GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering Syllabus

Subject Code : ME02004081

Subject Name : AI and Applications

WEF Academic Year :	2024-25
Semester :	2
Category of the Course :	PEC-05

Prerequisite :	**Basic knowledge of Mathematics, Statistics and Programming Skills.**
Rationale :	Unlike the natural intelligence of humans, Artificial Intelligence is the field that demonstrate the machine intelligence which can imitate the human consciousness and emotions. This subject introduces the basic principles, techniques, and applications of Artificial Intelligence. It is helpful for developing both fundamental concepts such as search and knowledge representation. Define the meaning of Intelligence and explore various paradigms. Apply the machine learning concepts in real life problems

Course Scheme :

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

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Introduction : History, Dimensions of AI, overview and Application of AI	4	8
2	Search : Problems, State Space Search & Heuristic Search Techniques: Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics and Issues in the Design of Search Programs, Generate-and Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis	14	30
3	Knowledge Representation and Reasoning : Representation and Reasoning using predicate logic, Inference in first-order logic, forward and backward chaining. Probabilistic reasoning, Bayesian networks, Probabilistic Reasoning over time: Hidden Markov Models, Kalman Filters.	10	21
4	Game Playing : Overview, Mini Max Search Procedure, Alpha-Beta Cut-offs, Refinements, Iterative deepening	7	14

5	Planning : The Blocks World, Components Of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems	7	15
6	AI Applications: speech and vision, natural-language processing, semantic web, robotics, Al-based programming Tools	6	12
	Total	**48**	**100**

Reference Book :

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill
2. A First course in Artificial Intelligence by Deepak Khemani , Mc-GrawHill
3. Handbook of Artificial Intelligence –preliminary edition by Avron Barr and Edward A. Feigenbaum, Stanford University
4. Artificial Intelligence - A Modern Approach 2nd ed - S. Russell, P. Norvig (Prentice-Hall, 2003)

Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Understand the basics of Artificial Intelligence.	UN
02	Ability to analyse Searching, knowledge representation and Inferencing Techniques.	AN
03	Understand various Game Playing techniques	UN
04	Apply problem solving, knowledge representation and reasoning techniques for various applications	AP
05	Demonstrate practical applications of AI Techniques.	AP

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List:

Minimum 10 Experiments are to be designed covering various activities and algorithms in machine learning with datasets from different domains

List of Laboratory/Learning Resources Required:

For AI and ML Lab Implementation – Suggested programming languages are R programming or Python

For AI , ML and DL – Suggested Code Editor – Jupiter Notebook Python Programming Tool or Editor - PyCharm (by JetBrains)

Suggested General Framework – 1)TensorFlow 2) Keras 3) Pytorch

For Neural Network Applications -Suggested Models – 1) Convoneural Neural Network (CNN) for Image classification applications 2) Recurrent Neural Network (RNN) for speech recognition applications Sample Dataset: Kaggle (www.kaggle.com)

Supported Libraries (for Python): Pandas, NumPy, SciPy, Scikit-Learn, OpenCV, Google Vision, Matplotlib

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