RAMAKRISHNA MISSION VIDYAMANDIRA

CBCS Syllabus B.Sc. Computer Science Honours

Semester-VI

Course Code: CMSA CC 13 Credit: 6
Course Type: Core Course

Course Outcome:

i) Able to understand real life scenarios in terms of agents and environments.
ii) Able to formulate computational problems as search problems.
iii) Be able to understand informed, uninformed search and heuristics, multi agent search.
iv) Be able to develop and express problems in FOPL and understand inference rules.
v) Develop basic idea behind Soft Computing techniques.
vi) Building concepts of Fuzzy Logic and Neural Network.
vii) Learning practical implementation of FOPL using PROLOG and other Soft Computing techniques using open source platforms.

CMSA CC 13 T: Artificial Intelligence and Soft Computing

Credit: 4   **Marks: 50**

Introduction: Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment. [4 L]

Problem Solving and Searching Techniques: Problem Characteristics, Production Systems, Uninformed Search: Breadth First Search, Depth First Search, Heuristics Search Techniques: Best First Search, A* algorithm, Hill climbing and its Variations, Simulated annealing; Adversarial Search: Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms; Constraint Satisfaction Problem. [20 L]

Knowledge Representation: Overview of Propositional Logic; Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs.
Programming in Logic (PROLOG). [10 L]

Introduction to soft computing: Concept of computing systems, "Soft" computing versus "Hard" computing Characteristics of Soft computing [2 L]

Fuzzy Logic and Application: Fuzzy sets, application – basic operations, Properties, Fuzzy Relations, Fuzzy inference, Notion of Fuzziness, Operations on Fuzzy sets, Fuzzy Numbers, Brief overview of crisp sets, Crisp relations, Fuzzy relations, Max*-composition of fuzzy relation, Max*-transitive closure, Different methods of role aggregation and defuzzification.

Neural Network: Basics of Artificial Neural Network, Characteristics and Comparison with biological neural network, Basic model of Artificial Neural Network: Single layer Perceptron model, Learning, Feed Forward Neural Network, Error, Back Propagation and weight updation, Perceptron, Bayesian Networks. [12 L]

CMSA CC 13 P: AI and Soft Computing Laboratory

Credit: 2 **Marks: 25**

Programming in Logic using PROLOG.

Simulation and application of Soft Computing techniques using open source tools (Octave, Python etc.) [20 L]

Application of Soft Computing techniques in bio science:

1. Neural Network: Perceptron model, Learning, Feed Forward Neural Network, Error, Back Propagation and weight updation, Perceptron,
2. Neural network as tool for biological system.
3. Analysis of pandemic data using soft computing techniques with special case study for SARS –COV -2.
4. Fuzzy set as a framework for analyzing large volume biological or molecular data.
5. Gene prediction using ANN. [20 L]

Recommended Books:

1. Artificial Intelligence by Russel, Norvig; 3rd Edition; Pearson.
2. Introduction to Artificial Intelligence by Dan W Patterson; 1st Edition; Pearson.
3. Artificial Intelligence by Knight, Rich; 3rd Edition; TMH.
4. Neural Network and Learning Machine by Simon Haykin; 3rd Edition; Pearson.
5. Fuzzy Logic with Engineering Applications by Ross; 3rd Edition; Wiley.
6. Artificial Neural Network in Biological and Environmental Analysis by Grady Hanrahan; CRC.