FACULTY OF COMPUTER APPLICATIONS
Bachelor of Science in Information Technology (B.Sc.(IT))

- **Sem.** : 5
- **Subject Code** : 05BS0504
- **Subject** : Artificial Intelligence
- **Course Objectives** :

1. To provide an overview of the basic concepts and principles of AI and its historical development.
2. To understand problem and problem space.
3. To develop problem-solving skills related to AI through the application of search algorithms, heuristics, and optimization techniques.
4. To understand knowledge representation, its issues and usage of predicate logic.
5. To provide an introduction to the fundamentals of Natural Language Processing (NLP) and various learning techniques.

- **Prerequisites** : NIL

Unit No	Topics Covered	No of lectures required
1	Introduction to AI The AI Problems, The Underlying Assumptions, AI Technique, The Level of the Model, Success Criteria	6
2	Problems, Problem Spaces and Search Defining problem as a state space search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in Design of Search Programs	12
3	Heuristic Search Techniques Generate-and-Test, Hill Climbing, Best-first Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis	12
4	Knowledge Representation Issues and Predicate Logic Representations and Mappings, Approaches to knowledge Representation, Issues in Knowledge Representations, The Frame Problem, Representing	12

	Simple Facts in Logic, Representing instances and ISA relationships, Computable Functions and Predicates, Resolution, Natural Deduction	
5	NLP and Learning Introduction to NLP, Syntactic Processing, Semantic Analysis, What is Learning?, Rote Learning, Learning by Taking Advice, Learning in Problem-Solving, Learning from Examples : Induction	**8**

Course Outcomes: (Students will be able)

1. To understand principles of AI
2. To understand problem and problem spaces.
3. To apply problem-solving skills related to AI.
4. To understand how to represent knowledge and will be able to use predicate logic.
5. To understand the fundamentals of Natural Language Processing (NLP) and various learning techniques.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H					H	H	
CO2	L	H	M		M	M	H	H
CO3	L	H	H		M	H	H	H
CO4	L	H	H	M	M	H	H	H
CO5	H	M	L	L	M	H	H	H

Text Book :

1. Rich, E., Knight, K. and Nair, S.B. (2008) Artificial Intelligence. Third Edition, Tata McGraw-Hill Publ. Co. Ltd., New Delhi.

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Reference Books :

1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig
2. "Introduction to Artificial Intelligence and Expert Systems" by Dan W. Patterson
3. "Artificial Intelligence and Ethics: An Introduction" by Keith Frankish and Josh Weisberg
4. "Human Compatible: Artificial Intelligence and the Problem of Control" by Stuart Russell

Web References :

1. https://nptel.ac.in/courses/106/105/106105077/
2. http://www.journals.elsevier.com/artificial-intelligence/

App References :

1. Learn Artificial Intelligence – Epic Code Studio
2. Artificial Intelligence – AFS Square Pvt Ltd
3. MethdAI – The AI Learning App - MethdAI

Syllabus Coverage from text / reference book & web / app reference:

Unit #	Chapter Numbers
1	Chapter 1 : 1.1, 1.2, 1.3, 1.4, 1.5
2	Chapter 2 : 2.1, 2.2, 2.3, 2.4, 2.5
3	Chapter 3 : 3.1, 3.2, 3.3, 3.4, 3.5, 3.6
4	Chapter 4 : 4.1, 4.2, 4.3, 4.4 Chapter 5 : 5.1, 5.2, 5.3, 5.4, 5.5
5	Chapter 15 : 15.1 , 15.2, 15.3 Chapter 17 : 17.1, 17.2, 17.3, 17.4, 17.5

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PRACTICALS

Sr No.	List of Practicals
1	Write a program to implement Tic-Tac-Toe game problem.
2	Write a program to implement BFS (for 8 puzzle problem or Water Jug problem or any AI search problem) .
3	Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)
4	Write a program to implement Single Player Game (Using any Heuristic Function) 5.
5	Write a program to Implement A* Algorithm.
6	Write a program to implement mini-max algorithm for any game development.
7	Assume given a set of facts of the form father(name1,name2) (name1 is the father of name2).
8	Define a predicate brother(X,Y) which holds iff X and Y are brothers. Define a predicate cousin(X,Y) which holds iff X and Y are cousins. Define a predicate grandson(X,Y) which holds iff X is a grandson of Y. Define a predicate descendent(X,Y) which holds iff X is a descendent of Y. Consider the following genealogical tree: father(a,b). father(a,c). father(b,d). father(b,e). father(c,f). Say which answers, and in which order, are generated by your definitions for the following queries in Prolog: ?- brother(X,Y). ?- cousin(X,Y). ?- grandson(X,Y). ?- descendent(X,Y).
9	Write a program to solve Tower of Hanoi problem using Prolog.
10	Write a program to solve N-Queens problem using Prolog.
11	Write a program to solve 8 puzzle problem using Prolog.
12	Write a program to solve travelling salesman problem using Prolog