GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3171516
Semester – VII
Subject Name: Artificial Intelligence in Manufacturing

Type of course:

Prerequisite: Nil

Rationale:
Artificial Intelligence is a vast and truly universal field now a days. In this area tremendous growth has been observed in the past two decades owing to valuable contributions from scientists and engineer from a variety of domains such as computers, medicine and manufacturing. This subject is designed based on such latest demand from Industry and objective is to make aware students to AI in Manufacturing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Concepts of Artificial Intelligence:** Origin of Artificial Intelligence, Human and machine Intelligence, Branches of artificial intelligence, Programming in AI environment, Emergence of expert systems, Applications in Engineering and Manufacturing. Intelligent Manufacturing Systems – System components, System Architecture and Data Flow and System Operation	**10**
2	**Knowledge Based Systems/Expert Systems:** Expert systems: Expert system process, characteristics and components of expert systems, Knowledge Acquisition: Knowledge acquisition phases, Methods of extracting knowledge from experts, Knowledge acquisition meetings, Group knowledge acquisition. Knowledge Representation: Characteristics of knowledge, Knowledge representation models, Concepts of knowledge sets and Reasoning models. Expert system justification and future directions for expert systems	**10**
3	**Machine Learning:** Machine Learning – Concept, Artificial Neural Networks, Biological and Artificial Neuron, Types of Neural Networks, Applications in manufacturing Use of probability and fuzzy logic for machine thinking	**07**
4	**Knowledge Based Group Technology:** Group Technology: Models and Algorithms – Visual method, Coding method, Cluster analysis method.	**10**

	Knowledge based group technology – Group technology in automated manufacturing system, Structure of knowledge based system for group technology (KBSGT) – Database, Knowledge base, Clustering algorithm	
5	**Industrial Applications of AI:** Intelligent system for design, equipment selection, scheduling, material selection, maintenance, facility planning and process control	**08**
	Total Hours	**45**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**20**	**25**	**15**	**20**	**-**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. A. B. Badiru, Expert Systems Applications in Engineering and Manufacturing, Prentice-Hall, New Jersey, 1992.
2. Robert Levine et al., A Comprehensive guide to AI and Expert Systems, McGraw Hill Inc, 1986.
3. J. Paulo Davim (Editor), Artificial Intelligence in Manufacturing Research, Nova Science Publisher, New York, 2010.
4. Andrew Kussiak, Intelligent Manufacturing Systems, Prentice Hall, 1990.
5. Brent M. Gordon (Editor), Artificial Intelligence: Approaches, Tools and Applications, Nova Science Publisher, New York, 2011.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Describe Artificial Intelligence for Manufacturing	20
CO-2	Demonstrate knowledge base/ Expert Systems for Intelligent manufacturing	30
CO-3	Describe Machine learning for Manufacturing	30
CO-4	Understand knowledge base group technology for manufacturing and Industrial application	20

List of Experiments:

Experiments based on above topics.