INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (COMPUTER ENGINEERING)**
SEMESTER	**7**
COURSE TITLE	**ARTIFICIAL INTELLIGENCE**
COURSE CODE	**01CE1702**
COURSE CREDITS	**4**

Objective:

1 As the World Wide Web continues to expand, AI and its methodologies are being applied in various areas that have a direct impact on human life. Various techniques for encoding information in computer systems, such as Predicate Logic, Production Rules, and Semantic Networks, are being utilized to solve real-world problems. In addition, fields like Game Playing, Natural Language Processing, and Connectionist Models are also essential. Graduates are expected to have a good understanding of the fundamentals of AI and its processes, in addition to having proficiency in at least one programming language.

Course Outcomes: After completion of this course, student will be able to:

1 Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents

2 Develop the ability to apply state space search algorithms to solve problems in artificial intelligence

3 Understand and apply different knowledge representation approaches

4 Develop game-playing agents and plan solutions to problems using planning systems

5 Understanding of various reasoning techniques and their practical applications in AI

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction to AI** Fundamental concepts The History of Artificial Intelligence, The AI Problems, AI Techniques, Intelligent Agents, Applications of AI, Criteria for Success, Introduction to Prolog Prolog Facts and rules, goals, terminology, variables, control structures, arithmetic operators, back tracking, recursion and List	6

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Contents : Unit	Topics	Contact Hours
2	**State Space Search** Defining the Problems as a State Space Search, Problem Solving, Production Systems & Characteristics, Problem Characteristics, Issues in The Design of Search Programs,, Uninformed Search - DFS, BFS , Uniform Cost Search, Heuristic Search - Generate-And-Test, Hill Climbing, Best First Search, A*, Problem Reduction - AO*,, Constraint Satisfaction, Means-Ends Analysis	12
3	**Knowledge Representation and Logic** Knowledge Representations and Mappings,, Approaches to Knowledge Representation., Issues in Knowledge Representation,, Representing Knowledge using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Logic: Instance and ISA Relationship, Computable Functions and Predicates, Resolution	6
4	**Game Playing and Planning** Game Playing: The MiniMax Search Procedure, Adding AlphaBeta Cutoffs, Additional Refinements, Iterative, Deepening, Planning: Blocks World Problem,, Compoments of Planning Sysytem,, Goal stack Planning, STRIPS	8
5	**Application of AI** Reasoning: Probability and Bayes' Theorem, Certainty Factors and Rule-Base Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic., Natural Language Processing (NLP): Introduction, Steps in NLP (Morpological Analysis, Syntactic Processing, Semantic Analysis Discourse and Pragmatic Processing, Applications of NLP - Spell Checking, Text Analytics: Text pre-processing, Bag of Words, Word Cloud, Machine Translation, sentiment analysis	10
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practica 1** Write a Prolog program to implement the Factorial of a given number & Fibonacci of a given number	2
2	**Practica 2** Implement Tree and define the Various predicates in Prolog.	2
3	**Practica 3** Write a Prolog program to perform the following operations of the list, i) To display the element of the given list, ii) To check given element is in the list or not, iii) To print the last element of the list, Iv) To print the sum of the elements of the given list	2
4	**Practica 4** Write a program to implement the Tic-Tac-Toe game problem in Prolog.	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
5	**Practica 5** Breadth-First Search (BFS) & Depth-First Search (DFS) algorithms in Python.	2
6	**Practica 6** Implement Hill Climbing & Best First Search algorithm in Python.	2
7	**Practica 7** Implement Best First Search algorithm in Python.	2
8	**Practica 8** Implement A* Search algorithms in Python.	2
9	**Practica 9** Implement the MiniMax algorithm for game playing in Python.	2
10	**Practica 10** Apply probabilistic reasoning with Python, including Bayesian Networks and Fuzzy Logic	2
11	**Practica 11** Implement Library for visual representations of text data in Python.	2
12	**Practica 12** Process and analyse text data in Python.	2
13	**Practica 13** Preform Sentiment Analysis using Pre-trained Model in Python.	2
14	**Practica 14** Develop an NLP application in Python.	2
Total Hours		**28**

Textbook :

1 "Artificial Intelligence: A Modern Approach" , Stuart Russell and Peter Norvig, Pearson, 2016

References:

1 “Artificial Intelligence” , “Artificial Intelligence” , Elaine Rich and Kevin Knigh, Tata Mcgraw-Hill, -

2 “Artificial Intelligence and Expert System”, “Artificial Intelligence and Expert System”, D.W. Patterson, Prentice-Hall Of India Pvt. Limited, 1990

3 “Introduction to Prolog Programming” , “Introduction to Prolog Programming” , Carl Townsend, BPB Publications, 1988

4 “PROLOG Programming For Artificial Intelligence”, “PROLOG Programming For Artificial Intelligence”, Ivan Bratko, Wesley, 1986

5 “Programming with PROLOG” , “Programming with PROLOG” , Klocksin and Mellish, Springer Berlin Heidelberg, 2003

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**
30.00	30.00	10.00	20.00	10.00	0.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1. https://www.edx.org/course/cs50s-introduction-to-artificial-intelligence□with-python
2. https://www.coursera.org/learn/ai-for-everyone
3. https://www.journals.elsevier.com/artificial-intelligence
4. https://www.springer.com/journal/10994
5. https://dl.acm.org/journal/tist

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