| **CSD 3102** | **ARTIFICIAL INTELLIGENCE TECHNIQUES** | **L** | **T** | **P** | **C** |
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| **SDG: 9** | **3** | **0** | **0** | **3** |
| **COURSE OBJECTIVES:** | | | | | |
| **COB1:** To give appropriate Artificial Intelligence methods to solve  a given problem. | | | | | |
| **COB2:** To learn the different search strategies in AI. | | | | | |
| **COB3:** To explore the facts and concepts of computational model and their applications. | | | | | |
| **COB4:** To gain knowledge on planning strategy for real time problems. | | | | | |
| **COB5:** To introduce the concepts of Expert Systems. | | | | | |
| **MODULE I** | **INTRODUCTION** |  |  |  | **9** |
| Introduction to Artificial Intelligence(AI) - History of AI - AI Techniques - Problem Solving with AI - AI models - Data Acquisition and Learning Aspects in AI - Problem-Solving Process - Formulating Problems - Problem Types and Characteristics - Problem Analysis and Representation - Performance Measuring - Problem Space and Search - Toy Problems - Real-world problems - Problem Reduction Methods. | | | | | |
| **MODULE II** | **HEURISTIC SEARCH TECHNIQUES** |  |  |  | **9** |
| General Search algorithm – Uniformed Search Methods – BFS, Uniform Cost Search - Depth First search , Depth Limited search (DLS), Iterative Deepening - Informed Search-Introduction- Generate and Test, BFS, A\* Search, Memory Bounded Heuristic Search - Local Search Algorithms and Optimization Problems – Hill climbing and Simulated Annealing. | | | | | |
| **MODULE III** | **KNOWLEDGE AND REASONING** |  |  |  | **9** |
| Knowledge Representation-Knowledge based Agents-The Wumpus World   * Logic-Propositional Logic-Predicate Logic-Unification and Lifting - Representing Knowledge using Rules-Semantic Networks Frame Systems * Inference – Types of Reasoning. | | | | | |
| **MODULE IV** | **PLANNING** |  |  |  | **9** |
| Planning Problem – Simple Planning agent –Blocks world - Goal Stack Planning-Means Ends Analysis- Planning as a Statespace Search - Partial Order Planning-Planning Graphs-Hierarchical Planning - Non- linear Planning -Conditional Planning-Reactive Planning - Knowledge based Planning-Using Temporal Logic – Execution Monitoring and Re-planning-  Continuous Planning-Multi-agent Planning-Job shop Scheduling Problem. | | | | | |

| **MODULE V** | **GAME PLAYING** | **9** |
| --- | --- | --- |
| Introduction-Important Concepts of Game Theory - Game Playing and Knowledge Structure-Game as a Search Problem -Alpha-beta Pruning- Game Theory Problems Game Theory - Expert System - Architecture- Knowledge acquisition-Rule based Expert System-Frame based and  Fuzzy based expert system- Case study in AI Applications. | | |
|  |  | **L – 45; TOTAL HOURS – 45** |
| **TEXT BOOKS:** |  |  |
| 1. Stuart Russell and Peter Norvig., “Artificial Intelligence - A Modern Approach”, Prentice Hall Publishers, 4th edition, ISBN-13 : 978-  1292401133, 2021. | | |
| **REFERENCES:** |  |  |
| 1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence”, Mc Graw Hill Education, 3rd edition, ISBN-13 : 978-0070087705, 2017. 2. Parag Kulkarni, Prachi Joshi, “Artificial Intelligence –Building Intelligent Systems”, PHI learning private Ltd, 1st edition, ISBN-13 : 978-8120350465, 2015. 3. Deepak Khemani “Artificial Intelligence”, Mc Graw Hill Education, ISBN-13 : 978-1259029981, 2017. | | |
| **COURSE OUTCOMES:** | | |
| CO1:Solve basic AI based problems. | | |
| CO2:Apply AI techniques to real-world problems and develop intelligent  systems. | | |
| CO3:Implement basic principles of AI in solutions that require problem  solving, inference, perception, knowledge representation, and learning. | | |
| CO4:Design and implement AI planning systems. | | |
| CO5:Develop good evaluation functions and strategies for game playing and expert systems using fuzzy logic. | | |
| **Board of Studies (BoS) :**  19th BoS of CSE held on 28.12.2021 | | **Academic Council:**  19th AC held on 29.09.2022 |

|  | **PO**  **1** | **PO**  **2** | **PO**  **3** | **PO**  **4** | **PO**  **5** | **PO**  **6** | **PO**  **7** | **PO**  **8** | **PO**  **9** | **PO10** | **PO**  **11** | **PO1**  **2** | **PSO**  **1** | **PSO**  **2** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO1 | H | M | H | H | M | **-** | **-** | **L** | M | H | H | L | H | L |
| CO2 | M | M | L | L | L | **-** | **-** | **L** | M | M | H | L | H | M |
| CO3 | M | L | M | L | L | **-** | **-** | **L** | M | L | L | H | H | L |
| CO4 | M | L | M | M | H | **-** | **-** | **L** | M | L | M | M | H | H |
| CO5 | M | M | M | L | L | **-** | **-** | **L** | H | M | L | M | H | M |

**Note:** L- Low Correlation M - Medium Correlation H -High Correlation

| SDG 9 : Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation |
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| Statement :  The holistic understanding of AI techniques and the methods of solving problems using AI concepts in Game Playing, Natural Language Processing, Expert Systems and Machine Learning which enable the analysis of large and complex datasets for  better products, more efficient software and optimized production. |