ARTIFICIAL INTELLIGENCE
(Common to CSE/IT/DS)
(Professional Elective)

Course Code:22CT1151

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Course Outcomes: At the end of the course, a student will be able to:

CO1: Demonstrate various AI applications, languages and Intelligent Agents. (L2)

CO2: Solve problems using uninformed and informed search strategies. (L3)

CO3: Apply propositional logic techniques for knowledge representation.(L3)

CO4: Classify the real world tasks using Back Propagation algorithm.(L3)

CO5: Build expert systems for real world applications.(L3)

UNIT I: (10 Lectures)

INTRODUCTION: Definition of AI, Goals of AI, Turing Test, History and foundations of AI, Branches of AI, Applications of AI, current trends in AI, AI Programming languages

INTELLIGENT AGENTS: Introduction, Intelligent Systems, the Concept of rationality, types of Agents, Environments and its properties, PEAS. (TextBook-1)

Learning Outcomes: At the end of the unit, student will be able to

1. classify various AI Applications. (L2)
2. list the AI Languages. (L1)
3. explain various types of Agents. (L2)

UNIT II: (10 Lectures)

PROBLEM SOLVING AND SEARCHING:

Introduction to Problem Solving, Problem Formulation, State Space Representation, Problem Formulation of real-world problems, Production System, Problem Characteristics, Solving problems by searching.

UNINFORMED & INFORMED SEARCH STRATEGIES:

Breadth-First Search, Depth First Search, Uniform Cost Search, Depth-Limited Search, Iterative Deepening Search, Bidirectional Search, Comparing Uniform Search Strategies, Hill Climbing, Best First Search, A* Search, AO* Search. (TextBook-1)

Learning Outcomes: At the end of the unit, student will be able to

1. Demonstrate the state space search and control strategies techniques. (L2)
2. Describe Characteristics of a Problem. (L2)
3. Apply uninformed search techniques to problems. (L3)
4. Apply informed search techniques to problems. (L3)

UNIT III: (10 Lectures)

ADVERSARIAL SEARCH STRATEGIES: Introduction, Optimal Strategies, The Minimax Algorithm, Alpha-Beta Pruning, Constraint Satisfaction Problem, Cryptarithmetic Problem. **KNOWLEDGE AND REASONING:** Knowledge Representation Issues, Predicate Logic - Resolution, Unification, Representation Knowledge Using Rules-Inference in First-Order Logic, Forward and Backward Reasoning. (TextBook-1)

Learning Outcomes: At the end of the unit, student will be able to
1. understand game playing strategies using AI techniques. (L2)
2. solve Cryptarithmetic Problems. (L3)
3. demonstrate logic techniques using Predicate Logic. (L2)
4. apply forward and backward reasoning to infer knowledge. (L3)

UNIT IV: (10 Lectures)

PLANNING: Introduction, Planning Problem, the language of Planning Problems, Planning with state space search, Partial Ordering Planning,Conditional Planning (TextBook-1)

ARTIFICIAL NEURAL NETWORK: Introduction, Artificial Neural Networks, Single-Layer Feed Forward Networks, Multilayer Feed Forward Networks, Design issues of Artificial Neural Networks .(TextBook-2)

Learning Outcomes: At the end of the unit, student will be able to
1. Describe the language of planning Problems. (L2)
2. explain various Activation Functions.(L2)
3. apply different artificial neural network architecture for real world problems.(L3)

UNIT V: (10 Lectures)

NATURAL LANGUAGE PROCESSING: Introduction, Sentence Analysis phases, Types of parsers, Semantic Analysis.
EXPERT SYSTEM: Introduction, Phases in building Expert Systems, Expert Systems Architecture, Expert Systems versus Traditional Systems, Rule based Expert Systems, Applications of Expert SystemsList of shells and tools (TextBook-2)

Learning Outcomes: At the end of the unit, student will be able to
1. demonstrate phases of natural language for communication. (L2)
2. explain the need and justification of an expert system. (L2)
3. build an expert system suitable for solving particular problems. (L3)

TEXT BOOKS:
1. Dr.Nilakshi Jain, *Artificial Intelligence : Making a System Intelligent,* Wiley Publications,1st Edition,2019.
2. Saroj Kaushik, *Artificial Intelligence*, Cengage Learning India,1st Edition,2011

REFERENCES:
1. Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, 3rd Edition, Pearson Publications, 2020.

WEB REFERENCES:

1. https://ai.google/
2. https://www.coursera.org/learn/neural-networks-deep-learning#syllabus
3. https://swayam.gov.in/nd1_noc19_me71/preview
4. https://pypi.org/project/experta/