|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| http://www.ictee.in/images/logo.png | | | **COURSE SYLLABI**  **(2016-2020)** | | |
|
|
| **SCHOOL OF COMPUTER ENGG. & TECHNOLOGY** | | | **W.E.F** | **:** | **2018-19** |
| **TY BTECH** | | | **COURSE NAME** | **:** | Artificial Intelligence and Neural Networks |
| **COURSE CODE** | **:** | CS312 |
| **COURSE CREDIT** | **:** | 4 |
| **RELEASE DATE** | **:** | 01/06/2018 | **REVISION NO.** | **:** | 1.0 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TEACHING SCHEME :** | | **EVALUATION SCHEME :** | | | | | |
| **LECTURE** | **PRACTICAL** | **THEORY** | | | **PRACTICAL** | **PRESENTATION/ DEMONSTRATION** | **TOTAL** |
| **ICE** | **ECE** | **IA** |
| 3 | 2 | 30 | 40 | 30 | 25 | --- | 125 |

|  |
| --- |
| **PRE-REQUISITE:** |
| 1. CS201 – Data and File Structures |

|  |
| --- |
| **COURSE OBJECTIVES:** |
| 1. CS312.CEO.1: Gain a historical perspective of AI and its foundations. 2. CS312.CEO.2: Become familiar with basic principles of AI toward problem solving, inference,   perception, knowledge representation and learning.   1. CS312.CEO.3: Investigate applications of AI techniques in intelligent agents, expert systems,   artificial neural networks and other machine learning models.   1. CS312.CEO.4: Explore the current scope, potential, limitations and implications of intelligent system. |

|  |
| --- |
| **COURSE OUTCOMES:** |
| Students successfully completing the course will be able to   1. CS312.CO.1: Analyze the variations in agents and environments behavior and major functions implemented in a general agent. 2. CS312.CO.2: Evaluate agents using search algorithms such as uninformed search, informed search or local search. 3. CS312.CO.3: Illustrate adversarial search mechanism and game-playing agents. 4. CS312.CO.4: Identify capabilities of specific knowledge representation formalisms for specific   tasks.   1. CS312.CO.5: Apply the methodology to transfer human knowledge into an expert system. 2. CS312.CO.6: Explain the learning and adaptation capability of neural systems. |
|  |

|  |  |  |
| --- | --- | --- |
| **THEORY:** | | |
| **Unit I** | **Introduction** | **7 Hours** |
| App/System/Case study: Virtual Personal Assistants, Autonomous cruise control system.  Contents:  Introduction to Artificial Intelligence, The Foundations of Artificial Intelligence, Emergence of Intelligent Agents, PEAS Representation of Agents, Rationality, Environment, Problem Formulation.  Self Study: Agent Oriented Design  Further reading: A taxonomy of autonomous agents | | |
| **Unit II** | **Search Strategies** | **7 Hours** |
| App/System/Case study: GPS Navigation systems, Tile games.  Contents:  State space search, heuristic search, Uninformed Search Techniques- DFS, BFS, Iterative Deepening, Informed search Techniques- Greedy best first search, A\* search.  Self Study: Genetic Algorithms  Further reading: Hill Climbing Search | | |
| **Unit III** | **Constraint Satisfaction Problem** | **7 Hours** |
| App/System/Case study: SICStus Prolog  Contents:  Constraint Satisfaction Problem, Backtracking search for CSPs, Adversarial search - Games, Optimal decisions in games, Mini Max Algorithm, Alpha-Beta pruning.  Self Study: Deterministic games in practice  Further reading: Map coloring problem | | |
| **Unit IV** | **Reasoning and Knowledge Representation** | **7 Hours** |
| App/System/Case study: WebQR , Inquire an [iPad app](http://inquireproject.com/#features)  Contents:  Introduction to Reasoning and Knowledge Representation, Knowledge-based reasoning-First- order Logic and theorem proving, Rules and rule-based reasoning, Knowledge representation – Production based system, Frame based system.  Self Study: Propositional Logic  Further reading: Uncertainty representation and management | | |
| **Unit V** | **Expert Systems and Learning** | **7 Hours** |
| App/System/Case study: MYCIN  Contents:  Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics, Expert systems shells. Learning from Observations, General Model of Learning Agents, Inductive learning.  Self Study: Natural Language Processing  Further reading: Statistical Learning | | |
| **Unit VI** | **Neural Networks** | **7 Hours** |
| App/System/Case study: Architecture of Complex Pattern Recognition: ART/ART-1  Contents:  Introduction to neural networks, Perceptrons, Single layered feed forward network, Applications of ANN, Neural Networks viewed as directed graphs, Feedback from neurons to ANN.  Self Study: Multi-layered Feed- forward Networks.  Further reading: Hebb’s rule | | |

|  |  |  |
| --- | --- | --- |
| **PRACTICAL:** Perform 6 experiments (a or b) using python/specified tools. | | |
| **Practical No. 1** |  | **6 Hours** |
| 1. Elaborate uninformed search algorithm for any suitable real time application. 2. Develop Vacuum Cleaner Agent Application. | | |
| **Practical No. 2** |  | **6 Hours** |
| 1. Find the shortest path (by number of towns passed and by distance) for any particular source and destination using A\* search. 2. Elaborate hill climbing algorithm. | | |
| **Practical No. 3** |  | **6 Hours** |
| 1. Develop 8-puzzle problem using appropriate search method. 2. Develop 4 Queens or 8 Queens Problem using backtracking. | | |
| **Practical No. 4** |  | **6 Hours** |
| 1. Design map coloring problem using backtracking. 2. Make use of Natural Language Toolkit to count word frequency. | | |
| **Practical No. 5** |  | **6 Hours** |
| 1. Develop game of tic-tac-toe using minimax algorithm. 2. Build Fact, Rule, goal for family relationships and arithmetic operations using Prolog. | | |
| **Practical No. 6** |  | **6 Hours** |
| 1. Design Medical Diagnosis System using Prolog. 2. Develop Monkey Banana Problem using Prolog. | | |

|  |
| --- |
| **TEXT BOOK:** |
| 1. Stuart Russel and Peter Norvig, “Artificial Intelligence: A Modern Approach”, Third Edition, Pearson, ISBN-13: 978-0-13-604259-4. 2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, “Artificial Intelligence”, Third Edition, Tata McGraw Hill, ISBN-13: 978-0-07-008770-5.  Simon Haykin, “Neural Networks and Learning Machines”, Third Edition, Pearson, ISBN: 9789332570313. |
| **REFERENCES:** |
| Nils Nilsson, “Artificial Intelligence: A New Synthesis “, Second Edition, Morgan Kaufmann Series, ISBN: 9780080948348.Deepak Khemani, “A First course in Artificial Intelligence”, First Edition, McGraw Hill Education, ISBN: 9781259029981.Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, ISBN:0201876868.  1. Yegna Narayanan, “Artificial Neural Networks”, 8th Printing, PHI, ISBN: 9788120312531. |