INTELLIGENT MANUFACTURING SYSTEMS

CourseCode		Year		Semester	
Course Category	Minor in DM	**Branch**	ME	**Course Type**	Theory
Credits	4	**L – T – P**	3 – 1 – 0	**Prerequisites**	MP
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	BTL	Units
CO1	Discuss reachability graphs for various manufacturing system problems using petri net models	Understand Communication	L2	1
CO2	Illustrate components of knowledge based systems and clustering techniques to identify the variations in information sharing	Understand Communication	L2	2,3
CO3	Apply machine learning techniques for various real life applications in manufacturing systems	Apply, Communication	L2	4
CO4	Evaluate block chain technology in the context of manufacturing systems design	Apply, Communication	L2	5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1		2							2		
CO2	3		1		2							2		
CO3	3		1		2							2		
CO4	3		1		2							2		

Syllabus		
UNIT	Contents	Mapped COs
I	**Petri Nets:** Key concepts and definitions, principles of net theory, Place/Transition Systems and Elementary Net (EN) Systems. Token game, reachability, state graph, behavioral properties like deadlock and boundedness, behavioral equivalence and normal forms. Elementary Net Systems: Causality, conflict, concurrency, and confusion. Examples of Petri net models. Examples in manufacturing Systems	CO1
II	**Components of Knowledge Based Systems:** Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition, Clustering. Examples in manufacturing Systems Cloud Manufacturing and Networking with TCP/IP: Introduction to cloud computing: cloud models, cloud service examples, cloud based services & applications. Introducing TCP/IP, IP Addressing and Related Topics, Data Link and Network Layer TCP/IP Protocols, Internet Control Message	CO2

	Protocol (ICMP), Transport Layer TCP/IP Protocols, Basic TCP/IP Services.	
III	**Machine Learning: Machine Learning**: Concept, Artificial Neural Networks, Biological and Artificial Neuron, Deep Nets, Applications in manufacturing; Use of probability and fuzzy logic for machine thinking, Examples in manufacturing Systems.	**CO2**
IV	**Agent and Multi-agent systems:** Agents, agent definitions and classification, multi-agent systems, Models of agency, architectures and languages, Agent communication and interaction protocols. Examples in manufacturing Systems	**CO 3**
V	**Block Chain Technology:** Basic Concepts, Trust- The need for trust, Forms of trust, The problem space for block chain. Cryptography - Information security as a form of trust, Public and Private keys, Digital signatures, Hashing. Examples in manufacturing Systems.	**CO 4**

Learning Resources
Text books
1.Automation, Production Systems and CIM", Groover M.P.,Prentice-Hall, New Delhi, 2009. 2.A Comprehensive guide to AI and Expert Systems", Robert Levine , McGraw Hill Inc, 1986. 3.Automation, Production Systems and Computer Integrated Manufacturing", Mikell P Groover, PHI, 2008, 8th edition.
Reference books
1.Guide to TCP/IP, Ed Tittel, Laura Chappell, Third Edition. Course Technology Incorporated, 2007, 2.Automated Planning- Theory and Practice, Malik Ghallab Malik, Morgan Kaufmann, 2004. 3.Machine Learning, Mitchell T, Mc-Graw Hill, 2012.