CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2020-21

Programme: **Bachelor of Engineering (Information Technology)**

Semester: **V**

Course Code: **102044503**

Course Title: **Artificial Intelligence**

Course Group: **Professional Elective Course**

Course Objectives: The concepts of artificial intelligence have been in focus since the inception of modern computers. The advancements in computing technologies have further stressed on the use of AI concepts in many real world problems. This course will aim to provide fundamental knowledge in basic domains of AI like search, knowledge representation and inference, game playing, planning, Natural Language processing and genetic algorithms. The course will also focus on study and use of logic programming for solving AI problems.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	40 / 14	60 / 21	20 / 07	30 / 10	150 / 52

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction, Problems and Search:** Introduction to Artificial Intelligence, Applications of AI Problems, Problem Spaces and Search: Problem as state space search, Production systems, Problem Characteristics	4
2	**Heuristic Search Techniques:** What is heuristics? Hill Climbing, Best First Search and A*, Problem Reduction and AO*, Constraint Satisfaction, Means-Ends Analysis	7
3	**Game Playing and Planning:** Game Playing: Overview, Minimax Search, Pruning through Alpha-beta cut-offs, Iterative deepening Planning: The Blocks World, Components of a Planning System, Goal Stack Planning	6

4	**Knowledge representation and Inference:** Propositional logic, Using Predicate Logic: Representing facts, Inference methods – Resolution, Forward Reasoning, Backward Reasoning Reasoning under uncertainty: Probability and Bayes' Theorem, Bayesian Networks, Introduction to Fuzzy Logic	11
5	**Natural Language Processing:** Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Spell Checking	4
6	**Genetic Algorithms:** Introduction to Genetic Algorithms (GAs), Genetic Operators, Termination Parameters, Applications.	4
7	**Logic Programming:** Programming languages in AI: Prolog, LISP, Python Prolog: Knowledge representation through facts and rules, Variables, Control structures and Operators, Matching, Backtracking, Recursion, List, Working with demo problems	4
	Total	**40**

List of Practicals / Tutorials:

1	Working with Prolog.
2	Study of recursion in Prolog. Solving Tower of Hanoi Problem using Prolog or Python.
3	Implement 'Monkey-banana Problem' using Prolog.
4	Study of List in Prolog. Implement programs of finding member of list, length of list, insert element, delete element, union, etc.
5	Implementation of Best first search or A* for solving AI problem (8-puzzle or Water Jug or other)
6	Implement a program to solve N-Queens problem using Prolog.
7	Solving Travelling Salesman Problem using Prolog or Python.
8	Solving Cryptarithmetic problem using Prolog or Python.
9	Implement Tic-Tac-Toe game using Min Max algorithm.
10	Use of Genetic algorithm for a given search and optimization problem. (De Jong's function, Rastrigin function, etc.)
11	Implement text tokenization using python.
12	Case Study: Study of any AI system or real-time application.

Reference Books:

1	Elaine Rich, Kevin Knight and Shivashankar B Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill
2	Stuart J Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson
3	Vinod Chandra S.S. and Anand Harindran S., "Artificial Intelligence and Machine learning", PHI
4	Denis Rothman, "Artificial Intelligence", Example. By, Packt
5	Ivan Bratko, PROLOG Programming For Artificial Intelligence", Pearson Education
6	Nils J Nilsson, "Artificial Intelligence: A new synthesis", The Morgan Kaufmann Series in Artificial Intelligence

Supplementary learning Material:	
1	NPTEL-SwayamCourses:https://nptel.ac.in/courses/106105077 https://onlinecourses.nptel.ac.in/noc22_cs56/preview
2	Coursera courses: AI For Everyone, IBM Applied AI, AI Foundations for Everyone, Introduction to Artificial Intelligence (AI)

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Projects

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
15%	25%	25%	15%	15%	5 %	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand and apply the search techniques for solving real world problems	**45**
CO-2	Learn and use various knowledge representation and reasoning methods.	**15**
CO-3	Study and use of AI in game playing, planning and NLP.	**25**
CO-4	Apply of genetic algorithms in search and optimization tasks	**15**
CO-5	Develop solution of AI problems with by using logic programming.	

Curriculum Revision:	
Version:	1.0
Drafted on (Month-Year):	June-2020
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2025