VII Semester

ADVANCED AI AND ML			
Course Code	21AI71	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning Objectives

CLO 1. Demonstrate the fundamentals of Intelligent Agents
CLO 2. Illustrate the reasoning on Uncertain Knowledge
CLO 3. Explore the explanation-based learning in solving AI problems
CLO 4. Illustrate the use of KNN
CLO 5. Explore the Text feature Engineering concepts with Applications

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents

Problem Solving : Game Paying

Text book 1: Chapter 2, Chapter 5 (2.1 to 2.4, 5.1 to 5.6)

Teaching-Learning Process	Chalk and board, Active Learning, Problem based learning

Module-2

Uncertain knowledge and Reasoning: Quantifying Uncertainty**,** Acting under Uncertainty , Basic Probability Notation, Inference Using Full Joint Distributions, Independence , Bayes' Rule and Its Use The WumpusWorld Revisited,

Text book 1: Chapter 13

Teaching-Learning Process	Chalk and board, Active Learning, Demonstration

Module-3

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution

and Learning.

Text book 2: chapter 4.1-4.6 & 9.1-9.5

Neural networks and genetic algorithms:
Brief history and Evolution of Neural network, Biological neuron, Basics of ANN, Activation function, MP model.

Text book 3: chapter 6

Teaching-Learning Process	Chalk and board, Problem based learning, Demonstration

Module-4

Recommender System:
Datasets, Association rules, Collaborative filtering, User-based similarity, item-based similarity, using surprise library, Matrix factorization

Text Analytics:
Overview, Sentiment Classification, Naïve Bayes model for sentiment classification, using TF-IDF vectorizer, Challenges of text analytics

Text book 4: Chapter 9 and 10

Teaching-Learning Process	Chalk& board, Problem based learning

Module-5

Clustering
Introduction, Types of clustering, Partitioning methods of clustering (k-means, k-medoids), hierarchical methods

Text book 3: Chapter 13

Instance Based Learning: Introduction, k-nearest neighbour learning(review), locally weighted regression, radial basis function, cased-based reasoning,

Text book 2: Chapter 8.1-8.5

Teaching-Learning Process	Chalk and board, MOOC

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

CO 1. Demonstrate the fundamentals of Intelligent Agents
CO 2. Illustrate the reasoning on Uncertain Knowledge
CO 3. Explore the explanation-based learning in solving AI problems
CO 4. Apply effectively ML algorithms to solve real world problems.
CO 5. Apply Instant based techniques and derive effectively learning rules to real world problems.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE

(Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module Marks scored proportionally reduced to 50 marks

Suggested Learning Resources:

Textbooks:

1. Artificial Intelligence, A Modern Approach, Stuart J. Russell and Peter Norvig, Third Edition, Pearson, 2010
2. Tom M. Mitchell, Machine Learning, McGraw-Hill Education, 2013
3. Machine Learning, Anuradha Srinivasaraghavan, VincyJoeph, Wiley 2019
4. Machine Learning using Python ,Manaranjan Pradhan, U Dinesh Kumar, Wiley 2019

Reference:

1. An Introduction to Multi Agent Systems, Michael Wooldridge, Second Edition, John Wiley & Sons

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/playlist?list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH
2. https://nptel.ac.in/courses/106/102/106102220/
3. https://www.youtube.com/playlist?list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77
4. https://nptel.ac.in/courses/106/106/106106139/

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning