Andrew Kusiak, "Intelligent Manufacturing Systems", Prentice Hall, 1st edition, 2013.
2. Yagna Narayana, "Artificial Neural Networks", PHI, 1st edition, 2004.
3. Groover M.P, "Automation, Production Systems and CIM", PHI, 4th edition, 2013.

VI. REFERENCE BOOK:

1. Li Min Fu, "Neural networks in Computer intelligence", TMH, 1st edition, 2013.
2. Jacek M. Zurada, "Introduction to Artificial Neural Systems", Jaico Publishing House, 1st edition, 2013.

VII. ELECTRONICS RESOURCES:

1. https://nptel.ac.in/courses/110/106/110106044/

VIII. MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper – I
5. Model question paper – II
6. Lecture notes
7. PowerPoint presentation